Brief Physician Advice for Heavy Drinking College Students: A Randomized Controlled Trial in College Health Clinics*

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ABSTRACT. Objective: The aim of this study was to test the efficacy of brief physician advice in reducing alcohol use and related harm in college students. **Method:** The College Health Intervention Projects (CHIPs) is a randomized, controlled clinical trial with 12-month follow-up conducted in five college health clinics in Wisconsin; Washington state; and Vancouver, Canada. Of the 12,900 students screened for high-risk drinking, 484 men and 502 women met inclusion criteria and were randomized into a control (n = 493) or intervention (n = 493) group. Ninety-six percent of students participated in the follow-up procedures. The intervention consisted of two 15-minute counseling visits and two follow-up phone calls, and used motivational interviewing, contracting, diary cards, and take-home exercises. **Results:** No significant differences were found between groups at baseline on alcohol use, age, socioeconomic or smoking status, rates of depression, or measures of alcohol-related harm. At 12 months, the experimental subjects reduced their 28-day drinking totals by 27.2%, and the control group reduced their totals by 21%. A mixed effects repeated measures model found a statistical difference in favor of the brief-intervention group (β = 4.7, SE = 2.0, p = .018) in 28-day drinking totals. The total Rutgers Alcohol Problem Index score was also significantly different during the 12-month follow-up period (β = 0.8, SE = 0.4, p = .033). There was no difference on the other outcome measures of interest, such as frequency of excessive heavy drinking, health care utilization, injuries, drunk driving, depression, or tobacco use. **Conclusions:** The study supports resource allocation and implementation of alcohol screening and brief physician advice in primary care–based college health clinics. (*J. Stud. Alcohol Drugs, 71,* 23-31, 2010)

ALCOHOL-USE DISORDERS are an important public health concern in the college population (Task Force of the National Advisory Council on Alcohol Abuse and Alcoholism, 2002a, 2002b). Heavy alcohol use in young people is associated with an increased risk for social, academic, and health problems, including unintended injuries, assault, and death (Abby, 2002; Cooper, 2002; Giancola, 2002; Hingson et al., 2002; Perkins, 2002). A survey of the drinking behaviors of the college population found that frequent heavy episodic drinking was associated with a 7- to10-fold rise in risky behavior, including unprotected and unplanned sexual intercourse, driving while intoxicated, and aggressive behavior, compared with the non-heavy episodic drinking cohort (Marlatt et al., 1998).

Alcohol misuse also affects the nondrinking student. In an environment where heavy episodic drinking is common, the nondrinking student is exposed to a higher likelihood of violence and physical and sexual abuse compared with a low heavy episodic drinking campus (Wechsler et al., 2002). Among college students ages 18-24, alcohol-related unintentional injury deaths increased by 6% from 1998 to 2001 (Hingson et al., 2002). These sobering facts had led to a national push to decrease episodic heavy drinking behavior by 20% by 2010 (Healthy People, 2010).

One promising method that may reduce rates of heavy alcohol use and alcohol-related harm on college campuses is physician-delivered brief counseling sessions. These clinically based interventions include assessment and direct feedback, contracting and goal setting, behavioral-modification techniques, and the use of written materials such as self-help manuals (Fleming, 1999; Zgierska and Fleming, 2009). These interventions are based on motivational interviewing (Miller, 1983), physician-directed advice (Fleming, 1999), cognitive behavioral therapy, and general education strategies (Larimer and Cronce, 2002). A number of meta-analyses conducted in the last 5 years have demonstrated that brief advice from physicians that is delivered in health care

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settings can reduce alcohol use, harm, mortality, and costs (Bertholet et al., 2005; Cuijpers et al., 2004; Whitlock et al., 2004). However, there is limited information on the efficacy of brief physician advice in young people, especially college students.

Grossberg et al. (2004) demonstrated significant reductions in alcohol use and alcohol-related harm in 225 adults ages 18-25 seen in primary care settings. However, fewer than 2% of this sample were college students. Monti et al. (1999) conducted a trial in an emergency department setting with 89 underage drinkers ages 18-19 and demonstrated a reduction in alcohol-related harm. One of the limitations of the trial was the use of a counselor to conduct the intervention rather than a member of the emergency department staff. Dimeff (1997) conducted a small pilot program in a college health clinic with 41 students but used a counselor to deliver the intervention. Schaus et al. (2009) recently reported a positive physician-delivered brief-intervention trial in a college health clinic in Florida. Reviews by Larimer and Cronce (2002, 2007) and Carey et al. (2007) provided a comprehensive summary of recent studies testing individual-directed therapy among college students and provided support for the use of brief counseling strategies on college campuses. However, none of the previous trials discussed in this review, with the exception of the recent trial by Schaus et al. (2009), was carried out in the context of a routine primary care visit and delivered by the student's primary care provider.

This report of the College Health Intervention Projects (CHIPs) presents the results of the largest brief alcohol trial conducted to date with high-risk college students seeking routine primary care. This randomized, controlled trial reports 1-year outcome data on a sample of 986 students randomized to either "usual care" or brief intervention delivered by a primary care provider. The study also provides new information on changes in alcohol-related harm and comorbid conditions.

Method

Protocol

Physician/clinic site recruitment. Five college health services and their clinical staffs agreed to participate in the trial. The five sites included the University of Wisconsin-Madison, University of Wisconsin-Oshkosh, University of Wisconsin-Stevens Point, University of Washington-Seattle, and University of British Columbia-Vancouver. Thirteen physicians, three nurse practitioners, and one physician assistant were recruited and trained to deliver the brief intervention. Physicians conducted 91% of the interventions. The providers had a mean age of 45 and an average of 15 years in practice. All physicians were board-eligible or board-certified in family medicine, pediatrics, or internal medicine.

Study population. All college students 18 years of age and older were asked to complete a health screening survey (Fleming and Barry, 1991) as they arrived for regularly scheduled appointments to see their primary care clinicians. One of the sites conducted the initial screening in a college health class (University of Wisconsin-Stevens Point). Although the group that completed the health screening survey in a health class (n = 1,294) was slightly younger than the students recruited in the primary care clinics (n = 11,706), there were no differences by gender, the baseline frequency of high-risk drinking, or alcohol use at the 6- and 12-month follow-ups. In addition, although a prior visit to the clinic was not required, more than 90% of the students who completed the health screening survey during the health class had at least one visit to the student health clinic.

The rate of patient refusal varied by clinic, with more than 85% of students completing the health screening survey. All patients who screened positive for high-risk drinking and who had signed a consent form were contacted by telephone by one of the CHIPs researchers and invited to participate in a face-to-face interview to determine their eligibility for the trial. The characteristics of the sample by group assignment are reported in Table 1.

Inclusion/exclusion criteria for entry into trial. The minimum drinking criteria for entry into the trial were more than 50 drinks or 8 or more heavy drinking episodes (5 or more standard 14-g drinks) in the previous 28 days for male students and more than 40 drinks or 6 or more heavy drinking episodes (4 or more standard 14-g drinks) in the previous 28 days for female students. The Timeline Followback procedure was used in the baseline interview to assess daily alcohol use in the previous 28 days. Patients were excluded from the trial if they were pregnant, younger than age 18, had attended an alcohol-treatment program in the previous year, reported symptoms of alcohol withdrawal in the last 12 months, received advice from their physician in the previous 3 months to change their alcohol use, drank more than 200 drinks in the previous 28 days, or reported symptoms of suicide. Students were paid a total of $200 if they completed the required procedures. Written informed consent was obtained at the time of the face-to-face interview. The research protocol was reviewed and approved by the University of Wisconsin, University of Washington, and University of British Columbia Human Subjects Committees.

Intervention protocol. The brief-intervention manual consisted of 24 intervention strategies designed to change behavior. These sections included feedback regarding current health behaviors obtained at the time of the baseline interview, a review of the prevalence of high-risk drinking among college students, a list of alcohol's adverse consequences relevant to college students, lists of personal likes and dislikes of drinking, worksheets on drinking cues, a blood alcohol level calculator, life goals and alcohol effects, agreement in the form of a prescription, and drinking diary cards. (The full manual is available at: www.fammed.wisc.edu/files/webfm-uploads/documents/research/workbook_chips_v6.pdf.)

TABLE 1. Sample characteristics of CHIPs subjects (n = 986)

Variable	Experimental (n = 493)	Control (n = 493)	p
Male, %	49.5	48.7	.799
Non-Hispanic White, %	89.5	91.9	.189
Age, in years, *M* (*SD*)	21.0 (2.2)	20.8 (2.3)	.281
Year in school, %			
Freshman	17.4	21.3	.051
Sophomore	15.0	18.3	
Junior	25.6	18.5	
Senior	26.2	25.0	
Graduate student	15.8	17.0	
Tobacco use, past 30 days, %	45.8	46.0	.949
University, %			
University of Wisconsin-Madison	42.0	42.0	1.000
University of Wisconsin-Oshkosh	25.4	25.4	
University of Wisconsin-Stevens Point	10.1	10.1	
University of Washington-Seattle	12.8	12.8	
University of British Columbia-Vancouver	9.7	9.7	
Living location, %			
On campus	38.7	38.3	.896
Off campus	61.3	61.7	
Most common drinking location, %			
Bar	35.1	34.1	.692
Dormitory	10.6	12.4	
Fraternity/sorority	6.5	4.9	
House/apartment	42.8	44.2	
Other	5.1	4.5	
Accident or injury, past 6 months, %	41.4	44.0	.403
Hospitalized, past 6 months, %	3.0	2.0	.311
Emergency department visit, past 6 months, %	18.7	17.4	.619
Urgent care visit, past 6 months, %	12.0	15.4	.115
Transport to detox, lifetime, %	3.7	3.8	.867
Sensation seeking score, *M* (*SD*)	3.4 (0.6)	3.5 (0.6)	.366
Depression score, *M* (*SD*)	2.3 (2.6)	2.5 (2.5)	.203

Note: CHIPs = College Health Intervention Projects.

The intervention was based on protocols developed by the principal investigator for previous brief-intervention trials (Fleming et al., 1997, 1999, 2008). Two 15-minute visits with the physician were scheduled 1 month apart (brief-intervention and reinforcement session). Each patient received a follow-up phone call or email from the primary care interventionist at 2 weeks after the first visit and 1 month after the second visit.

Outcome variables. The primary outcome variables of interest were changes in alcohol use (i.e., previous 28 days of use, heavy episodic drinking, and reduction in the frequency of heavy drinking), health care utilization (i.e., hospital days, urgent care visits, detoxification events, emergency department visits), the 23-question Rutgers Alcohol Problem Index (RAPI; White and Labouvie, 1989), and health status measures (i.e., smoking, violence, depression, accidents, injuries). The variables were selected a priori and based on the findings of previous trials conducted among college students (Larimer and Cronce, 2007; Marlatt et al., 1998).

Research procedures. All college students seeking routine care who were 18 years and older with regularly scheduled appointments were asked by the receptionist or a research staff to complete the health screening survey in the clinic waiting area. The health screening survey was designed as a general lifestyle questionnaire to increase student acceptance of the research procedures and to minimize the intervention effect of the alcohol questions. The health screening survey contained four sets of parallel questions on exercise, smoking, weight, and alcohol use. Subjects who screened positive for high-risk drinking, and who consented, were contacted by telephone within 2 weeks of completing the screening questionnaire and were invited to participate in a research interview.

The face-to-face, 30- to 45-minute research interview took place in each college health center and was conducted by one of the CHIPs research staff. This baseline assessment interview included a 28-day Timeline Followback procedure, the number of episodes of heavy drinking in the past 28 days using Timeline Followback procedures, the number of weeks of abstinence in the past 3 months, symptoms of alcohol withdrawal (lifetime and previous year), and treatment for alcohol problems (lifetime and previous year). Additional questions included the frequency of injuries, emergency department visits, and overnight hospital stays.

Subjects assigned to the control group received a health booklet on general health issues and participated in follow-

up phone calls at 6 and 12 months. Clinicians were instructed to address any health concerns in their usual manner. Patients in the experimental group were given the same booklet and were scheduled to see a primary care clinician.

Primary care clinicians were trained to administer the intervention protocol through role playing and general skill-training techniques in full-day workshops delivered at each of the five college health clinics. The clinicians also received additional training in the form of booster sessions within 1 month of their first scheduled brief intervention. Physicians were asked to complete a form following each intervention visit to document that patients had received the protocol and had agreed to reduce their alcohol use. Follow-up procedures included a telephone interview at 6 and 12 months by one of the researchers not assigned to the students' clinic. Researchers were blinded to group status. Tracking procedures used to ensure high rates of follow-up included obtaining multiple contact telephone numbers and email addresses at each interview, use of Facebook (www.facebook.com) and MySpace (www.myspace.com), and asking for names and phone numbers of friends and family members to locate subjects, if necessary.

Analysis. All data were entered into an Oracle database (Oracle Corporation, Redwood Shores, CA) maintained by the University of Wisconsin-Madison, Department of Biostatistics. Baseline interview information was entered via Scantron forms (Scantron Corporation, Eagan, MN). The telephone follow-up interview data were double-entered by research staff. Tracking systems were in place to ensure timely follow-up interviews as close to 6 and 12 months as possible. Data cleaning was performed using programs developed by the project's data analyst. Statistical analyses of the data were conducted to investigate alcohol consumption and alcohol-related harm among study participants. Chi-square tests determined statistical significance between groups for gender and tobacco use. *T* tests were employed to compare group differences in age and depression. The Beck Depression Inventory for Primary Care was used to quantify depression (Beck et al., 1997).

A mixed effects repeated measures analysis of covariance was used to assess the primary outcomes of interest—namely, changes in alcohol use and RAPI score. The analysis modeled the intervention effect on the follow-up measures (6- and 12-month outcomes) using the subject's baseline measure as a random covariate. We also used an indicator of gender to adjust for treatment effect differences between men and women. All analyses were performed on an intention-to-treat basis. Observations with a single follow-up point missing (at either 6 or 12 months) were imputed with the available follow-up. Data for subjects who were lost to follow-up at both 6 and 12 months (4.3% of sample) were imputed using baseline values.

Secondary outcomes of interest such as health care utilization, injuries, tobacco use, and depression were compared at 6 and 12 months using Mantel-Haenszel chi-square tests, controlling for baseline measures. We reported changes in health care utilization (see Table 5) to illustrate the data and changes from baseline to 12 months. We did not find any significant changes in the other secondary outcomes of interest and did not report these findings in the Results section.

Assignment

The unit of randomization was the individual student. Randomization of subjects to the experimental and control groups was carried out separately for men and women in each college health clinic using a computer-generated allocation method. Each clinician had both control and experimental patients in his or her practice with no identifiers available to recognize controls. The goal of the trial was to have 30-40 control patients and 30-40 experimental patients for each clinician in the study.

Masking (blinding)

One of the goals of the trial was to blind subjects assigned to the control groups to minimize the intervention effect of the research procedures. The subjects randomized into the control group were told the trial focused on a number of health behaviors, including alcohol. All research procedures, including the follow-up student interviews, contained parallel questions on smoking, exercise, weight, and alcohol use. The physicians and their staffs were not told which of their patients were randomized into the control group.

Participant flow and follow-up

A total of 12,900 subjects from five clinics completed the health screening survey. Of those 4,512 subjects (35%) screened positive for at-risk drinking (>14 drinks/week for men, >11 drinks/week for women, >5 drinks more than four times in the previous 28 days, and/or two or more positive answers to the CAGE questions); 2,751 consented to further participation in the study and provided their name and contact information. The 1,761 students who did not provide any contact information were not statistically different on age, gender, or frequency of high-risk drinking from those who consented to further participation in the trial.

These 2,751 students were contacted by phone and/or email and invited to participate in a 40-minute face-to-face interview to determine eligibility for the trial. We were unable to reach 487 students using the information provided by the student. Another 174 failed to show up for their appointments. All students were contacted at least five times by phone and/or email. A total of 2,090 students participated in the 40-minute baseline interview. The interview was conducted at the student health clinic for each site.

Of the 2,751 students invited to participate, 661 declined to participate in the baseline interview; 2,090 participated

in the baseline interview with 493 subjects randomized to the experimental group and 493 to the control group; 1,044 were using alcohol below our entry criteria (28-day calendar method), 8 had reported suicide ideation, 22 appeared to be alcohol dependent, 24 had participated in formal alcohol counseling in the last year, and 6 declined to participate in the trial. Nine hundred eighty-six subjects met all inclusion criteria and were randomized into the experimental group (n = 493) or usual-care control group (n = 493).

Eighty-eight percent (n = 435) of the subjects completed the four-part intervention protocol. Eight percent (n = 37) received only one physician visit, and 4% (n = 21) of the students randomized to the experimental group failed to keep their appointment with the physician and did not receive the physician intervention. These subjects were scheduled at least five times by the researchers. Primary reasons given by these patients for not following through with the scheduled intervention included lack of time, family illness, academic workload, and inability to take time off from part-time jobs. This group was not statistically different at baseline from the persons who completed the intervention regarding age, gender, alcohol use, health services use, employment status, marital status, education, or frequency of mental illness.

All persons initially randomized to the intervention group (n = 493) remained in this group for the analysis. This included the 20 students who did not receive the brief-intervention protocol. Of the 986 subjects enrolled in the trial, 96% (n = 945) completed the 6- and/or 12-month follow-up interview with 868 (88%) completing both the 6- and 12-month follow-up procedures. Of the 41 students who did not provide 6- and/or 12-month follow-up data, 16 students in the experimental group and 4 in the control group refused to provide follow-up data. The remaining 21 students were either lost to follow-up or said they did not have time to complete the study. A number of students in the study were abroad or off campus at the time of the follow-up interviews.

Results

Patient characteristics

Minimal differences were found between the experimental and control groups on a number of potential confounding variables (see Table 1). The sample consisted of 484 men and 502 women with a mean age of 21. The students were equally distributed across years in school, with the largest group being graduating seniors. Forty-six percent (n = 455) of the total sample reported tobacco use at the time of randomization. The most common drinking location was apartment or house parties (43%, n = 423), with bars (35%, n = 345) being a close second. Adverse health events were common, with 42.9% (n = 423) reporting an accident or injury and 18% (n = 177) reporting an emergency department visit in the past 6 months. Thirty-six students reported admission to a local alcohol detoxification program for withdrawal or intoxication. Table 1 suggests that random assignment procedures equally distributed known confounders across groups.

Table 2. A comparison the mean number of drinks in the past 28 days at baseline and 6- and 12-month follow-up

Variable	Experimental (n = 493)	Control (n = 493)	p
Baseline, M (SD)	71.0 (35.4)	69.2 (31.9)	.421
6 months, M (SD)	52.9 (42.5)	57.2 (39.6)	
12 months, M (SD)	51.7 (40.1)	54.7 (40.3)	.018[a]
% Change, baseline to 12 months	27.2%	21.0%	

[a]Mixed effects repeated measures model found a β = 4.7, SE = 2.0, and p = .018

Alcohol-use outcome measures. The major alcohol-use outcome variables used in this analysis were average number of standard drinks in the previous 28 days, number of episodes of episodic heavy drinking, and days of drinking. As shown in Tables 2-4, there were large decreases in alcohol use in both groups between the time of the baseline interview and the 6- and 12-month follow-up telephone interviews.

Table 2 reports changes in mean number of drinking days. As noted, the experimental group was drinking, on average, 71.0 drinks, and the control group was drinking 69.2 drinks in the previous 28 days at baseline. The experimental group reduced their alcohol use by 27.2% (71.0 to 51.7 drinks) and the control by 21.0% (69.2 to 54.7 drinks) at the 12-month follow-up. A mixed effects repeated measures analysis of covariance found significant differences in alcohol use in favor of the experimental group (p = .018) during the follow-up period.

Table 3 reports changes in days of heavy drinking, defined as four or more drinks for women and five or more drinks for men. As noted, the experimental group reported 7.2 and the control group 7.1 heavy drinking episodes in the previous 28 days. The experimental group reduced the frequency by 26.3% (7.2% to 5.3%) and the control by 23.3% (7.1% to 5.5%) at the 12-month follow-up. There were no significant differences between groups on this alcohol outcome at 12 months.

Table 3. A comparison in the mean number of heavy drinking days (five or more drinks/day for men, four or more for women)

Variable	Experimental (n = 493)	Control (n = 493)	p
Baseline, M (SD)	7.2 (3.7)	7.1 (3.3)	.751
6 months, M (SD)	5.3 (4.2)	5.8 (4.1)	
12 months, M (SD)	5.3 (4.3)	5.5 (3.7)	.148[a]
% Change, baseline to 12 months	26.3%	23.3%	

[a]Mixed effects repeated measures model found a β = 0.4, SE = 0.3, p = .148.

TABLE 4. A comparison of mean number of drinking days in the past 28 days

Variable	Experimental (n = 493)	Control (n = 493)	p
Baseline, *M* (*SD*)	11.7 (5.0)	11.8 (4.9)	.729
6 months, *M* (*SD*)	9.9 (5.8)	10.4 (5.5)	
12 months, *M* (*SD*)	9.9 (5.8)	10.3 (5.5)	.053[a]
% Difference, baseline to 12 months	15.4%	12.6%	

[a]Mixed effects repeated measures model found a β = 0.4, *SE* = 0.2, p = .053

Table 4 reports changes in days of any drinking in the previous 28 days. As noted, the experimental group reported 11.7 and the control group reported 11.8 drinking days. The experimental group reduced the frequency of daily drinking by 15.4% (11.7 to 9.9 days) and the control group by 12.6% (11.8 to 10.3 days) at the 12-month follow-up. The difference was not statistically significant (p = .053).

Health care utilization. Table 5 examines patterns of health care utilization between groups over time. These data are based on student self-reports. As noted in the table, 29.2% of students in the experimental group and 29.6% in the control group reported at least one event, such as an emergency department visit, a hospitalization, an urgent care visit, or a detoxification visit. Both groups showed a similar decrease in health care utilization events over the 12-month follow-up period.

Alcohol-related harm. Table 6 reports the results of the 23-question RAPI score. Total scores were reported. As noted, there were large reductions in scores at all points in both groups, with significantly different reductions in alcohol-related harm in favor of the experimental group (p = .033).

Discussion

The CHIPs study found significant reductions in alcohol use and alcohol-related harm in male and female college students using alcohol at high-risk levels. This is the first large alcohol-screening and brief-intervention trial (n = 986 subjects) conducted in a college health setting where primary care providers delivered the brief counseling protocol. The trial was conducted in five distinct university settings, including two sites located in rural areas of Wisconsin (Stevens Point and Oshkosh), a university located at the Wisconsin state capital (Madison), a large metropolitan area on the West Coast (Seattle), and a Canadian university (University of British Columbia). These diverse settings strengthen the generalizability of the findings.

TABLE 5. A comparison of the percentage of subjects with at least one hospitalization or emergency department visit or urgent care visit or admission to local detoxification unit in the previous 6 months

Variable	Experimental (n = 493)	Control (n = 493)	p
Baseline, %	29.2	29.6	.889
6 months, %	20.1	19.9	.937
12 months, %	18.5	18.3	.934

TABLE 6. A comparison of mean RAPI score between groups at baseline and 6 and 12 months follow-up

Variable	Experimental (n = 493)	Control (n = 493)	p
Baseline, *M* (*SD*)	15.2 (10.4)	15.9 (10.7)	.319
6 months, *M* (*SD*)	9.7 (8.9)	11.0 (9.4)	
12 months, *M* (*SD*)	7.8 (7.5)	9.1 (8.8)	.033[a]

Note: RAPI = Rutgers Alcohol Problem Index.
[a]Mixed effects repeated measures model found a β = 0.8, *SE* = 0.4, p = .033

The CHIPs study adds important new information to the medical literature. Although there have been more than 100 alcohol-screening and brief-intervention trials conducted in a medical setting, there is limited information on the efficacy in primary care–based college health clinics. As in other trials conducted in health care settings (Fleming et al., 1997, 1999, 2008; Schaus et al., 2009; Whitlock et al., 2004), CHIPs found large reductions in alcohol use and harm in control groups. The 20% or more reduction noted in our trial in the no-treatment, usual-care control group has at least three possible explanations, including regression to the mean, the intervention effect of alcohol screening/follow-up, and natural history changes in drinking over time.

In a recent article, Finney (2007) makes a strong case that regression to the mean is to be expected in pretest/post-test substance-abuse trials. Randomization provides equal likelihood of regression to the mean between groups. The potential for a Hawthorne or Assessment effect is reviewed by McCambridge and Day (2007). They provide evidence that simply asking about drinking behavior changes drinking outcomes for 18- to 24-year-old college students. The effect of natural history changes over time is reviewed by Clark (2004), who reports that many adolescents transition out of alcohol-use disorders to abstinence or normative drinking without intervention.

The absence of an effect of the intervention on health care utilization, alcohol-related injuries, and other health outcomes is not surprising because of the infrequency of these individual events. However, as noted in Table 5, nearly 30% of the subjects did report a hospitalization, an emergency department visit, a trip to a detoxification unit, or an urgent care visit. Although the RAPI score did show a significant reduction in the experimental group compared with the control group in self-reported harm, these harder measures may be less affected by brief physician advice. Long-term outcome studies are needed with other measures of harm such as academic performance, trouble in the dormitory, underage drinking tickets, drunken-driving arrests, legal records, and more specific alcohol-related harms.

Another observation that needs further discussion is the smaller effect size found in CHIPs and other studies in

college students compared with other trials. Fleming et al. (1997) reported a 40%-60% reduction in alcohol and health care utilization in Project TrEAT (Trial for Early Alcohol Treatment) among subjects exposed to physician-delivered brief intervention. One explanation is that young people and college students do not respond to brief physician advice as much as people in their 30s and 40s. College students often feel invincible and have had limited exposure to the serious sequelae of alcohol use. In addition, peer pressure and perceived social norms may counter brief physician advice. Brief clinician-delivered interventions may need to be combined with more innovative Web-based or social-norm programs.

What are the clinical and public health implications of the trial? First, systematic alcohol screening of college students coming into clinics for routine care is feasible using a paper-and-pencil questionnaire. Receptionists are able to distribute the questionnaires, and students are willing to provide information on health habits such as exercise, tobacco use, weight concerns, and alcohol. Scoring and recording alcohol-use information does have a cost in terms of use of staff time. Other trials, such as Project TrEAT, have clearly demonstrated the cost-benefit of alcohol screening and brief physician advice in young adults (Grossberg et al., 2004). The notion that college health clinics have a minimal role to play in campus-wide efforts to screen and identify high-risk students as a result of clinic or student resistance is not supported by this study.

Second, primary care providers can be trained to conduct and successfully implement brief alcohol interventions. Most other college alcohol trials have used non–primary care providers such as counselors, research staff, health educators, housing staff, and peers to deliver the brief intervention to high-risk students. Physicians on college campuses often are left out of resource allocation for prevention of alcohol-related harm on college campuses. Although college campuses have successfully implemented clinic-based tobacco-cessation programs, the prevention of alcohol-related harm continues to be relegated to counseling centers and nonclinical settings rather than general medical care settings.

Third, the trial was able to demonstrate reductions in alcohol use and self-reported harm. As noted in Table 6, there were significantly different reductions in harm in favor of the experimental group, with changes in total RAPI scores going from 15.2 at baseline to 7.8 at 12 months. The RAPI (White and Labouvie, 1989) has been widely used as an outcome measure to assess alcohol-related harm in adolescents and college students. The RAPI consists of 23 questions with five possible responses for each item. (The questions begin with, "How many times has this happened to you because you were drinking or because of your drinking in the past year.") Examples of individual items include "caused shame or embarrassment to someone," "passed out or fainted suddenly," "had a bad time," and "had a fight or argument with a friend." Potential responses included none, one to two times, three to five times, more than five times. Like the CHIPs trial, other college drinking trials (Marlatt et al., 1998) reported significant reductions in RAPI scores between groups over the 24-month follow-up period.

Strengths of the trial include state-of-the-art research procedures, a large diverse sample size, recruitment of non-treatment-seeking students attending college health clinics for routine care, primary care providers delivering the intervention, brief-intervention protocols placed within the context of routine office visits, high rate of follow-up with 96% of the sample providing 6- and/or 12-month follow-up data, and use of intention-to-treat procedures and multiple outcomes. Methods used to achieve the high follow-up rates included the use of Facebook and MySpace to find students; obtaining multiple contact information, such as telephone numbers, emails, and family and friend contact information at each follow-up visit; persistent researchers; and robust college databases.

A number of methodological issues should be considered when interpreting the results. Reliance on self-report of alcohol consumption as one of the primary outcome measures is an important consideration. Research conducted by a number of investigators indicates that self-reported alcohol consumption is more reliable than other methods of inquiry or testing (American Psychiatric Association, 1987; Babor et al., 1987; Ewing, 1984). Methods employed in this trial to minimize self-report bias included (a) informing patients that the researchers administering the follow-up interviews were from the University of Wisconsin; (b) reassuring subjects that the information provided to the researchers was confidential; (c) using follow-up questionnaires containing parallel questions regarding weight, exercise, sleeping patterns, alcohol use, and smoking to lessen the impact of the alcohol questions; and (d) using multiple measures of alcohol use.

Another potential limitation of the study included the use a student health class to recruit 10% of the sample. However, because there were no significant differences in age, gender, and prerandomization or postrandomization alcohol use between the groups recruited via a student health class versus those recruited in the student health clinics, the two methods did not appear to introduce selection bias into the sample.

As with all clinical trials, the percentage of potential eligible subjects enrolled in the trial may be suboptimal and could limit the generalizability of the findings. Of the 4,512 students who screened positive on the health screening survey, 22% (986) met all the inclusion/exclusion criteria and consented to participate in the trial. Reasons include varying alcohol use over time (alcohol use varied during the 2-8 weeks that occurred between the time the health screening survey and the face-to-face interview were completed), lack of time to participate in research, and concerns of confidentiality. Although it is reassuring to note that a comparison of the positive sample from the health screening survey (n =

4,512) and the group randomized (n = 986) was not significantly different on age, gender, or reported alcohol use, there may be other potential differences between the students who screened positive and students randomized into the trial.

The CHIPs study supports the widespread implementation of alcohol screening and brief intervention on college campuses, including medical clinics. Indeed, the significant proportions of students attending primary care clinics for routine medical care who have underlying high-risk drinking (34% overall) represent an opportunity to screen and intervene. These clinic visits are "teachable moments" when students present to a clinician for a health concern and can be motivated to modify their alcohol use as part of their treatment plan. Programs need to include training and support of primary providers. Although brief physician advice is not difficult to administer, it does require training and practice in "saying the words," incorporating these issues into seemingly unrelated patient symptoms or reasons for visit, handling student resistance, and maintaining sense of treatment optimism. Primary care clinicians are often skeptical about the efficacy of brief alcohol counseling with students. This trial provides some of the best evidence to date that spending time talking with students about their alcohol use is worth the time, effort, and resources required to do so.

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