

Screening and Brief Intervention for High-Risk College Student Drinkers Results From a 2-Year Follow-Up Assessment

G. Alan Marlatt

Department of Psychology University of Washington

John S. Baer

Department of Psychology University of Washington

Daniel R. Kivlahan

Department of Psychology University of Washington

Linda A. Dimeff

Department of Psychology University of Washington

Mary E. Larimer

Department of Psychology University of Washington

Lori A. Quigley

Department of Psychology University of Washington

Julian M. Somers

Department of Psychology University of Washington

Ellen Williams

Department of Psychology University of Washington

ABSTRACT

This randomized controlled trial evaluated the efficacy of a brief intervention designed to reduce the harmful consequences of heavy drinking among high-risk college students. Students screened for risk while in their senior year of high school (188 women and 160 men) were randomly assigned to receive an individualized motivational brief intervention in their freshman year of college or to a no-treatment control condition. A normative group selected from the entire screening pool provided a natural history comparison. Follow-up assessments over a 2-year period showed significant reductions in both drinking rates and harmful consequences, favoring students receiving the intervention. Although high-risk students continued to experience more alcohol problems than the natural history comparison group over the 2-year period, most showed a decline in problems over time, suggesting a developmental maturational effect.

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Correspondence may be addressed to G. Alan Marlatt, Department of Psychology, University of Washington, Seattle, Washington, 98195-1525.

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From the first comprehensive study ([Straus & Bacon, 1953](#)) to recent national surveys (e.g., [Johnston, O'Malley, & Bachman, 1997](#)), widespread drinking and a variety of associated problems among college students has been amply documented in the literature. In one comprehensive national survey of over 17,000 college students, [Wechsler, Davenport, Dowdall, Moeykens, and Castillo \(1994\)](#) reported that almost half the sample (44% overall; 50% of the men and 39% of the women) engaged in binge drinking, defined as the successive consumption of five or more drinks for men (four or more for women) at least on one occasion during the 2 weeks prior to the survey. Survey results from the study showed that frequent binge drinkers were 7 to 10 times more likely than nonbinge drinkers to engage in unplanned and unprotected sexual intercourse, to get into trouble with campus police, to damage property, to get hurt or injured, or to drive under the influence of alcohol. College student health services report high rates of alcohol-related injuries ([Meilman, Yanofsky, Gaylor, & Turco, 1989](#)), and alcohol-related injury remains a leading cause of death in this population ([McGinnis & Foege, 1993](#)).

Research on the determinants of adolescent college student drinking behavior has identified a number of risk factors that span both individual and socioenvironmental levels of influence ([Boyd, Howard, & Zucker, 1995](#)). In terms of individual risk factors, researchers have investigated the impact of biobehavioral vulnerability, including gender ([Wechsler, Dowdall, Davenport, & Rimm, 1995](#)), family history of alcohol problems ([Sher, 1994](#)), decreased perceived sensitivity to alcohol's intoxicating effects ([Schuckit & Smith, 1996](#)), and personal history of conduct disorder or delinquent behavior ([Jessor, Donovan, & Costa, 1991](#)). Studies of social and environmental determinants reveal that although parental and family factors continue to influence adolescent drinking prior to college, by the time most students arrive on campus, exposure to peers and their normative influence significantly impacts student drinking ([Baer, 1994](#)). Expectancy for alcohol effects, often shaped by peer influence, appears to be a mediating variable in this regard ([Smith & Goldman, 1995](#)).

Although treatment services for students with drinking problems exist on some campuses ([Keller, Bennett, McCrady, Paulus, & Frankenstein, 1994](#)), most college programs focus on prevention as the goal. Primary prevention on college campuses typically includes educational programs designed to increase student awareness of the risks of alcohol problems and to develop alternative recreational activities that do not involve drinking. Primary prevention programs also include community-based programs designed to modify the campus environment as a whole and policy changes that impact alcohol pricing and availability to underage youth or raise the legal drinking age. Overall, the effectiveness of primary or universal prevention programs in reducing harmful drinking appears to be limited ([Moskowitz, 1989](#)).

Secondary prevention programs target students who are already drinking. Previous work in our laboratory has targeted high-risk college students who volunteered to participate in a series of secondary prevention programs conducted at the University of Washington ([Marlatt, Baer, & Larimer, 1995](#)). In the first study ([Kivlahan, Marlatt, Fromme, Coppel, & Williams, 1990](#)), students who were taught moderate drinking skills in a group format showed significant reductions in high-volume drinking at a 1-year follow-up, in comparison with students who received only information about drinking risks or those in an assessment-only control condition. In another study ([Baer et al., 1992](#)), students who drank heavily on campus were randomly assigned to one of three conditions: group training in moderate drinking skills, a self-help manual-only condition (presented as a correspondence course), or a single session of feedback and advice about drinking risks provided individually by a member of our professional staff. Because of compliance problems in the manual-only condition, data from students in this condition were not included in the analysis, however. Two-year follow-up results showed that students in the remaining two conditions significantly reduced their drinking frequency and rate per drinking occasion. Note that the single session of professional advice showed results comparable with those of the more extensive group intervention. This finding is consistent with other studies showing that a brief intervention, including advice given by professionals, can have a significant

impact on reducing alcohol consumption and associated drinking problems in other high-risk populations ([Bien, Miller, & Tonigan, 1993](#) ; [World Health Organization \[WHO\] Brief Intervention Group, 1996](#)).

The primary purpose of the present study was to evaluate the efficacy of a brief intervention designed to reduce harmful consequences associated with alcohol consumption by high-risk college student. Consistent with a harm-reduction approach ([Marlatt, Larimer, Baer, & Quigley, 1993](#)), the emphasis is on preventing or reducing harmful consequences, rather than targeting drinking frequency and quantity per se. The study improves on previous research in a number of respects. Unlike our previous two studies (conducted with volunteers from among heavy drinkers already on campus), recruitment of participants in the present study took place prior to the beginning of the freshman year. Those at highest risk, on the basis of high school drinking, were targeted for secondary prevention. Further, the brief intervention program occurred during the winter of the freshman year, a time of both high-risk and potential receptivity to prevention messages. Participants were randomly assigned to treatment and control conditions. The study is enhanced by the selection of a third group of students, selected from the entire screening pool regardless of risk level, to serve as a longitudinal natural history comparison group.

Method

Procedures Screening.

We mailed a questionnaire in the spring of 1990 to all students who were accepted and had indicated an intention to enroll at the University of Washington the following autumn term (by sending in \$50 deposit), who were matriculating from high school, and who were not over 19 years of age. Each student was offered \$5 and entrance into a prize drawing for return of the questionnaires. Of 4,000 questionnaires sent, 2,179 (54%) completed forms were returned. Of these 2,179, 2,041 students (51% of the total screening sample) provided usable questionnaires and indicated a willingness to be contacted for future research. The screening questionnaire was four pages in length and asked participants to rate their frequency of alcohol consumption, typical quantity of alcohol consumed on weekend evenings, and the most alcohol consumed on one occasion over the past 3 months ([Sobell & Sobell, 1995](#)). The Rutgers Alcohol Problem Inventory (RAPI; [White & Labouvie, 1989](#)) was included as a measure of alcohol-related problems over the previous 3 years.

Sample.

A two-step process was used to acquire participants for the study: sample selection and participant recruitment. From the screening pool, a high-risk sample was selected. Students were considered as high-risk if they (a) reported drinking at least monthly and consuming at least 5—6 drinks on one drinking occasion in the past month or (b) reported the experience of three alcohol-related problems on 3 to 5 occasions in the past 3 years on the RAPI. These selection criteria identified the top quartile 25% of the screening sample ($n = 508$) as high risk.

An additional normative comparison sample was randomly selected from the pool of 2,041 responders ($n = 151$); as this sample was selected to represent normative practices, it included students at all risk levels (including those previously screened as high risk). As a result, 33 individuals of the 151 comparison group sample (22% of the random sample) were also selected as high risk. Data from the comparison sample are not included in comparative statistical analyses in this report but are included in descriptive presentations of the data, as they provide a natural history comparison for the assessment of drinking changes over time.

Baseline recruitment.

On arrival on campus for the fall term, students identified as high risk or selected for the normative comparison group were invited by means of a personal letter to participate in a 4-year longitudinal study of alcohol use and other lifestyle behaviors. Subsequent phone calls were used to assure the receipt of the letter and to respond to questions. Students were asked if they would be willing to be interviewed for approximately 45 min and to fill out questionnaires in return for a \$25 payment. Students in the high-risk group also agreed to be randomly assigned to participate in the intervention program or to the no-treatment control condition. All participants agreed to additional paid follow-up questionnaire assessments and to provide the names and addresses of two collateral reporters who could be called to confirm the drinking practices of participants. Of the 508 high-risk students invited, 366 (72%) were successfully recruited for the intervention study; 115 of 151 (76%) participants in the normative comparison sample were similarly recruited (26 of 33 participants who were selected to be in both high-risk and normative groups were successfully recruited). Comparisons on screening measures using multivariate analysis of variance (MANOVA) and chi-square procedures between students successfully recruited for the project and those not recruited revealed no significant differences in drinking rates (quantity and frequency), alcohol-related problems (RAPI scores), or gender. A description of the characteristics of the final participant sample is provided below.

Baseline and follow-up assessments.

At the baseline assessment (first term in college), all participants completed the Brief Drinker Profile ([Miller & Marlatt, 1984](#)), a structured interview conducted by a program staff member. During this 1-hr interview, informed consent procedures were completed, and structured assessments were administered to measure family history of alcohol problems, history of conduct disorder, and personal drinking history (see below). At the baseline and each follow-up, assessment participants also completed a questionnaire packet containing measures of drinking and drug use, problems associated with alcohol abuse and dependence, and a variety of psychosocial measures (life events, perceived drinking norms, alcohol expectancies, and sexual behavior). Follow-up assessment occurred first at 6 months postbaseline (approximately 3 months postintervention), and then annually each subsequent fall term (1 and 2 years postbaseline).

Collateral assessment.

To both assess and maximize the validity of self-reports of drinking behaviors, two collateral reporters were solicited from each participant to serve as additional data sources; informed consent was obtained from all collaterals. Collaterals were most often a friend of the participant (78% of cases) or a roommate (15%). Most collaterals reported that they had known the participant for several years and saw them daily. After each follow-up assessment, collateral reporters were contacted and asked to complete a brief phone interview for a payment of \$5.

Measures Drinking rates.

At all assessments students rated their typical drinking quantity, frequency, and the single greatest amount of alcohol consumption (peak consumption) over the past month on 6-point scales. For the assessment of drinking frequency, response options and associated labels were 0 (*less than once a month*), 1 (*about once a month*), 2 (*two or three times a month*), 3 (*once or twice a week*), 4 (*three or four times a week*), and 5 (*nearly everyday*). For the assessment of typical drinking quantity and most recent peak consumption, response options and associated labels were 0 (*0 drinks*), 1 (*1–2 drinks*), 2 (*3–4 drinks*), 3 (*5–6 drinks*), 4 (*7–8 drinks*), and 5 (*more than 8 drinks*).

Participants also completed the Daily Drinking Questionnaire (DDQ, [Collins, Parks, & Marlatt, 1985](#)), which asks the respondent to fill in boxes representing each day of the week with the number of drinks they typically consume on that day. From this measure two scores were derived: number of drinking days per week and average drinks per drinking day.

Alcohol-related problems and dependence.

Students completed the RAPI ([White & Labouvie, 1989](#)), rating the frequency of occurrence of 23 items reflecting alcohol's impact on social and health functioning over the past 6 months. Sample items include " *Not able to do homework or study for a test,*" "*Caused shame or embarrassment,*" [cf1]and " *Was told by friend or neighbor to stop or cut down drinking.* " The scale has high reliability and accurately discriminates between clinical and normal samples ([White & Labouvie, 1989](#)). Scores on the RAPI were computed as the number of items occurring at least 1—2 times; scores could range from 0 to 23. Students also completed the Alcohol Dependence Scale (ADS; [Ross, Gavin, & Skinner, 1990](#)), a widely used assessment of severity of physical dependence symptoms (scores on this scale could range from 0 to 47). During the baseline interview, *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., rev.; *DSM—III—R*; [American Psychiatric Association, 1987](#)) diagnostic criteria for alcohol dependence were also rated using the Diagnostic Interview Schedule ([Helzer & Robins, 1988](#)). Each criterion for alcohol dependence from *DSM—III—R* was rated as present or absent by the interviewer. Each participant then received a score reflecting the number of dependence criteria present.

Assessment of family history of drinking problems and conduct disorder.

As part of the structured interview completed at baseline, parental history of drinking problems was assessed using the Family Tree Questionnaire ([Mann, Sobell, Sobell, & Pavan, 1985](#)). Students were classified as family history positive if they reported either natural parent or a sibling as being an alcoholic or problem drinker and reported at least two identifiable problem drinking symptoms for that individual. History of conduct problems was also assessed through interview using questions from the Diagnostic Interview Schedule—Children ([Helzer & Robins, 1988](#)). Fourteen items reflecting common adolescent conduct problems but not alcohol or drug use (i.e., truancy, fighting, stealing, and school misconduct) were coded as present or absent prior to age 18 and summed to form a scale, with $\alpha = .65$. College residence was coded as living off campus, in the dormitory system, or in a fraternity or sorority (Greek house).

Collateral assessment.

Collaterals reported in a brief telephone interview how long they knew the participant (in months and years) and their typical frequency of contact (daily, weekly, monthly, occasionally, or other). Collaterals were then asked to rate the participant's drinking quantity and frequency using two different techniques: first by describing daily drinking on a typical week based on the DDQ; and second by reporting how frequently participants drank at all and their typical drinking quantity over the past 30 days. Collaterals were asked to report on the participant's experience and frequency of alcohol-related problems over the previous 6 months using a short version of the RAPI (based on [Baer & Carney, 1993](#); [White & Labouvie, 1989](#)). Collaterals were also asked to rate how often the participant drank to intoxication and to indicate whether they thought that the student had decreased or increased their drinking over the past year.

Student Feedback

Seven questions requesting program feedback and satisfaction were administered to intervention

participants following the individualized feedback session. Five items were on a Likert-type scale assessing level of agreement or disagreement coded as 1 (*strongly disagree*), 2 (*disagree*), 3 (*uncertain*), 4 (*agree*) and 5 (*strongly agree*). Items assessed agreement with the following statements: "I would recommend this interview to a friend," "the interview was thorough and complete," "the interviewer seemed well-organized," "the interview seemed competent and well-trained," and "the interviewer seemed warm and understanding." The last two items were open-ended format and assessed the parts of the interview the respondent felt were "most useful" and "least useful."

Participants

At screening while in high school, the normative comparison group reported drinking approximately once a month ($M = 1.88$, $SD = 1.04$ on our 6-point scale), consuming 1—2 drinks when drinking ($M = 1.92$, $SD = 1.22$ on our 6-point scale). Description of the high-risk samples members' drinking at the screening (during high school) and the transition into college have been described elsewhere ([Baer, Kivlahan, & Marlatt, 1995](#)).

The fall of the first year in college forms the baseline for the prevention outcome study. Of the 366 high-risk students recruited, 11 were removed prior to randomization because of extreme levels of drinking and drinking problems. These individuals were immediately given our intervention program (described below) and referred for additional treatment. In addition, 7 participants returned questionnaires so late as to miss the randomization. The remaining 348 high-risk students were randomly assigned by computer-generated random numbers to the intervention condition or to the assessment only control condition.

Demographic data and responses to the Brief Drinker Profile are presented in [Table 1](#) for participants in both the high-risk and normative comparison conditions. At baseline, prior to randomization, the sample of high-risk drinkers (188 female and 160 male students) reported drinking about twice a week, consuming almost 11 drinks a week. High-risk participants reported reaching an estimated blood alcohol concentration (BAC) of .12 weekly, .18 on peak episodes. The high-risk sample endorsed almost one and one half *DSM—III—R* alcohol dependence criteria on average. The random comparison group reported drinking once a week, fewer than 6 drinks each week, and lower estimated typical (.08) and episodic (.14) BACs. Few *DSM—III—R* dependence criteria were endorsed by the random comparison group ($M = 0.54$). High-risk students reported an average of 2.49 ($SD = 1.94$) conduct incidents during childhood, although the distribution was predictably skewed. Most high-risk participants reported between 0 and 3 previous conduct incidents (72%). Fifty-three of the high-risk participants (15%) and 20 of the random comparison sample (18%) reported significant drinking problems in at least one first-degree relative (parent or sibling).

Brief Intervention Winter term, first year.

The brief intervention provided in the winter term of the 1st year of college (January—March) was based on our previous research with brief interventions with college students described earlier (see also [Baer et al., 1992](#)) and on principles of motivational interviewing ([Miller & Rollnick, 1991](#)). Students assigned to receive the intervention were contacted to schedule an appointment for the feedback interview (based on the data obtained the previous fall term). Students were provided with alcohol consumption monitoring cards and asked to keep track of their drinking on a daily basis for 2 weeks prior to their scheduled interview.

The interviewers consisted of 2 doctoral-level clinical psychologists, 2 postdoctoral-level clinical psychologists, and 4 advanced graduate students in clinical psychology. Of the 8 interviewers, 4 were women and 4 were men. Interviewers were trained (using a written manual, role play, and piloting) by

John S. Baer, based on the specific protocol to be used for the feedback interviews. A pilot session was conducted and observed, and ongoing supervision supported consistent performance. In the feedback session, the interviewer met individually with students, reviewed their alcohol self-monitoring cards, and gave them concrete individualized feedback about their drinking patterns, risks, and beliefs about alcohol effects. Students' self-reported drinking rates were compared with college averages, and perceived risks for current and future problems (grades, blackouts, and accidents) were identified. Beliefs about real and imagined alcohol effects were addressed through discussions of placebo effects and the nonspecific effects of alcohol on social behavior. Biphasic effects of alcohol (stimulant followed by depressive effects) were described and the students were encouraged to question the assumption that "more alcohol is better." Suggestions for risk reduction were outlined.

Interviewer style was based on techniques of motivational interviewing ([Miller & Rollnick, 1991](#)). Confrontational communications, such as "You have a problem and you are in denial" (thought to create a defensive response) were specifically avoided. In contrast, interviewers simply shared the available evidence with the student, avoiding moralistic judgments and arguments. Interviewers sought to allow students to evaluate their situation and to begin contemplation of the possibility of change. "What do you make of this?" and "Are you surprised?" were common questions raised in an effort to facilitate conversations about risk and the possibility of behavior change. The technique is quite flexible. Issues of high-risk residential setting (life in a fraternity), peer use, prior conduct difficulties, and family history were addressed when applicable. In no circumstance was direct advice provided. Risk factors, such as family history of alcohol problems or conduct disorder, were explored with students to determine their own experience and impressions of risk. Increased risk based on family history of alcohol problems or conduct history was acknowledged, but each student was encouraged to reflect about how that risk might manifest itself in his or her own life.

Motivational techniques assume that college student drinkers are in a natural state of ambivalence and must come to their own conclusions regarding the need to change behavior and reduce risks. Specific goals of behavior change were left to the student and not directed or demanded by the interviewer, thus placing primary responsibility for change with the student. Each student left the interview with a personalized summary feedback sheet (comparing his or her responses with college norms and listing individualized problems and risk factors), along with a generic tips page describing biphasic responses to alcohol, placebo effects, and suggestions for techniques of reduced risk drinking. Students were encouraged to contact project staff if they had any further questions or were interested in any additional services throughout college.

Winter term, second year.

During the winter term of the 2nd year of the study (1 year after the individual feedback interviews) members of the motivational intervention group were mailed graphic personalized feedback pertaining to their reports of drinking at baseline and 6- and 12-month follow-ups. Each feedback sheet contained individualized bar graphs depicting baseline and subsequent levels of drinking quantity, drinking frequency, and alcohol-related problems (RAPI items). On the basis of two variables at the 1-year follow-up, the report of peak drinking experiences and the number of reported alcohol-related problems (RAPI), intervention participants were categorized into four risk categories: low (neither elevated), medium (one elevated), high (both elevated), and extreme (both elevated and RAPI problems greater than 10). In a summary paragraph, each intervention participant was given individualized feedback about his or her level of risk and encouraged to seek assistance if so desired. Participants in the high ($n = 40$) and extreme ($n = 16$) risk categories were also contacted by phone to offer assistance and encouragement to reduce their risks associated with alcohol use. If the student was interested, an additional follow-up interview was scheduled. Attempts to contact by phone and mail were successful in 44 cases (79%), and this procedure resulted in 34 additional motivational interviews (26 by phone, 8 in

person) during the winter and spring of the second year of the study.

Results

Success of Randomization

Several analyses were conducted to test for the success of randomization among high-risk participants between treatment and control conditions. A MANOVA for five measures of drinking rates (6-point scales reflecting quantity, frequency, and peak [Q-F-P] consumption, and average quantity and frequency from the DDQ) and two measures of alcohol-related problems (RAPI and ADS) revealed no significant differences, multivariate $F(7, 325) = 0.88, ns$. None of the seven univariate tests approached statistical significance. Similarly, chi-square analyses for dichotomous measures, including parental history of alcoholism, history of conduct disorder, and eventual residence type, revealed no significant failure of randomization. Prevalence rates of risk factors across the two groups were nearly identical. Participants were randomized separately by gender. There were exactly 78 participants categorized as having a history of conduct problems in each of the two high-risk groups, 66 and 61 individuals living for 2 years in the Greek system in the control and treatment groups, respectively, and 28 and 25 family history positive individuals in the control and treatment groups, respectively.

Longitudinal Attrition

Of 456 participants (combined high-risk and normative groups) at baseline, 403 (88%) provided data at the 2-year follow-up; of these, 379 (83%) provided complete data at both the 1- and 2-year follow-up assessments. Twenty-six participants (6%) dropped out during the first year of the study through nonresponse to assessments mailed in spring and fall of 1991. An additional 27 (6%) failed to respond to the assessment in the fall of 1992. Initial contacts were completed with 168 of the 174 students randomly assigned to receive the preventive program. Because the intervention subsequently involved mailing of feedback to all participants assigned to the motivational interviewing group (including those who were randomly assigned but never received the initial motivational intervention), all randomized participants have been included for statistical analyses (i.e., intent to treat as a basis for group inclusion).

Analyses comparing students who completed all assessments with those who dropped out (both early and late dropouts) revealed no significant differences as a function of sample selection (high-risk vs. normative groups), treatment assignment (treatment vs. control), measures of baseline drinking (quantity and frequency of drinking and alcohol-related problems), or risk factors (parental history of alcoholism and prior conduct problems). Attrition was related, however, to student residence. Those living with their parents during the freshman year dropped out at a higher rate (27%) than others (dormitories, 12%; fraternities, 9%; sororities, 6%; private residence, 6%; $\chi^2(8) = 16.59, p < .04$). This differential attrition is thought to have minimal statistical impact because only 6% of the original study sample lived with their parents the first year.

Statistical comparisons for treatment effects were completed on those high-risk students providing complete data at the 1- and 2-year follow-up: 143 of 174 (82%) in the treatment group, and 156 of 174 (90%) in the no-treatment control group. Failure to respond to specific questions in specific cases results in smaller sample sizes for analyses of different variables. Data from the normative group are presented descriptively for comparative purposes.

Treatment Effects Overview.

The effects of treatment on drinking over time were assessed using multivariate repeated measures

MANOVA. Short-term results (baseline to 6-month follow-up) were analyzed only for drinking patterns and are presented first. Long-term results were then analyzed for all dependent variables using data from three evenly spaced annual assessments (baseline, 1-year, and 2-year follow-ups). Separate analyses of short- and long-term patterns were completed for several reasons. The 6-month follow-up was designed to assess short-term changes. Alcohol dependence patterns were not expected to change immediately after the motivational intervention, and one alcohol problem assessment, the RAPI, required ratings over the previous 6 months. Also, the 6-month follow-up is the only one to take place in spring, and thus may be confounded with seasonal changes in drinking.

For both short- and long-term outcomes, separate repeated measures analyses were completed for sets of related dependent measures (i.e., two groups of measures of drinking rates and one group of measures of drinking problems). For each analysis the between-group factor of treatment assignment was specified. Because of limitations in power, analysis of individual difference factors that might interact with treatment (gender, family history of alcoholism, conduct history, and residence type) were evaluated in separate MANOVAs on a post hoc basis.

Short-term drinking outcomes.

Analyses of self-reports of typical drinking quantity, frequency, and peak consumption (6-point scaled responses) revealed a significant multivariate effect of time, $F(1, 289) = 19.06, p < .000$, and a significant multivariate treatment by time interaction, $F(1, 289) = 7.58, p < .006$. This significant short-term treatment effect at the 6-month follow-up assessment was significant in each of the dependent measures when analyzed separately. In comparison with those in the control condition, those in the treatment group reported drinking less frequently over time, $F(1, 289) = 3.74, p < .054$, less quantity over time, $F(1, 289) = 5.56, p < .019$, and less peak quantity over time, $F(1, 289) = 5.61, p < .019$.

Analysis of responses to the DDQ revealed a similar pattern. Multivariate repeated measures analysis of two scores derived from the DDQ, drinking frequency and average drinks per drinking day, also revealed a significant multivariate effect for time, $F(1, 270) = 12.82, p < .001$, and a significant multivariate Treatment \times Time interaction, $F(1, 270) = 9.36, p < .002$. The Treatment \times Time effect was associated with both average quantity of drinking, $F(1, 270) = 8.10, p < .005$, and drinking frequency estimates, $F(1, 270) = 3.91, p < .049$.

Although statistically significant, the magnitude of these short-term treatment effects on drinking rates was small. To display the effects, we computed a composite index by standardizing and averaging baseline quantity and frequency ratings from both the Q-F-P and DDQ scales based on baseline responses from the normative comparison group. Subsequent follow-up scores were adjusted for variability at the time of assessment (SD set to 1), but subsequent mean responses were corrected from baseline mean scores so that changes in average reporting over time can be observed. [Figure 1](#) displays this composite drinking pattern score for participants in the intervention, control, and normative comparison groups. As can be seen in [Figure 1](#), the initial response to treatment was small, representing a standardized effect size of about .15.

Long-term outcomes.

Means, standard deviations, multivariate F tests, and univariate F tests of developmental trends (time effects) and long-term treatment effects (Treatment \times Time interactions over 2 years) are displayed in [Table 2](#). A number of patterns can be readily seen in [Table 2](#) (and [Figures 1](#) and [2](#)). Drinking and related problems tended to decline over the 2-year period, as reflected in main effects for time. This pattern was evident in most measures of drinking from both multivariate and univariate tests. Second,

those in the experimental treatment condition showed greater reductions in drinking rates and problems than those in the control condition. This pattern was evident as tested directly in Group \times Time interactions, as well as indirectly by the greater magnitude of main effects over time noted within the treatment group.

Analysis of self-reports of typical drinking Q-F-P consumption (6-point scaled responses) revealed a significant multivariate effect of time, $F(2, 289) = 17.24, p < .000$, and a significant multivariate Treatment \times Time interaction, $F(2, 289) = 6.89, p < .001$. This significant long-term treatment effect over the 2-year follow-up period was noted in each of the dependent measures when analyzed separately. In comparison with students in the control condition, those in the treatment group reported drinking less frequently over time, $F(2, 284) = 3.59, p < .029$, less quantity over time, $F(2, 290) = 6.65, p < .001$, and less peak quantity over time, $F(2, 294) = 3.63, p < .028$. The magnitude of these effects are modest; effect sizes ranged from .14 to .20. For example, on our 6-point scale for peak drinking quantity during the past month, at the 2-year follow-up, 70% of participants in the treatment group reported drinking as many as 5—6 drinks on one occasion, in comparison with 78% for those in the control group. In comparison, 42% of the normative comparison group reported drinking at this level during the previous month at the 2-year follow-up.

Multivariate repeated measures analysis of two scores derived from the DDQ, drinking frequency, and average drinks per drinking day (see [Table 2](#)), revealed a significant multivariate effect for time, $F(2, 280) = 9.83, p < .000$, and a significant multivariate Treatment \times Time interaction, $F(2, 280) = 4.16, p < .017$. A significant interaction among treatment, time, and drinking pattern dimensions, that is, quantity and frequency, $F(2, 280) = 3.42, p < .03$, indicated that the Treatment \times Time effect was differentially associated with average quantity of drinking, $F(2, 280) = 4.59, p < .011$. Analysis of drinking frequency estimates from the DDQ did not reveal Treatment \times Time effects, $F(2, 280) = 1.05, ns$. Again, the magnitude of the treatment effects was modest; effect size for the drinking quantity analysis was .15. At the 2-year follow-up those in the treatment group reported, on average, drinking 3.6 ($SD = 2.5$) drinks per drinking occasion, whereas those in the control condition reported drinking 4.0 ($SD = 2.8$) drinks per occasion. Participants in the normative control group reported drinking 2.19 ($SD = 2.46$) drinks per drinking occasion on the DDQ at the 2-year assessment. The pattern of drinking rate reduction can also be noted in [Figure 1](#), where z scores based on baseline responses for the normative comparison group are displayed over time. At the 2-year follow-up, students in the control condition were more than 0.72 standard deviations above the comparison group; those in the treatment condition remained 0.57 standard deviations above the comparison group.

Analysis of alcohol-related problems revealed similar significant effects favoring those receiving the brief intervention. Mean values for these variables are also listed in [Table 2](#). A multivariate repeated measures MANOVA for these two measures of alcohol-related problems (RAPI and ADS) revealed a significant multivariate effect of time, $F(2, 297) = 49.82, p < .000$, and a significant multivariate Treatment \times Time interaction, $F(2, 297) = 3.89, p < .021$. Treatment \times Time effects were noted when examining each of the two different scales: ADS $F(2, 297) = 2.83, p < .060$, and RAPI $F(2, 298) = 2.35, p < .097$. The magnitude of treatment effects for alcohol related problems was larger than those noted among drinking rate measures. For example, using the RAPI, 2 years after having completed the motivational interview in their Freshman year, treatment participants reported on average 3.3 ($SD = 3.5$) problems (in the previous 6 months), in comparison with 4.7 ($SD = 4.4$) problems for the high-risk control group. This represents a standardized effect size of .32. In comparison, the normative control group reported an average 2.4 problems on the RAPI at the 2-year assessment. Similar effects were noted with the measure of alcohol dependence (ADS). Using a cutoff score of 11 on the ADS ([Ross, Gavin, & Skinner, 1990](#)), only 16 of 145 (11%) of those in the intervention group were classified as showing mild dependence at the 2-year assessment, in comparison with 42 of 156 (27%) students in the no-treatment control condition, $\chi^2(1) = 12.19, p < .000$.

A composite score combining RAPI and ADS responses is displayed over the 2-year follow-up period in [Figure 2](#). For this figure, RAPI and ADS scores were each converted to z scores based on baseline responses of the normative comparison group. As noted earlier for drinking patterns, follow-up RAPI and ADS z scores were corrected for variability at the time of assessment, but means were adjusted only from baseline to reveal developmental trends. Despite a developmental trend of fewer problems over time for all participants, students in the control condition remained 0.78 standard deviations above the normative comparison; treatment participants were 0.36 standard units above the comparison group on average.

Treatment response was examined in relation to the experience (predoctoral vs. postdoctoral training) and gender of the clinical interviewer. No significant relationships were observed. Nor were any significant interactions noted between interviewer gender and student gender in analyses of drinking rates or changes.

Student Evaluations of Program

One hundred fifty-five intervention participants (89% of those receiving the intervention) responded to the feedback and satisfaction questions. Of these, 88% indicated agreement (43% agree, 45% strongly agree) that they would recommend the interview to a friend. The characteristics of the interview and interviewer were also favorably evaluated by participants with 97% agreeing or strongly agreeing that the interview was thorough and complete, and the interviewer seemed well organized (99%), competent and well trained (98%), and warm and understanding (98%). On the open-ended questions, 98% identified at least one part of the interview as "most useful," with BAC calculations (43%) and program handouts (43%) the most frequently noted. When asked to identify the "least useful" part, 30% gave no response and 26% indicated "nothing." The next most frequent response indicated the information provided was already familiar (10%).

Reliability of Self-Report

Analyses of collateral respondents were completed separately for the 1- and 2-year follow-up assessments. This was necessary because individuals serving as collaterals often changed over the course of the 2-year follow-up, and not all collaterals were assessed at each assessment. Within the high-risk groups at least one collateral interview was completed for 174 participants for the fall assessment of 1991 and 242 students for the fall assessment in 1992. Elimination of reports in which the interviewer judged that the collateral was grossly distorting responses, and when collaterals reported that they saw the student less than weekly, reduced the number of participants with collateral reports to $n = 156$ for fall 1991 and $n = 224$ for fall 1992.

To assess the reliability of collateral and self-reports, we first evaluated the relationships between collateral report and student self-report. For this reliability analysis, if two collateral reports existed for 1 student ($n = 46$ for 1-year follow-up; $n = 99$ for the 2-year follow-up), then the average of the two responses was taken. Second, if two collateral reports were obtained for the same student, then the correlation between the two was assessed.

On the basis of the 1-year follow-up collateral reports, intercorrelations on drinking pattern measures between two collaterals for one student ranged from $r(46) = .54$ (frequency of intoxication) to $r(46) = .69$ (total drinks per week on the DDQ). Correlations with self-reports of drinking ranged from $r(156) = .55$ (frequency of intoxication) to $r(156) = .72$ (total drinks per week on the DDQ). Reports of problem involvement on the shortened RAPI were less reliable: $r(46) = .23$ within collaterals, and $r(156) = .29$ between collateral and student self-report. Reliability of collateral reports at the 1-year

follow-up, examined separately within the treatment and control groups, revealed no evidence that collateral reports were less reliable among the treatment group. Correlations within the treatment group were moderately higher than those observed within the control group. It was possible to compare average levels of drinking using the DDQ and to compare drinking problems by matching common RAPI items between student and collateral to create similar scales. On the basis of these comparisons, participants did not appear to be minimizing problems. Participants reported significantly greater alcohol-related problems at the 1-year assessment ($M = 2.26$, $SD = 2.3$) than did their collaterals ($M = 1.74$, $SD = 1.9$), $t(150) = 2.78$, $p < .006$. Students also reported drinking significantly more total drinks in a typical week on the DDQ ($M = 10.25$, $SD = 8.69$) than did collaterals ($M = 8.93$, $SD = 8.3$), $t(121) = 2.30$, $p < .023$. Comparison of average levels of problems and drinking rates reported by participants and collaterals separately within the treatment and control groups revealed a similar pattern of higher means from self-report than collateral report within the control group, and nonsignificant differences between self- and collateral report within the treatment group.

Analyses of 2-year follow-up collateral reports revealed modest increases in reliability. Intercorrelations between two collaterals for one participant on drinking rate measures ranged from $r(99) = .54$ (frequency of intoxication) to $r(99) = .78$ (typical drinking quantity per occasion). Correlations with participants' self-reports of drinking ranged from $r(242) = .60$ (DDQ drinks per week) to $r(242) = .66$ (typical quantity per occasion). Perceptions of problems were more reliable between collaterals, $r(99) = .61$, but again, less reliable between student and collateral, $r(242) = .46$. Reliability of collateral reports at the 2-year follow-up was also examined separately within the treatment and control groups, again suggesting no evidence that collateral reports were less reliable in the treatment group. At the 2-year assessment, no systematic biases in levels of drinking or problems were noted between participants and collaterals. Students and collaterals reported similar numbers of alcohol-related problems occurring in the past 6 months ($M = 1.92$, $SD = 2.1$ for participant; $M = 1.77$, $SD = 1.8$ for collaterals) $t(214) = 1.16$, ns , as well as similar levels of drinking on the DDQ (total drinks for an average week $M = 9.04$, $SD = 8.33$ for participants vs. $M = 8.43$, $SD = 9.13$ for collaterals), $t(210) = 1.14$, ns . Comparison of average levels of problems and drinking rates reported by participants and collaterals separately within the treatment and control groups revealed a similar pattern of nonsignificant differences within the treatment group.

In summary, self-report of participants was reasonably correlated with collateral reports, and given the precision of the judgments involved (i.e., ratings of average quantity of drinking), reliability appeared quite respectable. Further, collateral reports provided no support for the concern that participants were systematically underreporting or minimizing problems. No systematic pattern of correlation or mean differences emerged when treatment and control groups were analyzed separately. Locating collaterals and completing collateral interviews took considerable time, and interviews were sometimes completed 2 to 3 months after the follow-up assessment. As a result, reliability analyses were reanalyzed accounting for the date of assessment of both student and collateral. Although later assessment dates were modestly associated with heavier drinking according to both self- and collateral reports, reliability between reports did not vary as a function of absolute or differential time between assessments. Further analyses controlling for collaterals' prior experiences in giving reports also did not result in systematically increased reliability. ¹

Risk Factors Associated With Treatment and Developmental Trends

Four individual difference factors, gender, family history of alcoholism (present vs. absent for parents), personal history of conduct problems (above vs. below a cut score of 3; see [Baer et al., 1995](#)), and student residence type (Greek vs. other), were evaluated as possible moderators of treatment impact and developmental trends of drinking over time. A general repeated measures model including all possible

factors was not feasible because of power limitations. Instead, each of three factors (parental history of alcoholism, conduct history, and residence type) was evaluated in a separate repeated measures analysis, which also included treatment condition and gender. As in the evaluation of treatment (see above), separate multivariate models were tested for three different groups of drinking measures.

Treatment interactions.

Analyses of drinking rates and alcohol-related problems did not reveal interactions between treatment and a history of conduct problems, family history of alcoholism, students residence type, or gender. Note, however, that in all analyses the main effect for treatment remained statistically significant. Thus, based on self-report of drinking and drinking problems, the treatment appeared comparably effective regardless of these individual risk factors. These analyses, however, did reveal several main effects for risk factors. These developmental trends suggest that not all high-risk drinkers from high school are equally at risk for drinking problems over time in college. These results are summarized below separately by risk factor.

Gender.

Analyses reported earlier evaluating treatment effects revealed consistent main effects of gender on drinking, but not for alcohol-related problems. Men reported drinking more than women did at all points in time, Q-F-P, $F(1, 286) = 39.01, p < .000$; DDQ, $F(1, 277) = 35.92, p < .000$. Within the MANOVA, significant interactions suggested differential effects for different measures. Men reported markedly higher drinking quantity than women, Q-F-P quantity, $F(1, 287) = 42.37, p < .000$; DDQ average drinks, $F(1, 277) = 33.50, p < .000$. For example, using the DDQ (drinks per drinking occasion) averaged over the three annual assessments, men reported consuming 4.88 ($SD = 2.49$) drinks when drinking, in comparison with women, who reported 3.47 ($SD = 1.57$) drinks. Men also reported significantly more frequent drinking than women, Q-F-P, $F(1, 291) = 9.89, p < .002$; DDQ frequency, $F(1, 277) = 14.34, p < .000$. For example, using the DDQ frequency measure averaged over time, men reported drinking 2.4 ($SD = .99$) times a week, in comparison with women, who reported drinking 2.0 ($SD = .83$) times a week. Analysis of alcohol-related problems did not reveal general between-group differences between men and women but did reveal a Gender \times Time interaction, $F(2, 588) = 4.40, p < .013$. This effect was most strongly revealed in RAPI scores, with women reporting significantly greater decrements in problems over time than men, $M = 7.83, 4.44, 3.37$ for baseline, 1-, and 2-year follow-ups, respectively, for women versus $M = 7.35, 5.19, 4.83$ for men; univariate $F(2, 594) = 4.98, p < .007$.

Parental history of alcoholism.

Parental history of alcoholism was not significantly related to drinking rates or problems at any point in time in the current study. Reanalysis using a more inclusive definition of family history similarly revealed no significant trends or group differences.

Conduct disorder history.

A history of conduct disorder interacted with gender in the prediction of alcohol consumption. In the analysis of Q-F-P scales the Gender \times Conduct disorder interaction was significant, Q-F-P, $F(1, 282) = 6.39, p < .012$; a similar trend was observed in analysis of the DDQ, $F(1, 273) = 3.58, p < .06$. For example, using our 6-point peak consumption scale averaged over time, men with conduct disorder histories reported a peak average of 4.23 ($SD = 1.14$; note that 4.0 on the 6-point scale indicates drinking at least 7—8 drinks on one occasion in the past 30 days), which by post hoc Tukey contrasts

was significantly higher than women with ($M = 2.83$, $SD = 1.2$) or without ($M = 3.23$, $SD = 1.04$) conduct disorder histories. Men without conduct disorder histories were intermediate ($M = 3.76$, $SD = 1.17$). Analysis of alcohol-related problems revealed a significant multivariate main effect of conduct disorder history, $F(1, 290) = 12.83$, $p < .000$; no interactive tests approached significance. For example, those who reported conduct histories generally reported more alcohol-related problems on the RAPI ($M = 6.34$, $SD = 3.88$) than those without such a history ($M = 4.84$, $SD = 3.53$).

Student residence type.

For evaluation of residence effects, students were grouped at the 2-year follow-up assessment as living in fraternities or sororities ($n = 128$) or as living elsewhere ($n = 182$). Residence in the Greek system is fairly stable over time, by college standards, with 114 of 128 participants at the 2-year follow-up reporting residence in the Greek system the previous year. In contrast, by the junior year, few students remained in the dormitory system ($n = 18$). Our sample was too small to evaluate potential differential effects of different types of living arrangements off-campus. Three MANOVAs (Q-F-P, DDQ, and Problems) resulted in consistent significant relationships. All revealed strong main effects for residence indicating more drinking and more problems in fraternities and sororities in comparison with all others, Q-F-P, $F(1, 282) = 41.55$, $p < .000$; DDQ, $F(1, 273) = 37.20$, $p < .000$; Problems, $F(1, 290) = 8.41$, $p < .004$. In addition, all three analyses revealed Gender \times Residence interaction effects, Q-F-P, $F(1, 282) = 3.93$, $p < .048$; DDQ, $F(1, 273) = 6.16$, $p < .014$; Problems, $F(1, 290) = 4.40$, $p < .037$. For example, using the RAPI averaged over three assessments, by Tukey contrasts men in fraternities reported significantly higher problems scores ($M = 7.30$, $SD = 4.0$) than women and men living elsewhere ($M = 4.76$, $SD = 3.6$ and $M = 4.76$, $SD = 3.3$, respectively). Women living in sororities ($M = 5.91$, $SD = 3.79$) were intermediate, not significantly different from any other group.

Discussion

The overall pattern of results supports the hypothesis that high-risk college students who receive a brief intervention in their freshman year show significant reductions in both drinking rates and harmful consequences in comparison with students in a no-treatment control condition. Although on average, all high-risk students drank less and reported fewer alcohol-related problems over the 2-year follow-up period, participants who received the brief intervention showed a significantly greater deceleration of drinking rates and problems over time in comparison with participants in the control group. Significant reductions were found for both harmful consequences on the drinking problem inventory (on the RAPI) and for alcohol dependence (on the ADS) for high-risk students who received the intervention in comparison with those in the no-treatment control condition. Although main effects on drinking and problems were found for gender and for history of conduct disorder, no significant interactions with treatment condition were found, suggesting that the brief intervention was effective independent of individual risk factors. The reliability of self-reported data provided by participants was generally confirmed by independent observations provided by collaterals.

These results are consistent with earlier findings from our laboratory showing that preventive interventions are effective in reducing high-risk drinking and alcohol problems in the college student population (Baer et al., 1992; Kivlahan et al., 1990). These findings are also consistent with the results of other studies showing that brief interventions lead to reduced alcohol consumption and fewer problems among high-risk drinkers (Bien et al., 1993; Institute of Medicine, 1994). Although statistically significant, the treatment effect size remains modest, particularly in the magnitude of decreased drinking patterns for high-risk students. High-risk students in both the intervention and control conditions reported drinking rates and problem consequences that remained substantially greater than students in the normative comparison sample throughout the follow-up period.

Although significant decrements were found for both drinking rate (e.g., quantity consumed per occasion) and problems (adverse consequences and dependence symptoms), the magnitude of the treatment effect was greater for drinking problems. In a recent cross-national trial of brief interventions with adult heavy drinkers, it was found that although participants who received a brief intervention showed a significant reduction in daily alcohol consumption at a 9-month follow-up, no effect was obtained for drinking problems or alcohol dependence ([WHO Brief Intervention Study Group, 1996](#)). It is possible that students in our brief intervention group who showed significantly fewer drinking problems did so because they learned to avoid excessive drinking in hazardous situations (situational risk reduction), rather than by reducing drinking rates uniformly across all drinking situations. Future research is needed to determine to what extent drinking rate changes are linked to specific risky drinking situations (cf. [Carey, 1993](#)).

The distinction between drinking rates and consequences is important in terms of recruiting college students and other young drinkers into educational and prevention programs. Programs that attempt to reduce problems solely by reducing or eliminating drinking per se may miss the mark. On the other hand, prevention programs that address the proximal adverse consequences of high-risk drinking rather than absolute rates of drinking may be both more appealing and more effective for this age group. In the present study, every attempt was made to contextualize drinking by identifying high-risk situations for negative consequences as the focus for change in both the brief intervention interview and the administration of subsequent personalized feedback information. This switch in focus from reducing overall drinking rates to reducing harmful consequences of drinking in high-risk situations is consistent with a harm-reduction approach ([Marlatt, 1996](#)).

Note that main effects were obtained on primary outcome measures for the individual risk factors of gender and conduct disorder history. Although male students show higher overall drinking frequency and quantity rates than their female counterparts, this gender difference may mask the possibility that female drinkers achieve similar peak blood alcohol rates to male drinkers because of their increased physiological vulnerability to the effects of alcohol (cf. [Whitfield & Martin, 1994](#)). Women in our study, on the other hand, showed significantly greater decrements in drinking problems over time than men, a finding that has been previously reported ([Sanchez-Craig, Leigh, Spivak, & Lei, 1989](#)).

History of conduct disorder showed a significant interaction with gender in predicting alcohol consumption. Men with a history of conduct disorder showed a significantly higher rate of drinking at binge levels in comparison with women overall or men without history of conduct disorder. A significant main effect of conduct history was also found, showing greater alcohol problems on the RAPI for those with a positive history, consistent with predictions from problem behavior theory ([Jessor et al., 1991](#)). Results on parental history of alcohol problems, however, failed to show any predictive near-term effect on either drinking rates or problems, a finding also reported in earlier research with college student drinkers ([Alterman, Bridges, & Tarter, 1986](#)). However, other research has indicated more drinking problems in college students with a family history of alcoholism ([Sher, Walter, Wood, & Brent, 1991](#)).

Results show significant main effects for student residence, with more drinking and more problems reported by students living in fraternity and sorority houses. For students who live in the Greek system, it is possible that a house-based intervention (rather than the individual interviews conducted in this study) would be an effective prevention strategy. Current research conducted by our group is investigating the effectiveness of such a group-based intervention for these students.

From a developmental perspective, it is important to note that high-risk students, both in the intervention and control groups, showed a significant drop in drinking rates and problems over time. These findings are congruent with a developmentally limited model of adolescent drinking that predicts that most

heavy drinkers mature out of their risky behavior as they become more experienced as drinkers and are faced with greater life responsibilities (cf. [Gotham, Sher, & Wood, 1997](#); [Zucker, 1994](#)). It seems plausible that the brief intervention was associated with an acceleration of this maturational process in treatment participants in comparison with controls. It remains unclear as to how this maturational acceleration itself is mediated—by enhanced motivation, heightened personal awareness of risk, improved drinking habits and coping skills, or some combination thereof.

Further research is needed to differentiate between those heavy drinkers in college who go on to future alcohol abuse and dependence and those whose drinking decreases after college ([Schulenberg, O'Malley, Bachman, Wadsworth, & Johnston, 1996](#)). The present study represents an example of an indicated prevention approach, one that is targeted toward individuals who have been screened for risk factors ([Institute of Medicine, 1994](#)). Other approaches include selective prevention that is targeted toward high-risk groups (e.g., members of a fraternity) and universal prevention consisting of educational and information programs targeted to the campus as a whole. Comprehensive college prevention programs often combine these various approaches.

There are a number of distinctive features of the present study. Participants were screened for risk during their last months in high school, thereby eliminating the possibility that selection would be contaminated by further assessments once students arrived on campus. It is possible, on the other hand, that certain risk factors may have been missed by limiting screening to students still in high school. Other strengths include the large sample size with a balance of men and women, random assignment to conditions, and the inclusion of a normative comparison sample to assess developmental trends in drinking and problems. Limitations include the lack of process measures to account for change in drinking rates and problems (e.g., assessment of drinking skills), reliance on self-report data, and the possibility that our sample of high-risk drinkers may not generalize to other college student populations. Inclusion of collateral reports provided good evidence that the self-report of participants is generally reliable when it comes to assessing drinking rates, although reliability tends to be lower for assessment of drinking problems (some of which may be more difficult to assess by collateral observers). There was no evidence, however, that participants minimized the extent of their drinking problems.

One advantage of the brief intervention program described in this study is that students appear receptive to this approach. The appeal of the program may be related to several user-friendly characteristics, including program brevity, acceptance of nonabstinence drinking goals, and the nonjudgmental yet pragmatic approach of the intervention itself. Another advantage is that drinking is viewed in a contextual framework that is matched to student lifestyles (e.g., focus on drinking and dating) and is geared to their contemporary life problems (vs. prevention of adult alcoholism). For students with more serious drinking problems or alcohol dependence, a brief intervention can be administered as the first step of a series of progressively more intensive interventions. Such an approach is consistent with a public health-based stepped-care model, which adds additional interventions only if earlier, briefer treatments are not effective ([Marlatt et al., 1995](#); [Sobell & Sobell, 1993](#)).

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Collateral data could also be evaluated as an outcome in and of itself. A MANOVA for collateral reports of drinking rates and problems by treatment condition did not reveal significant treatment effects. Note that this analysis represents a highly conservative test, because of the relatively small effect sizes in the self-report data, the small sample of collaterals, and the less-than-perfect reliability between self- and

collateral report.

Figure 1. Z-transformed drinking rates over time for high-risk treatment, high-risk control, and random comparison groups.

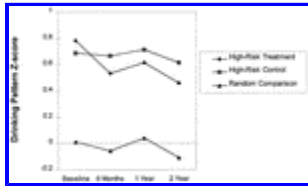


Figure 2. Z-transformed drinking problems over time for high-risk treatment, high-risk control, and random comparison groups.

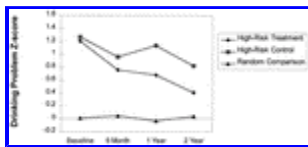


Table 1.

Table 1
Demographic and Baseline Drinking Patterns for High-Risk and Random Comparison Samples

Measure	High-risk sample (n = 348)		Random comparison (n = 315)	
	M	SD	M	SD
Drinks per week	10.74	9.77	5.47	8.86
Drinking days	1.87	1.32	0.99	1.13
Typical BAC ^a	.12	.04	.08	.08
Episodic BAC	.38	.32	.14	.11
Conduct problems	2.49	1.94	1.74	1.63
DDM-DSI-R	1.28	1.30	0.54	0.90
% female	54		55	
% Caucasian	84		78	
% family history positive	15		18	

Note. BAC = Blood alcohol concentration; DDM-DSI-R = Diagnostic and Statistical Manual of Mental Disorders (4th ed., rev.).

Table 2.

Table 2
Means, Standard Deviations, and Reported Meanwise Significance Tests for Treatment Outcomes for Self-Reported Drinking Rates and Associated Problems in High-Risk Participants

Measure	Mean values over time for group				F	Significance test
	Baseline	1 Year	1 Year	2 Year		
	(n = 35)	(n = 98)	(n = 97)	(n = 100)		(Treatment v. Control)
Self-Reported Drinking Rates					17.00***	4.00***
Control					1.00***	
Treatment					16.00***	
Alcohol problems					4.00***	3.00**
Control					0.00	
Treatment					4.00***	
BDQ scores					1.00	4.00**
Control					0.00	
Treatment					1.00	
Alcohol problems					1.00	4.00**
Control					0.00	
Treatment					1.00	
BDQ scores					1.00	4.00**
Control					0.00	
Treatment					1.00	

Note. Values represent mean scores on measures of drinking rates and problems. Self-Reported Drinking Rates = mean of drinking rates and problems; BDQ = Brief Drinking Questionnaire; BAC = Blood Alcohol Concentration; DDM-DSI-R = Diagnostic and Statistical Manual of Mental Disorders (4th ed., rev.).

*p < .05. **p < .01. ***p < .001.