

## Secondary Prevention With College Drinkers: Evaluation of an Alcohol Skills Training Program

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*This study evaluated secondary prevention approaches for young adults ( $N = 36$ , mean age 23 years) at risk for alcohol problems. Subjects were randomly assigned to cognitive-behavioral alcohol skills training, a didactic alcohol information program, or assessment only. The skills program included training in blood alcohol level estimation, limit setting, and relapse prevention skills. All subjects maintained daily drinking records during the 8-week intervention and for 1 week at each follow-up. Repeated measures MANOVA found a significant reduction over 1-year follow-up in self-reported alcohol consumption for the total sample. For all drinking measures, the directional findings consistently favored skills training. Despite overall reductions, most subjects continued to report occasional heavy drinking.*

Many studies have identified college students as a population at elevated risk of immediate alcohol-related problems based on high levels of alcohol consumption (Berkowitz & Perkins, 1986; Brennan, Walfish & AuBuchon, 1986; Engs & Hanson, 1988; Institute of Medicine, 1990; Saltz & Elandt, 1986). A recent national survey of 3,375 college students found that over 20% drank six or more drinks at a sitting more than once a week, and 49% reported driving a car when they knew they had drunk too much (Engs & Hanson, 1988). Despite the fact that most students drink and many drink excessively, few students see themselves as having a problem with alcohol, and most "mature out" rather than become alcohol dependent as adults (Fillmore, 1988).

In response to such concerning drinking patterns, most college campuses have developed alcohol awareness or primary prevention programs (Braucht & Braucht, 1984). As with prevention programs for other groups (Moskowitz, 1989; Staulcup, Kenword, & Frigo, 1979), college-aged participants typically show changes limited to alcohol-related knowledge and attitudes (Kraft, 1984; Mills & McCarty, 1983). No studies using adequate experimental controls and outcome measures have shown changes in drinking behavior among college students (Goodstadt, 1986; Moskowitz, 1989).

Most traditional college prevention programs have been re-

stricted to providing information about the negative effects of alcohol abuse emphasizing a disease model of alcoholism or using a more affective-based "values clarification" approach (Miller & Nirenberg, 1984). These programs omit training in cognitive-behavioral skills that have been used successfully to reduce alcohol consumption in studies with young adult problem drinkers (Alden, 1988; Graber & Miller, 1988; Sanchez-Craig, Annis, Bornet, & MacDonald, 1984; Sanchez-Craig, Leigh, Spivak, & Lei, 1989). Among the cognitive-behavioral techniques included in such intervention programs are self-monitoring of alcohol consumption, instruction about blood alcohol levels and appropriate limit setting, identification of situations in which the risk of heavy drinking is increased, and practice of specific cognitive and behavioral responses to high-risk situations without drinking excessively.

Based on social learning theory and cognitive-behavioral principles (Marlatt & George, 1984), the High Risk Drinker Project at the University of Washington has developed an alcohol skills training (ST) program aimed at reducing the amount and moderating the pattern of alcohol consumption among college drinkers (Kivlahan, Coppel, Fromme, Miller, & Marlatt, 1990). The philosophy of the program is more consistent with a public health model geared to risk reduction and harm minimization, rather than recommending abstinence for all young persons who have experienced an alcohol-related problem. However, the program is not viewed as a treatment intervention for alcohol dependence. Students with evidence of moderate to severe alcohol dependence are screened out and referred to Alcoholics Anonymous or abstinence-oriented treatment.

The present study evaluated the ST program as a secondary prevention approach for college student drinkers using an experimental design that improves on previous studies in several ways: (a) random assignment to experimental or control conditions, (b) broadened range of intervention procedures focusing

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This research was supported by National Institute on Alcohol Abuse and Alcoholism Grant AA05591 to G. Alan Marlatt.

We thank Karen Vanderbilt, Theresa Doyle, and Mary Pat Casey for their assistance in conducting groups; Henne Queisser and Don Wood for technical assistance; and John Baer for helpful comments on a draft of this article.

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on change in drinking behavior, and (c) systematic outcome assessment involving self-monitoring of drinking as well as retrospective reports of typical drinking (Babor, Stephens, & Marlatt, 1987). Subjects were randomly assigned to the ST group or one of two control groups: an assessment only (AO) control group that included daily self-monitoring of alcohol consumption or an alcohol information (AI) class control group. Although others have reviewed the limited effectiveness of such didactic approaches on driving while intoxicated (DWI) offenders (Donovan, 1989), this is the AI class developed and used by the State of Washington for first-time offenders following conviction for DWI.

## Method

### Subjects

Subjects were recruited at the University of Washington by campus newspaper ads, flyers, sign-up booths at the student union, and class announcements. An 8-week educational program was offered at the Addictive Behaviors Research Center for social drinkers wanting to learn more about, or to change, their drinking behavior. Announcements included a statement that subjects could earn up to \$50 for their participation over a 1-year period. Prospective volunteers telephoned the Center to schedule an initial screening session. During the screening session, volunteers completed three questionnaires: Alcohol-Related Life Problems (ARLP) from the Comprehensive Drinker Profile (Marlatt & Miller, 1984); the Alcohol Dependence Scale (ADS; Skinner & Horn, 1984) to assess symptoms of physical dependence on alcohol; and an abbreviated version of the Drinking Habits Questionnaire (DHQ; Cahalan, Cissin, & Crossley, 1969) assessing quantity and frequency of alcohol consumption to yield a volume variability index.

To be included in the study, subjects had to report at least one negative consequence of drinking on the basis of the ARLP questionnaire, indicate no more than mild physical dependence based on the ADS (i.e., score of 13 or below), and be categorized as medium volume/high maximum or high volume/high maximum on the DHQ volume variability index.

Screening measures were completed by 161 prospective subjects. Fifty-two subjects did not meet inclusion criteria: 19 had scores of 0 on the ARLP questionnaire (i.e., were under criteria); 33 exceeded scores of 13 on the ADS (i.e., were over criteria); 47 could not be recontacted (typically due to relocation between spring and fall quarters); 9 did not attend the initial assessment session; and 3 dropped out after random assignment but before the first meeting. Those with high scores on the ADS were encouraged to seek alcohol treatment and referred to campus or community resources. Seven other subjects began the intervention but dropped out before the posttest, typically citing time constraints (2 in ST, 3 in AI, and 2 in AO).

Of the 43 subjects who completed the intervention phase of the study, 58.1% were male. The mean age was 23.1 years ( $SD = 4.5$ , range = 18–35 years, mode = 19 years). In addition to 39 (90.7%) White subjects, the sample included 1 Hispanic, 2 Black, and 1 Asian subject. On the basis of the DHQ, subjects reported moderate to heavy drinking, averaging 15.1 days per month ( $SD = 7.9$ ), 15.1 drinks per week ( $SD = 10.1$ ), and 4.1 drinks per occasion ( $SD = 1.3$ ). Evidence of high-risk drinking included lifetime maximum of 16.6 drinks per occasion ( $SD = 8.2$ ), mean of 7.5 ( $SD = 11.5$ ) occasions within the past year of driving after 4 or more drinks, mean ARLP score of 5.3 ( $SD = 3.2$ ), and mean ADS score of 8.0 ( $SD = 3.1$ ). Parental history of alcoholism was reported by 27.9% of the subjects. Thus selection criteria yielded subjects at risk of immediate as well as long-term alcohol-related consequences on the basis of current drinking patterns and drinking history.

### Measures

**Background information.** A personal and family history questionnaire collected basic demographic data, information about drug use, alcohol use by subjects' families and friends, and life-style behaviors (e.g., exercise and relaxation). Alcohol-specific items assessed driving after drinking ("Over the past year, how often would you say that you drove shortly after having more than 3 drinks?"); maximum drinks in one day ("Over the past year, what is the largest amount of alcohol that you have ever drunk in one day? Number of drinks \_\_\_\_\_ Kind of Drinks \_\_\_\_\_"); and Alcohol-Related Life Problems. At follow-up, only items that could change over time were asked again, including the alcohol-specific items. A question added at follow-up asked for a rating of current drinking on a 7-point scale from *a lot less* to *a lot more* than before program involvement.

**Self-monitored drinking.** Subjects agreed to self-monitor their alcohol consumption for at least a 1-week baseline period and throughout the 8-week intervention phase of the study. Subjects were given wallet-sized cards on which they were instructed to record the date, time, beverage type, and amount of each alcoholic drink consumed. Subjects were also instructed in use of a code system to record their mood, where drinking occurred, and with whom. Total drinks per week and maximum estimated blood alcohol level (BAL) per week (peak BAL) were computed from daily drinking records using a computer scoring program adapted from Matthews and Miller (1979). From among 11 weekly summary measures generated by the program, 2 variables were selected as the least redundant and most conceptually relevant: total drinks per week and maximum estimated BAL per week (peak BAL).

**Drinking Habits Questionnaire (DHQ).** The DHQ, a widely used survey measure, asked subjects to estimate typical quantity, frequency, and variability of alcohol consumption during the previous 3 months. The DHQ sets an upper limit of 6 on the number of drinks consumed per occasion. The DHQ was administered only at initial screening and 12-month follow-up.

**Daily Drinking Questionnaire (DDQ).** The DDQ (Collins, Parks, & Marlatt, 1985) asked subjects to estimate average alcohol consumption for each day of the week during the previous 3 months. The DDQ was administered at initial screening and added to the more extensive battery at 12-month follow-up. At baseline, the DDQ was strongly correlated with drinks per month computed from the DHQ,  $r(43) = .78$ ,  $p < .001$ . Given the DDQ's absence of an upper limit on reports of the number of drinks consumed per day and greater sensitivity to daily variability in drinking found in previous work with this population (Mooney, Fromme, Kivlahan, & Marlatt, 1987), the DDQ was included in subsequent analyses as potentially more sensitive to changes in drinking.

**Alcohol knowledge test.** Subjects responded to 23 multiple choice items at baseline and again at posttreatment. Items covered basic knowledge about effects of alcohol including rates of absorption and elimination and so forth.

**Course evaluation questionnaire.** This 19-item instrument was administered at posttreatment to the ST and AI subjects to assess the perceived helpfulness of program components and satisfaction with program format, content, and instructors.

### Procedures

The 43 subjects were randomly assigned to one of three experimental conditions: (a) a moderation-oriented, cognitive-behavioral, ST class ( $n = 15$ ); (b) an AI class emphasizing the negative consequences of drinking ( $n = 13$ ); or (c) an AO control group ( $n = 15$ ). All subjects completed pretreatment assessment questionnaires and began daily monitoring of their alcohol consumption. The two classroom conditions (ST and AI) began weekly 90-min group meetings following 7–10

days of baseline monitoring of alcohol consumption. Eight weekly meetings were conducted.

All subjects completed questionnaires in person at pretreatment and posttreatment and by mail at 4-, 8-, and 12-month follow-up. All subjects monitored drinking daily throughout the 8-week intervention phase and for 1 week at each follow-up assessment. Subjects in the two intervention conditions returned their monitoring cards at each weekly meeting. Subjects in the AO condition returned their cards weekly in person or by mail.

After completion of 12-month follow-up, subjects were notified of the results of the between-groups comparison. Subjects in the AO and AI conditions were then offered the ST program at no charge. One subject accepted this offer and was seen individually and given program materials.

*Skills Training (ST).* This intervention was based on social learning principles (Marlatt & George, 1984) to foster development of self-control, responsible decision making, and coping skills. Classes encouraged interaction among instructors and participants, including specific discussion of subjects' weekly self-monitored drinking. Male-female pairs conducted the ST groups. Instructors included two doctoral level clinical psychologists and one advanced clinical psychology graduate student. The eight sessions covered the following themes: (a) models of addiction and the immediate and delayed effects of drinking; (b) training in estimation of BAL, drinking moderation skills, and setting moderate drinking limits (consistent with other parallels between responsible driving and drinking, subjects were encouraged to view a BAL of .055 mg% as analogous to the 55 miles per hour speed limit for drivers); (c) relaxation training and alternative self-rewarding behaviors; (d) nutrition information and suggestions on aerobic exercise as a method of moderating alcohol consumption; (e) antecedents of heavy drinking and recognition and response to situations involving increased risk of overdrinking; (f) assertiveness training and drink refusal skills; (g) a placebo drinking session in a simulated tavern to identify alcohol-related expectancies and to challenge inappropriate attributions of pleasurable effects to drug rather than to setting; presentation of information on relevant research using the balanced placebo design; and (h) relapse prevention strategies for maintaining behavior change including recognition and response to exceeding self-imposed rules or limits.

*Alcohol Information (AI).* This class was based on the Washington State program for first-time DWI offenders. The classes were taught by an experienced, licensed instructor with the assistance of an advanced graduate student in physiological psychology. This class involved primarily lecture and films with limited class discussion. The emphasis was on the hazards of alcohol consumption and was based on a disease model of alcoholism. The eight sessions covered the following themes: (a) dispelling myths about alcohol, (b) bodily and behavioral effects of alcohol, (c) effects of other drugs and their interactions with alcohol, (d) the alcohol industry, (e) alcoholism, (f) alcoholism and the family, (g) alcohol and the law, and (h) responsible decision making about alcohol.

## Results

### *Data Analysis of Drinking Changes*

A two-phase multivariate analysis of variance (MANOVA) method for analyzing repeated measures designs (O'Brien & Kaiser, 1985) was used to test for differential changes over time. Measures collected at 4-, 8-, and 12-month follow-ups were averaged to more reliably reflect maintenance of posttreatment changes. Correlations between 12-month and mean follow-up scores ranged from  $r(36) = .73$  to  $r(36) = .92$ . The self-monitored drinking measures (drinks per week and peak BAL) were included in a 3 (group: ST, AI, AO)  $\times$  3 (time: pretreatment,

posttreatment, follow-up) MANOVA. Measures obtained at only two assessments (the knowledge test at pretreatment and posttreatment and the DDQ at pretreatment and 12-month follow-up) were analyzed separately. Four drinking-related measures either were not relevant at pretreatment (self-rated change in drinking) or were collected using lengthy retrospective baselines (lifetime for the ARLP questionnaire and maximum drinks per occasion and 1 year for driving after drinking), making them inappropriate for complete repeated-measures analysis. Maximum drinks per occasion and ARLP score were included in a 3 (groups)  $\times$  2 (time: posttreatment to follow-up) repeated-measures MANOVA. Two of the measures (self-rated change in drinking, driving after drinking) showed group differences at posttreatment, so changes over follow-up were investigated using analysis of covariance (ANCOVA) with the posttreatment measures as covariates.

### *Validation Checks*

As a manipulation check, differential changes on the knowledge test from pretreatment to posttreatment were investigated. There was a significant main effect for time,  $F(1, 39) = 7.79$ ,  $p < .01$ , indicating a differential increase in test scores. Post hoc (Scheffé) comparisons showed that both the ST,  $F(1, 39) = 7.4$ ,  $p < .01$ , and AI,  $F(1, 39) = 7.54$ ,  $p < .01$ , groups improved more than the AO control group but did not differ from each other. This demonstrates that ST and AI subjects increased comparably on alcohol-related knowledge, consistent with program objectives.

### *Analysis of Pretreatment Differences and Attrition*

To test for success of the randomization procedure, a MANOVA was conducted for differences among the three conditions on baseline characteristics. There was no significant multivariate main effect for group using age, alcohol knowledge, and the following drinking history variables: age at first drink, most drinks on any occasion, frequency of driving after four or more drinks, ARLP, and ADS, Wilks's lambda = .80,  $F(14, 62) < 1$ ,  $ns$ . Neither sex,  $\chi^2(2, N = 43) = 1.49$ ,  $ns$ , nor parental history of alcohol problems,  $\chi^2(2, N = 43) = 1.71$ ,  $ns$ , were distributed differently in the three groups. A separate MANOVA found no baseline differences on the following measures of recent alcohol consumption: monitored drinks per week, peak BAL, DDQ drinks per week, and DHQ drinks per month, Wilks's lambda = .88,  $F(8, 74) < 1$ ,  $ns$ . These findings documented the effectiveness of the randomization procedure.

Of the 43 subjects who completed the intervention phase, 7 (16.3%) were lost to follow-up, with a tendency for greater attrition from the AO control. One subject was lost from the ST, 1 from AI, and 5 from AO,  $\chi^2(2, N = 43) = 4.92$ ,  $p < .10$ . MANOVA indicated no significant baseline differences on drinking history variables, Wilks's lambda = .84, approximated  $F(6, 33) = 1.05$ ,  $ns$ , or recent alcohol consumption, Wilks's lambda = .90, approximated  $F(4, 36) < 1$ ,  $ns$ , between the 7 subjects who were lost to follow-up and the remainder for whom complete follow-up data were available. When the 7 dropouts were excluded, no between-groups baseline differences were found among the 36 subjects who completed the 12-month follow-up on age, alcohol

knowledge, or drinking history, Wilks's lambda = .70,  $F(14, 48) < 1$ , *ns*, or recent alcohol consumption, Wilks's lambda = .76, approximated  $F(8, 60) = 1.23$ , *ns*.

### Course Evaluation

MANOVA to compare the ST and AI groups revealed no significant multivariate (or univariate) effect for group at either post-treatment or 12-month follow-up on evaluations of program understandability, helpfulness of the program for making behavior change, instructor characteristics, or likelihood of recommending the program to others. MANOVA on perceived usefulness of eight program components found a group difference at 12-month follow-up, Wilks's lambda = .32, approximated  $F(8, 15) = 3.94$ ,  $p < .02$ , but not at posttreatment, Wilks's lambda = .62, approximated  $F(8, 17) = 1.28$ , *ns*. Univariate differences at 12-month follow-up showed the AI group had significantly higher ratings of usefulness of course handouts,  $t(24) = -2.31$ ,  $p < .05$ , and presentation of information on physical effects of alcohol,  $t(24) = -2.71$ ,  $p < .01$ . ST subjects rated significantly greater usefulness of the self-monitoring cards,  $t(15.6) = 2.25$ ,  $p < .05$ ; separate variance estimates. These isolated differences are consistent with respective program emphases.

### Changes in Drinking

**Self-monitored drinking.** The 3 (group)  $\times$  3 (time: pre, post, mean of 4-, 8-, and 12-month follow-up) MANOVA for repeated measures on monitored drinks per week and peak BAL revealed a significant main effect for time, Wilks's lambda = .61, approximated  $F(4, 29) = 4.67$ ,  $p < .01$ , with significant univariate differences on drinks per week,  $F(1, 32) = 11.28$ ,  $p < .01$ , and peak BAL,  $F(1, 32) = 7.78$ ,  $p < .01$ , from pretreatment to posttreatment (see Table 1). Reduction in monitored drinks per week from baseline to posttreatment was 38.5% for ST, 21.6%

for AI, and 16% for AO. For monitored peak BAL, reductions were 47.3% for ST, 21.5% for AI, and 1.7% for AO. The absence of a subeffect for time from posttreatment to follow-up indicates that changes on both measures were maintained during follow-up. Although the direction of results consistently favored the ST group, there was no significant multivariate Group  $\times$  Time interaction.

Despite the significant overall reduction in self-monitored drinking, episodes of heavy drinking continued for many subjects. The proportion of subjects who exceeded a peak BAL of .1% (i.e., the legal limit of intoxication) during at least one of the 3 weeks of follow-up monitoring was 40% for ST, 58.3% for AI, and 63.6% for AO,  $\chi^2(2, N = 36) = 1.65$ , *ns*. Thus the task of self-monitoring was not so reactive that it eliminated reports of heavy drinking.

**Retrospective self-report of typical drinking.** MANOVA on changes in retrospective measures of typical drinking showed no main effect for time, but there was a nonsignificant trend for the Group  $\times$  Time interaction, Wilks's lambda = .79, approximated  $F(4, 64) = 2.03$ ,  $p = .10$  (see Table 1). Given the modest statistical power and desire to develop hypotheses for further research, a liberal approach was adopted to permit exploratory univariate tests despite the nonsignificant level of the interaction. Analysis of variance (ANOVA) indicated differential changes favoring the ST group on drinks per week based on the DDQ,  $F(2, 33) = 4.03$ ,  $p < .03$ . Post hoc tests (Scheffé) showed the reduction from baseline to 12-month follow-up was significantly greater in the ST group than in AO, which showed an increase in consumption:  $M = -7.9$  and 4.0 change in drinks per week, respectively;  $F(1, 33) = 7.59$ ,  $p < .01$ , but did not differ from AI, which was unchanged:  $M = -4$ .

**Other drinking measures.** Data on four other drinking-related measures were collected at posttest: self-rated changes in drinking since pretreatment, maximum drinks per occasion, driving after four or more drinks, and ARLP score. MANOVA revealed a main effect for group at posttest, Wilks's lambda =

Table 1  
Mean Scores Over Time on Self-Reported Alcohol Consumption by Condition

Measure by condition	Baseline		Posttreatment		4-month		8-month		12-month	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Monitored drinks per week										
Skills training	14.8	11.3	9.1	5.4	9.2	7.3	8.9	7.8	6.6	4.4
Alcohol information	19.4	16.2	15.4	15.1	13.6	11.3	17.6	13.0	12.7	10.7
Assessment only	15.6	11.8	13.1	10.0	13.1	10.1	13.0	9.7	16.8	13.6
Monitored peak BAL										
Skills training	0.129	0.067	0.068	0.022	0.074	0.046	0.069	0.056	0.069	0.057
Alcohol information	0.132	0.112	0.105	0.073	0.079	0.055	0.097	0.040	0.093	0.072
Assessment only	0.121	0.084	0.119	0.085	0.104	0.085	0.088	0.044	0.110	0.067
Drinks per week (DDQ)										
Skills training	15.5	8.8							7.6	4.8
Alcohol information	17.0	10.9							16.8	12.5
Assessment only	13.8	11.4							15.4	6.6
Drinks per month (DHQ)										
Skills training	55.1	30.2							32.6	26.4
Alcohol information	58.8	37.6							45.2	31.7
Assessment only	61.4	39.4							68.7	40.8

Note. BAL = blood alcohol level; DDQ = Daily Drinking Questionnaire; DHQ = Drinking Habits Questionnaire.

.57, approximated  $F(8, 72) = 2.90, p < .01$ . Univariate differences were found on self-rated change in drinking,  $F(2, 39) = 7.04, p < .01$ , with post hoc tests showing significantly greater rated reductions among ST subjects compared with AO:  $M = 2.3, SD = .90$  and  $M = 3.8, SD = 1.31$  for ST and AO, respectively;  $F(1, 39) = 13.98, p < .001$ , and AI compared with AO:  $M = 2.9, SD = .86$ ;  $F(1, 39) = 4.59, p < .05$ . Univariate differences were also found on reports of driving after drinking four or more drinks,  $F(2, 39) = 3.85, p < .05$ , with AI reporting significantly more episodes than both ST:  $M = 6.45, SD = 6.44$  and  $M = 1.47, SD = 2.56$  for AI and ST, respectively;  $F(1, 39) = 7.13, p < .05$ , and AO:  $M = 2.57, SD = 5.27$ ;  $F(1, 39) = 4.19, p < .05$ .

In light of group differences at posttreatment on self-rated change in drinking and occasions of driving after four or more drinks, separate ANCOVAs with posttreatment scores as the covariate were used to test for differential change over time on summary follow-up measures (mean of 4-, 8-, and 12-month values). There was no significant main effect for group on driving after drinking,  $F(2, 32) < 1, ns$ , but an effect was found for self-rated drinking change,  $F(2, 32) = 4.02, p < .05$ , indicating differential change over follow-up. Post hoc tests (Scheffé) showed the only significant pairwise difference was between ST ( $M = 2.1, SD = .95$ ) and AI ( $M = 3.3, SD = 1.48$ ) reflecting greater perceived change within the ST group.

Inasmuch as there were no group differences at posttreatment, maximum drinks per occasion and ARLP scores were entered in a 3 (group)  $\times$  2 (posttreatment, mean follow-up) MANOVA for repeated measures to test for differential change over follow-up. There was no main effect for time or Group  $\times$  Time interaction. The overall mean of 11.1 ( $SD = 5.3$ ) maximum drinks per occasion at posttreatment and 10.4 ( $SD = 4.2$ ) over follow-up reflects the high prevalence of at least occasional excessive drinking in the total sample.

### *Consistency of Self-Reported Drinking Measures*

Correlations among difference scores, on the basis of baseline and 1-year follow-up data, showed consistency among outcome measures. Self-ratings of perceived change in drinking were also included. All correlations showed significant common variance, ranging from  $r(36) = .41$  to  $r(36) = .72, SD = 6.44$ , except for monitored peak BAL and DDQ drinks per week,  $r = .23, ns$ . Correlations were highest between measures sharing a common method such as self-monitoring,  $r(36) = .72$  for change in peak BAL and changes in drinks per week, or retrospective reports of typical drinking,  $r(36) = .65$  for DDQ drinks per week and DHQ drinks per month. Subjects' self-rated change in drinking was significantly although moderately correlated with all four baseline follow-up difference scores, ranging from  $r(36) = .45$  to  $r(36) = .58$ , corroborating their perceptions of change over time. Although correlations based on 12-month follow-up measures tended to be slightly lower, the pattern of relationships similarly supported the concurrent validity of the drinking measures. In addition, means of the measures reflecting amount of drinking were quite consistent ( $M = 11.7, SD = 10.5$  for monitored drinks per week;  $M = 12.7, SD = 9.5$  drinks per typical week based on DDQ;  $M = 46.9, SD = 35.5$  drinks per typical month based on the DHQ).

### Discussion

This controlled evaluation of an alcohol skills training program for college students found a significant reduction over time in several measures of self-reported alcohol consumption for the total sample. A nonsignificant trend for the hypothesized Group  $\times$  Time interaction suggested greater improvement following skills training (ST) on the basis of retrospective reports of typical drinking but not for 1-week samples of self-monitored drinking. For both types of drinking measures, the pattern of findings consistently favored the ST group. From pretreatment to 1-year follow-up, subjects in the ST group reduced self-monitored drinks per week, peak BAL, and retrospective reports of typical drinks per week by more than 50%.

Given modest statistical power and the failure of previous studies to demonstrate change in drinking behavior, the observed pattern of overall risk reduction is encouraging. Yet occasional episodes of heavy drinking were reported by most subjects during the year of follow-up, with 70.3% reporting at least one occasion of 10 or more drinks and 52.6% having an estimated peak BAL over .10 mg% during one of the 3 weeks of follow-up monitoring. Given this widespread admission of excessive drinking, it appears less likely that the overall reductions in reported drinking were due to experimental demand characteristics. The prevalence of continued episodic heavy drinking also suggests the need to target other potentially strong influences in this population, such as peer drinking norms (Baer, Kivlahan, Fromme, & Marlatt, 1989). In addition, whereas the existing assessment methods may be flawed, there was no evidence of a significant change in alcohol-related life problems.

Longitudinal studies indicate that most college students "mature out" of heavy drinking as they make the transition to adult family and employment roles (Fillmore, 1988). Longer term follow-up is needed to determine whether skills training can speed up or enhance this natural maturing process, thereby reducing risks of near term alcohol-related morbidity as well as longer term alcohol dependence.

The design of the present study improved on previous methodologies by using random assignment, appropriate control groups for effects of assessment and the standard available intervention, and systematic outcome assessment including self-monitored drinking. The study is limited by the small sample size, the large variability in drinking measures, and the exclusive reliance on self-report to assess alcohol use. Although there was considerable consistency among the various types of self-report drinking measures, it would be preferable to have more thorough information on subjects' experience of adverse effects from alcohol use and independent corroboration from other sources such as friends, laboratory markers, or direct observations.

Despite these limitations, the present findings are more encouraging than those of most previous studies. On the basis of these initial findings, a study using a larger sample has provided preliminary data replicating the overall effect of skills training interventions and investigating the acceptability and effectiveness of different formats of a revised skills training program (Baer, Kivlahan, Fromme, & Marlatt, 1989). Among other possible explanations for these findings is the greater cred-

ibility of a moderation-oriented skills training approach for young adults weary of the simplistic advice to "Just say no."

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Received September 13, 1989  
 Revision received March 19, 1990  
 Accepted May 2, 1990 ■