

Goal Setting and Feedback in the Reduction of Heavy Drinking in Females

by

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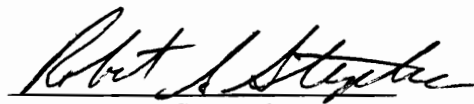
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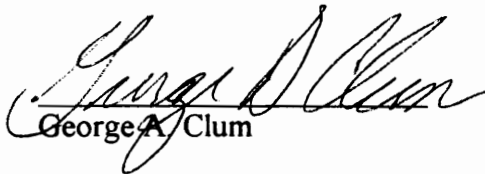
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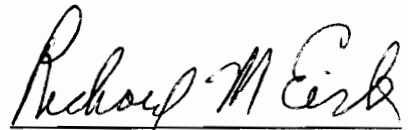
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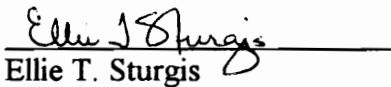
Robert S. Stephens



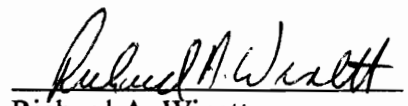
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GOAL SETTING AND FEEDBACK IN THE REDUCTION OF HEAVY DRINKING  
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by

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Psychology

(ABSTRACT)

The present study evaluated a brief intervention targeting reduction of heavy drinking in college females. Within the context of this brief intervention outcome study Bandura's (1986) model of self-regulation was tested. Seventy-six heavy drinking college females (minimum of four drinking occasions during past month with Blood Alcohol Concentration estimated at .08% or greater) participated in the intervention. Subjects participated in brief individual assessment sessions and all subjects were provided with drinking reduction information and strategies. Subjects were randomly assigned to one of three goal-setting conditions (no goal; proximal drinking reduction goal, distal drinking reduction goal). Within each of these three goal conditions subjects were randomly assigned to receive feedback on their drinking behavior or to not receive drinking behavior feedback. Subjects were reassessed one month and two months later on measures of drinking behavior and self-regulation variables (commitment to not drinking heavily, efficacy for not drinking heavily and discrepancy/discomfort relative to drinking heavily). Contrary to hypotheses, goal-setting, the provision of feedback, or the combination of goal-setting and feedback was not superior to assessment and information in the reduction

of heavy drinking. However, all conditions revealed a significant decrease in drinking across time. Although the self-regulation variables of efficacy and commitment related negatively to future drinking behavior in univariate correlational analyses, the interaction of the self-regulation variables (efficacy, commitment and discrepancy) failed to add to the prediction of future drinking beyond that accounted for by current drinking and the main effects of the self-regulation variables. The theoretically derived hypotheses were not supported by the present study. Procedural and theoretical limitations of self-regulation relative to reduction of heavy drinking in college females, as well as the difficulties involved in changing college student drinking given strong contextual influences are discussed.

## Acknowledgments

### The Goal

Each life converges to some center  
Expressed or still;  
Expressed in every human nature  
A goal,

Admitted scarcely to itself, it may be,  
Too fair  
For credibility's temerity  
To dare.

Adored with caution, as a brittle heaven,  
To reach  
Were hopeless as the rainbow's raiment  
To touch.

Yet persevered toward, surer for the distance,  
How high  
Unto the saints' slow diligence  
The sky!

Ungained, it may be, by a life's low venture,  
But then,  
Eternity enables the endeavoring  
Again.

--Emily Dickinson

## RECIPE FOR DISSERTATION

### Ingredients

**Robert Stephens:** (with a “ph” not a “v”) -- advisor extraordinaire. Thank you, Bob, for your support and encouragement, **and** for being a mentor and educator in every sense of the word(s). I can honestly say “**you** never cease to amaze me” -- in the best of all possible ways. You have served **as** a model of both professional and personal integrity that I will be thankful for forever.

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**Family:** Maternal, paternal and fraternal “units”. Thank you for your constant love and support. But...thank you most of **all** for the encouragement to always and only “follow my bliss”.

**Glenn:** Thank you for helping me **see** what is what and who is who, for the creation of stories (past, present and future), **and** for my “bouncy feet”.

Mix all ingredients with care. Do **not** let sit. Remember to check on and thank frequently.

“My aim is true”

--Elvis Costello

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## Goal Setting and Feedback in the Reduction of

### Heavy Drinking in Females

College student drinking is a common phenomenon (Leavy & Dunlosky, 1989; O'Hare, 1990), with rates generally between 80 and 90 % (Saltz & Elandt, 1986). Not only do many college students consume alcohol, but many do so at a level of concern. A two-year longitudinal study of 17 to 25 year olds found that 58% of males and 33% of women consumed 6 or more drinks two times in the past month (Grant, Harford & Grigson, 1988). These rates are notably higher and more dangerous than those found in older age groups (Baer, 1993). In addition, college student heavy drinking has been found to be related to a myriad of adjustment problems ranging from negative effects on academic performance to driving while intoxicated (Saltz & Elandt, 1986; Wechsler & Isaac, 1992). Consistent with these potential hazards, The Institute of Medicine (IOM; 1990) has recently noted the need to provide college students with services to prevent future drinking problems. Although the majority of individuals who drink heavily in their teens and early 20's will learn to moderate their alcohol consumption, approximately 30% carry their heavy drinking patterns into mid-life (Fillmore, 1988).

The problem of college student drinking (Baer et al., 1992; National Institute of Health, 1993) is receiving increased attention. Healthy People 2000 identifies alcohol consumption as most prevalent among people ages 18 to 24 compared with all other age groups (Department of Health and Human Services, 1991). National goals for health promotion and disease prevention outlined in Healthy People 2000 include reducing

occasions of heavy drinking by young people and providing better access to treatment.

The present proposal addresses both of these goals by investigating and providing college females with a brief self-regulation intervention focused on reduction of heavy drinking.

In light of the heavy drinking rates, the associated psychosocial problems, and the potential for future drinking problems (Fillmore, 1988) secondary prevention interventions have been implemented and tested with college students (Baer et al., 1992; Baer, Kivlahan & Marlatt, 1994; Kivlahan, Marlatt, Fromme, Coppel & Williams, 1990). Secondary prevention interventions are designed to target individuals most at risk for developing alcohol-related problems and those showing early signs of problems. The goal of such interventions is not to promote labeling individuals as having an alcohol problem or to promote abstinence from alcohol, but rather to promote responsible drinking and decrease potential negative consequences such as accidents associated with heavy drinking (Baer, 1993).

Similarly, the goal of brief interventions is consistent with the non-labeling approach. Brief interventions, ranging from self-help programs to direct advice to brief cognitive-behavioral interventions, vary in terms of delivery but in general involve less professional time (Heather, 1989). These interventions are conceptualized to not only target drinking behavior, but to target readiness to change (Miller & Rollnick, 1991). Brief interventions have been found to produce significant pre-post change as well as change equivalent to that of more lengthy interventions (Bien, Miller & Tonigan, 1993).

The majority of brief interventions have targeted less severe drinkers suggesting them as a viable option for intervening with college students.

There is precedence for brief advice and feedback (Baer et al., 1994) interventions with college students. A controlled comparison of a 6 week educational/skills training group intervention and a one-hour feedback and advice session yielded comparable reductions in alcohol consumption (Baer et al., 1992). This suggests that length of intervention exposure may be a limited predictor of subsequent outcome. Consistent with the goal of secondary prevention, these interventions have targeted reduction in drinking levels as opposed to abstinence from alcohol and have found lasting effects in two-year follow-up assessments (Baer et al., 1992; Baer et al., 1994).

Although these college student intervention studies have employed approximately equal percentages of male and female subjects, alcohol administration and intervention studies have traditionally employed male subjects. Reasons range from methodological difficulties involved in administering alcohol to females (i.e., pregnancy tests) to the greater percentage of males who consume and experience problems with alcohol (APA, 1994, Helzer, Burnam & McEvoy, 1991).

Epidemiological data indicates that despite stability in the overall percentage of women who report consuming alcohol, the makeup of that figure includes an increase in the percentage of younger female drinkers (Fillmore, 1987). Further, there is evidence that the gap between male and female college students' drinking practices has narrowed since the late 1970's (Mercer & Khavari 1990) revealing nearly identical percentages of

drinkers and abstainers (Johnson, O'Malley & Backman, 1989). There is a call for investigation of women's drinking and treatment (Gomberg, 1993). Some studies have found females to benefit significantly more than males in self-help/brief intervention formats (Robertson, Heather, Dzialdowski, Crawford & Winton, 1986; Sanchez-Craig, Leigh, Spivak & Lei, 1989). Sanchez-Craig et al. (1989) speculate that perhaps women have more experience with self-regulating behaviors (e.g., overeating) or prefer self-help/brief intervention formats due to the stigma associated with substance abusing females. However, this gender difference is not a consistent finding in the literature (Baer et al., 1992).

### Self-Regulation

Models of self-regulation have been proposed as a "context through which to understand, treat and prevent addictive behaviors" (Miller & Brown, 1991, p. 60). Although there are many models of self-regulation (e.g., Bandura, 1986, 1991; Kanfer, 1993) a common set of self-regulatory variables exist. These variables include commitment to a goal, feedback relative to goal-directed behavior, and discrepancy between present performance and the desired goal. Bandura (1986; 1991) additionally assigns a central role to positive efficacy expectancies for engagement in goal-directed behaviors.

Self-regulation is proposed to function via a feedback loop. When a person who is committed to a goal receives feedback that he/she is not achieving that goal, a discrepancy between the goal and the individual's behavior is activated. The discrepancy serves as an

impetus for discrepancy reduction. According to Bandura (1986, 1991), the discrepancy will be reduced by increasing goal directed efforts if the individual has positive efficacy expectancies. The feedback loop can function in both a proactive and reactive manner. People create discrepancy through setting goals that are inconsistent with current behavior. People also act to decrease discrepancy when current behavior fails to match desired goal behavior.

Although self-regulation models have been discussed in terms of substance abuse etiology and treatment (Miller & Brown 1991), the individual and interactive functions of self-regulation variables have undergone limited systematic investigation. Both behavioral self-control training (Harris & Miller, 1990; Miller & Baca, 1983; Miller & Taylor, 1980) and motivational interviewing (Miller & Rollnick, 1991) employ goal-setting as part of a package intervention and have resulted in encouraging findings. Motivational interviewing is designed to promote discrepancy between goals and current behavior in order to motivate self-regulation. Despite the central role assigned to goals and discrepancy production, tests of self-regulation based interventions have not assessed and evaluated their impact on the presumed mediating variables. Preliminary studies of self-regulation variables in the treatment of substance use and abuse has been encouraging (Alexy, 1985; Borrelli & Mermelstein, 1994), but more research examining the hypothesized roles of self-regulatory variables is needed to understand how current treatment programs work, design more effective treatment programs, and evaluate theory in the area of behavior change.

### Goal-setting: Role in self-regulation

Goals have been noted to direct attention, mobilize effort, increase persistence across time and aid in the development of goal-related strategies (Locke, Shaw, Saari, & Latham, 1981). According to Bandura's self-regulation theory (1986), goals are motivational in nature because they provide a standard against which people observe and evaluate their own behavior and because goal setting can produce motivational self-discrepancy. Social-cognitive theory (Bandura, 1986) differentiates between proximal goals and distal goals. Distal goals are generally long-term, distant from current behavior, and serve a directive function. On the other hand, proximal goals are subgoals which are generally smaller and provide a more proximate comparative standard relative to distal goals. Proximal goals are held to increase goal congruent behavior by mobilizing self-reaction(s) (e.g., discrepancy), and increasing self-satisfaction and efficacy with the meeting of each subgoal (Bandura, 1986).

Laboratory task studies (Locke et al., 1981; Masters, Furman & Barden, 1977) and field studies (Bandura & Simon, 1977; Perri & Richards, 1977) have found that goals result in better performance when they are proximal, explicit and challenging rather than when they are distal, easy and vague. Borrelli and Mermelstein (1994) examined the role of subgoal setting in relation to smoking cessation outcome. They found that the number of subgoals achieved and positive efficacy expectancies were predictive of abstinence 3 months later. A negative relationship, however, was noted between the number of subgoals set and the number of subgoals achieved.

Choice in goal-setting has also received some attention in the alcohol treatment literature. Although collaborative goal-setting has been recommended in the clinical literature (Washton & Washton, 1990) and choice in goal setting has been found to relate positively to treatment outcome for heavy drinkers (Sanchez-Craig & Lei, 1986), the goal-setting data does not clearly support an advantage of participative goals relative to assigned goals (Locke et al., 1981). In addition, alcohol treatment research has not found significant outcome differences between subjects randomly assigned to a moderation goal or an abstinence goal (Graber & Miller, 1988; Sanchez-Craig, Annis, Bornet & MacDonald, 1984). In fact, Alexy (1985) noted significantly greater reductions in alcohol consumption when subjects were assigned goals compared to when goals were collaboratively set. Indeed, it is possible that self-selection of goals may result in less challenging goals than assigned goals (e.g., Locke et al., 1984). In such a case, this practice may actually lead to inferior goal related behavior compared to challenging assigned goals. Assignment versus choice of goal may be independent of the more crucial issue of commitment to goal (see later).

#### Feedback: Role in self-regulation

Although goals are considered motivational in and of themselves, there is ample evidence for the effect of feedback on the propensity of goals to motivate behavior (Bandura & Cervone, 1983; Becker, 1978; Erez, 1977). In terms of self-regulation, Bandura (1986) concludes that "evaluative self-reactions cannot be much aroused if one does not have a clear idea of how one is doing" (p. 339). Feedback is held to serve two



functions (Bandura, 1986). First, it provides information concerning goal-related performance (e.g., positive feedback as reinforcement). Second, feedback serves as a sign of progress which can affect motivation through self-evaluative mechanisms.

The use of feedback is implicit in the teaching and practicing of coping skills in cognitive-behavioral substance abuse treatments (Marlatt & Gordon, 1985). However, explicit documentation of the use of feedback is missing. The relation of feedback to behavioral goals, and its potential to activate self-discrepancy and potentially motivate behavior has not been explored (Curtin, 1994). Although Miller and Rollnick (1991) utilize individualized objective feedback in their motivational interviewing intervention, the research designs employed to date have not disentangled the independent effect(s) of feedback from the other elements in the intervention package.

#### Self-efficacy: Role in self-regulation

Self-efficacy is defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986). Self-efficacy expectancies are proposed to influence initiation of, effort toward and persistence in behavior change (Bandura, 1986). Consistent with these hypotheses, self-efficacy has been found to relate to the adoption of challenging goals and to increase task performance (Locke et al., 1984). According to Bandura (1986) self-efficacy also partially determines whether a discrepancy between a goal standard and current behavior will be discouraging or motivating. Discrepancy in the face of low efficacy is predicted to

lead to decreased persistence toward the standard whereas high efficacy will promote increased persistence toward the standard (Bandura & Cervone, 1986).

In the area of substance abuse, efficacy is typically measured by asking individuals to report on their perceived ability to not use a given substance in a given situation or to utilize a specific coping behavior to avoid using the substance. The role and predictive utility of the self-regulation variable of self-efficacy expectancies (Bandura, 1986) has been investigated in substance abuse interventions. A number of investigations of the role of self-efficacy in treatment outcome have yielded negative relationships between post-treatment efficacy expectancies and subsequent substance use (e.g., Stephens, Wertz & Roffman, 1994; Supnick & Colletti, 1984). Similarly, in a recent review of the role of self-efficacy in the addictive behaviors, DiClemente, Fairhurst and Piotrowski (in press) note a generally positive relationship between post-treatment efficacy measures and outcome. However, tests of efficacy expectancies in relation to different levels of goals and feedback has not yet been studied in relation to substance abuse.

#### Commitment: Role in self-regulation

Although goals, feedback and self-efficacy provide promise for maintaining goal-congruent persistence, commitment is theoretically considered a prerequisite to the effectiveness of goal setting. Goal commitment is defined as "the resolve to pursue a course of action that will lead to selected outcomes or performance attainments" (Bandura, 1986, p. 477). In their review of commitment and goal setting, Locke, Latham and Erez (1988) state "it is virtually axiomatic that if there is no commitment to goals,

then goal setting does not work" (p. 23). A separate review of goal commitment and goal setting noted, however, that the majority of empirical investigations of the effectiveness of goal setting fail to measure commitment (Hollenbeck & Klein, 1987).

There is some evidence of a positive relationship between commitment and laboratory task performance (Locke & Shaw, 1984). In addition, the substance abuse literature lends some indirect support to the relationship between commitment and positive outcome. Hall, Havassy and Wasserman (1990) found that commitment to an abstinent goal at the end of treatment for alcohol, opiate or nicotine abuse significantly related to a decreased risk of a slip for the next 12 weeks. The same relationship was also found in a sample of cocaine patients (Hall, Havassy & Wasserman, 1991). More research on the role of commitment and the interaction with other self-regulatory variables is needed to understand the conditions that promote behavior change.

### Present Study

The present study used a brief intervention to examine the effectiveness of goal setting, feedback, and goal setting combined with feedback in the reduction of heavy drinking occasions in college females. These variables were also examined relative to their interaction with other self-regulatory variables of efficacy, commitment and discrepancy. Three levels of goal for reduction in heavy drinking occasions in a sample of college females were manipulated and crossed with two levels of feedback. Theoretically important self-regulatory variables as well as drinking behavior were measured across

time. Validation of college student self-reports of drinking were assessed through comparisons with collateral reports.

Findings hypothesized from the present study follow:

1) A main effect of goal condition was hypothesized. Subjects assigned to the proximal goal condition were expected to achieve the greatest reduction in heavy drinking, followed by subjects in the distal goal condition, and finally by subjects in the no goal condition.

2) An interaction between goal condition and feedback was hypothesized. The provision of feedback was predicted to produce greater behavior change in the proximal and distal goal conditions than in the no goal condition.

3) The interaction of efficacy, commitment and discrepancy was expected to significantly add to the prediction of future drinking beyond that predicted by the main effects of the individual self-regulation variables, and current drinking behavior. Future behavior change was hypothesized to be greatest when all components of self-regulation were present. For example, if either commitment or self-efficacy was low, change in heavy drinking was expected to be mitigated.

## Methods

### Participants

One hundred forty female Virginia Tech students were screened. Eligibility criteria for participation included:

- 1) a minimum of four heavy drinking occasions during the past month. Frequency of heavy drinking occasions was defined as the number of times the individual reached an estimated Blood Alcohol Concentration (BAC) of .08% or above. This estimate was based on number of self-reported alcoholic drinks, time period of consumption and body weight using a computer program by Markham and Miller (1991).
- 2) a minimum of one alcohol-related problem in the past six months on the Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989).
- 3) no health-related contraindications to alcohol consumption (i.e., pregnancy, unusual response to alcohol).
- 4) not currently participating in any type of alcohol intervention, including another alcohol intervention study targeting college students.
- 5) willingness to identify a collateral to report on the subject's drinking at the one and two month follow-ups.

Of the 140 screened subjects, 81 subjects (58%) were eligible and 59 (42%) subjects were ineligible. All ineligible subjects reported fewer than the minimum number of four heavy drinking occasions during the past month. There were no differences between eligible and ineligible subjects on age,  $F(1, 137) = 0.74, p > .05$ ; race,  $X^2(2, N = 140) = 2.33, p > .05$ ; marital status,  $X^2(1, N = 140) = 1.38, p > .05$ ; residence,  $X^2(2, N = 140) = 0.81, p > .05$ ; or sorority membership,  $X^2(1, N = 140) = 0.43, p > .05$ . Five of the eligible subjects choose not to participate due to scheduling difficulties ( $N = 3$ ) and/or lack of interest ( $N = 2$ ).

The final set of subjects were 76 female Virginia Tech students. Subjects' mean age was 19.51 ( $SD = 1.26$ ) years, and all were single. The majority were Caucasian (94.7%), 2.6% were African American, and 2.6% were Asian. Nearly equal percentages of subjects lived on campus (52.6%) as off campus (47.4%). The majority of subjects were not involved in the campus Greek system. Thirty-four percent of subjects were members of a sorority, and 5.3% were little sisters for a fraternity. Subjects reported experiencing an average of 14.47 ( $SD = 6.63$ ) alcohol-related problems at least one time across the past six months. Eligible subjects reported an average of 7.40 ( $SD = 3.26$ ) heavy drinking occasions. They reported drinking an average of 68.46 ( $SD = 51.41$ ) standard drinks across the preceding month, drinking an average of 6.56 ( $SD = 2.43$ ) standard drinks per occasion, drinking on an average of 9.75 ( $SD = 3.69$ ) occasions, and reaching an average estimated BAC of .17 ( $SD = .07$ ).

### Design

The overall design was a 3 (goal: no goal, proximal goal, distal goal) x 2 (feedback: feedback versus no feedback) x 3 (time: initial session, 1 month, 2 months) mixed-model factorial design. Goal condition and feedback condition served as between subjects factors. Time served as a within subjects factor. Subjects were randomly assigned to one of the 6 between subjects conditions created by crossing the three goal conditions with the two feedback conditions. Thirteen subjects were randomly assigned to each of the following conditions: no goal/no feedback, no goal/feedback, proximal

goal/no feedback, and proximal goal/feedback conditions. Twelve subjects were randomly assigned to each the distal goal/no feedback and the distal goal/feedback conditions.

### Procedure

Recruitment and Screening. Recruitment strategies included the psychology department subject pool; flyers posted around campus, at the counseling/health center and in the Greek organizations; and newspaper ads (see Appendix A). These promoted a brief program for females 18 and older who were interested in learning about their drinking behavior and/or changing their drinking patterns. Interested individuals were instructed to contact the investigator for information concerning participation.

Screening was conducted in group sessions in classrooms by both a fourth year clinical psychology graduate student and trained undergraduate research assistants. First, written informed consent was sought, with a copy of the consent form offered to each subject and another copy kept by the researcher. Consent forms detailed the goals and methods of the study, the subjects' rights to refuse to participate or withdraw at any time, and the potential risks and benefits associated with participation (Appendix B).

Screening measures included an alcohol consumption measure, the Rutgers Alcohol Problems Inventory (RAPI; White & Labouvie, 1989), the Michigan Alcoholism Screening Test (MAST; Selzer, 1971), a health screening questionnaire, and a general information questionnaire (Appendix C). As described above, eligible subjects reported a minimum of four heavy drinking occasions during the past month, reported experiencing at least one alcohol-related problem, and agreed to provide the name of an individual

familiar with her drinking habits to provide a confidential collateral report at intervals corresponding to subject follow-ups. The MAST and health screening questionnaire were administered to assess for symptoms of dependence and health problems, respectively.

Referrals were available to subjects who were not interested in study participation but who wanted help in reducing drinking. Such treatment was available and free of charge at the university counseling center and the Psychology Department's Psychological Services Center. In addition, information on community 12-step fellowships was available. No subjects accepted referrals for alternative interventions.

Initial Intervention Procedure. Subjects meeting inclusion criteria were invited to participate in an individual assessment and brief intervention session lasting approximately one hour. Subjects were contacted by phone and scheduled for an individual session. At this time, the subject was asked to contact a friend familiar with her drinking habits and ask that friend if he/she would agree to provide an independent report of the subject's drinking that was not to be shared with the subject. The subject was instructed to bring her friend's name, address and phone number to the scheduled session.

Individual assessment and feedback sessions were conducted by one of two female fourth year clinical psychology graduate students (Lisa Curtin or Sara Mattis). Both are well-versed in the use of structured assessment and treatment protocols, as well as basic therapeutic skills and issues of confidentiality. In addition, they were trained concerning administration of the instruments and procedures unique to the present study. Ongoing



supervision and consultation was provided by Dr. Robert S. Stephens, a licensed clinical psychologist who specializes in substance use and abuse.

Upon presentation for the individual session, subjects first granted the researcher written informed consent (Appendix D). Again, consent forms detailed the goals and methods of the study, the subjects' rights to refuse to participate or withdraw at any time, and the potential risks and benefits associated with participation. Subjects were informed that they would receive payment of \$10 for participating in two follow-up reassessment sessions, one and two months later, which were scheduled at the end of the initial session.

Subjects were then asked to provide the experimenter with collateral contact information. Consent forms and self-addressed stamped return envelopes were mailed to collateral informants (Appendix E). Subjects were then asked to complete a battery of assessment questionnaires. Assessment included measures of alcohol consumption, situational efficacy and coping efficacy. After completing measures, subjects were randomly assigned to receive one of three goal assignments: no goal, proximal goal, or distal goal. Within each of these three goal conditions subjects were randomly assigned to one of two feedback conditions: feedback or no feedback.

Goal Conditions. After completing assessment instruments, subjects assigned to the no goal condition received a list of cognitive and behavioral strategies for avoiding heavy drinking as well as BAC tables to assist in estimating BAC levels from weight and number of alcoholic drinks consumed (see Appendix F). This information was presented

to subjects with the explanation that other college students reported finding such information and strategies helpful in controlling heavy drinking.

Subjects in the proximal goal condition were provided with the same drinking control information and rationale provided to no goal subjects. The value of goal-setting for directing attention, increasing persistence and resulting in greater behavior change was explained to subjects. It was recommended that they utilize this information while attempting to reduce their number of heavy drinking occasions by 50% during the upcoming month. Goals were individually defined based on baseline frequency of heavy drinking occasions. Subjects were provided with a written goal specifying the maximum number of times they were to drink the number of drinks necessary to reach a BAC of .08% during a four hour time period. During the one month reassessment, subjects who were able to achieve their 50% reduction goal were instructed to reduce their number of heavy drinking occasions by 75% compared to baseline levels. Subjects who were unable to achieve their 50% reduction goal were instructed to continue attempts to meet the original 50% reduction goal. All subjects were able to discuss successes and difficulties in meeting their goal with the experimenter.

Subjects in the distal goal condition also received the drinking control information and rationale. They were then instructed verbally and in writing to use these to reduce their number of heavy drinking occasions by 75% over the next two months. Again, the value of goal-setting was shared with subjects. Identical to the proximal goal condition,

during the one month follow-up subjects were able to discuss goal-related successes and difficulties with the experimenter.

Feedback. Half of the subjects in each of the three goal conditions were randomly assigned to receive written and verbal feedback during both the initial intervention session and the one month follow-up session. Feedback concerned weekly average quantity of alcohol consumption, average quantity of alcoholic beverages consumed per occasion, average number of heavy drinking days during the past month and highest BAC level during the past month (see Appendix G). In the proximal and distal goal conditions feedback was delivered in relation to the specified goal. Feedback in the no goal condition provided subjects with a description of their drinking behavior without any reference to a goal standard.

After receiving the intervention, all subjects completed a measure of goal commitment and discrepancy. Finally, subjects were scheduled for two reassessment appointments. One appointment was scheduled for one month after the initial session, and a second appointment was scheduled for two months after the initial session

#### Reassessment Procedures

Subjects were reassessed one month and two months after the initial individual session. Seventy-four of the 76 subjects completed the one month reassessment. One subject from the no goal/feedback condition and one subject from the proximal goal/no feedback condition failed to attend the one month follow-up. Sixty-nine of the 76 subjects completed the two month reassessment. Attrition was distributed evenly across conditions

with two subjects missing from the proximal goal/no feedback condition, and one subject missing from each of the other five conditions. Sixty-eight subjects completed all three assessments. The 68 subjects who completed all assessments did not differ significantly from the eight subjects with incomplete data on pretreatment number of heavy drinking occasions,  $F(1,74) = 1.89, p > .05$ ; average BAC,  $F(1,74) = 1.02, p > .05$ ; average quantity per occasion,  $F(1,74) = 0.63, p > .05$ ; or frequency of drinking occasions,  $F(1,74) = 1.90, p > .05$ . There was a near significant difference between groups on total number of alcoholic beverage consumed,  $F(1,74) = 3.48, p < .07$ . The eight subjects lost to attrition reported consuming a greater total number of drinks during the month prior to participation ( $M = 100.04, SD = 112.42$ ) than the 68 subjects who completed all assessments ( $M = 64.75, SD = 38.80$ ).

Subjects received a reminder call prior to follow-up appointments from one of three undergraduate research assistants. At the one-month follow-up subjects first completed measures of alcohol consumption, situational efficacy, and coping efficacy. Subjects assigned to receive feedback were then provided with drinking feedback based on the current drinking assessment. This feedback was delivered in relation to goal progress for subjects in the proximal and distal goal conditions. Subjects in the distal goal condition were reminded of their goal. Subjects in the proximal goal condition were either offered a recommended goal change (from 50% reduction to 75% reduction), or encouraged to continue working on the original goal (50% reduction from baseline) if that

goal had not been reached. Subjects then completed measures of commitment and discrepancy and were reminded of their two month follow-up appointment.

Two month follow-up assessment sessions were conducted in small groups of 5 to 10 as no individualized feedback or instruction was required. The two month follow-up included a measure of alcohol consumption and a brief questionnaire concerning perception of goal assignment, and participation in alcohol or psychological intervention(s) while participating in the study.

Collateral informants who consented to participation were contacted by phone at both the one month and two month follow-ups. They were asked to provide information on the subjects' recent drinking practices using a collateral questionnaire (Baer et al., 1994; Appendix H). Undergraduate research assistants were trained to conduct these brief collateral phone interviews. Ongoing supervision and consultation was provided by the primary investigator.

### Measures

The primary measure of interest in the present study was alcohol use. The Time-Line Follow-Back method (TLFB; Sobell, Sobell, Klajner, Pavan & Basian, 1986) was utilized to assess daily quantity and frequency of alcohol consumption and patterns of alcohol consumption at all assessment points. This method uses a calendar with self-generated memory anchor points (e.g., holidays, parties, etc.) to assist the subject in reconstructing daily alcohol consumption (see Appendix I). Subjects were provided with a calendar of the previous month, and asked to provide daily reports of the type and

amount of alcohol consumed as well as the number of hours spent drinking. The present study assessed alcohol consumption for the preceding month based on the recommendations of Sobell et al. (1986) regarding adequate test-retest reliability across a 30-day time period with college students ( $r$ 's ranging from .76 to .96).

Time-Line Follow-Back data was used to compute a number of summary drinking indices. Total alcoholic beverages consumed represents a sum of standard drinks consumed across the past month. This variable was divided by the number of times the subject reported drinking any alcohol across the past month to create a variable representing the average number of alcoholic beverage consumed per occasion (average quantity). Average quantity was utilized as a primary dependent variable in the present study as subjects were instructed to reduce their average quantity in their efforts to reduce heavy drinking behavior. In addition, quantity is a standard dependent variable in alcohol research (Cahalan, Cisin, & Crossley, 1969; Grant, et al., 1988) and has been used in other evaluations of college student drinking reduction interventions (Baer, et al., 1994).

Daily estimates of alcohol consumption allow for an estimate of BAC level or degree of intoxication (Matthews & Miller, 1970; Miller, 1989). Blood Alcohol Concentration estimates were derived from alcohol use reported using the TLFB method, reported time period in which alcohol was consumed, and subject self-reported weight. A computer program, Blood Alcohol Concentration Calculation System (BACCUS), developed by Markham and Miller (1991) was used to compute BAC estimates. The primary dependent variable represents a frequency of times a subject's BAC reached an

estimated .08% or greater. This frequency count represented the number of heavy drinking occasions, as defined in this study, reported across the previous month. In addition, an average BAC was derived by creating a sum of all BAC's across the previous month and dividing by the number of drinking occasions.

Problems related to alcohol use such as neglecting responsibilities or fighting were assessed with the RAPI (White & Labouvie, 1989). The RAPI is a 23-item questionnaire that assesses frequency of problem drinking consequences in the past six months (e.g., not able to do your homework or study for a test, neglected your responsibilities, caused shame or embarrassment to someone; see Appendix J). Subjects are asked to respond to the question "How many times did the following things happen to you while you were drinking alcohol or because of your alcohol use during the past six months?" with responses ranging from 0 "never" to 4 "more than ten times". This questionnaire has been noted to have good internal consistency ( $\alpha = .93$ ) in the college population (Curtin, Stephens & Greaves, 1992). An identical alpha level of .93 was found in the present study.

The MAST (Selzer, 1971) was used to assess for severity of problem drinking. The MAST is a 25-item list of questions assessing signs or symptoms associated with problematic drinking such as "Have you ever lost a job because of drinking?" or "Do you feel you are a normal drinker?". Subjects are asked to respond "yes" or "no" to each question. Individual items are assigned weights of 0, 1, 2 or 5 and are summed to yield total scores ranging from 0 to 53. It has been noted that the specificity of the MAST

improves with college students when the wording of two questions is slightly altered to more adequately match the population (Martin, Liepman & Young, 1990). Based on this finding the question "Have you ever attended a meeting of Alcoholics Anonymous (AA)?" was changed to "Have you ever attended a meeting of Alcoholics Anonymous (AA) because of your own problem drinking", and the question "Has drinking ever created problems between you and your spouse?" was changed to "Has your drinking ever created a problem between you and your family members?" (see Appendix K). Eligible subjects averaged a score of 8.2 ( $SD = 5.8$ ) on the MAST. In a review of MAST score cut-offs, Jacobson (1989) suggests a score of five through nine may be suggestive of a drinking problem. Thus, on average the current sample endorsed items suggestive of a problem with drinking. Further, Jacobson (1989) suggests that a score of 12 or greater is likely to indicate a drinking problem. Fourteen of the eligible subjects had a MAST score of 12 or greater.

A health screening questionnaire which has been used in alcohol administration studies (Stephens & Curtin, 1994) was used to identify individuals for whom alcohol use was contraindicated. This questionnaire assesses current medication use, history of serious physical disorders such as strokes and diabetes, pregnancy, and unusual responses to alcohol such as skin flushing (Appendix L). Individuals endorsing any of the above were informed of contraindications to alcohol use and encouraged to speak to their physician.



A 46-item version of the Situational Confidence Questionnaire (SCQ; Annis, 1988) was used to assess subjects' perceived ability to not drink heavily. The questionnaire was adapted from the original 39-item SCQ (Annis, 1988). Subjects are asked to rate their perceived ability to "resist the urge to drink heavily" in a variety of situations (e.g., if other people didn't seem to like me; if at a happy hour with friends) on a scale ranging from 0 "not at all confident" to 100 "very confident" (see Appendix M). Total scores represent an average across situations. The adapted questionnaire includes situations specific to college student drinking (e.g., fraternity parties), has been utilized in pilot work, and showed good internal consistency ( $\alpha = .97$ ) and concurrent validity in a study of college student drinking (Curtin et al., 1992). Principle components analysis in the current study supported the use of a single scale with an average alpha level of .98.

In addition to situational efficacy, coping efficacy was assessed using the Alcohol Coping Efficacy Scale (ACES; Greaves, Stephens & Curtin, 1992). Coping efficacy refers to perceived ability to perform a specific coping behavior. The coping efficacy measure consisted of 18 items corresponding to specific behavioral skills for avoidance of heavy drinking, such as taking slow sips on a drink, refusing unwanted drinks or keeping track of the number of drinks consumed (Appendix N). Subjects are asked to rate their confidence in their ability to utilize each coping skill on a scale ranging from 0 "not at all confident" to 100 "very confident". Total scores represent an average across coping skills efficacy ratings. This measure has revealed adequate internal consistency ( $\alpha = .93$ ) and predictive utility in pilot work with college students (Greaves, Stephens & Curtin, 1992).

Principle components analysis in the present study supported the use of a single scale, and reliability analyses yielded good internal consistency ( $\alpha = .97$ ).

Commitment to assigned goals was assessed using a 7-item scale adapted from that employed in academic goal-setting research (Hollenbeck, Williams & Klein, 1989; see Appendix O). Subjects are asked to respond true or false to questions designed to assess unwillingness to abandon a goal. Five of the 7 items are reverse coded. True responses are assigned one point whereas false responses are assigned zero points yielding total scores which range from 0 to 7. Higher scores are indicative of greater commitment. Although, this scale has been found to be internally consistent ( $\alpha = .88$ ) and to possess construct validity and predictive utility in prior research (Hollenbeck et al., 1989), the 7-item scale yielded inadequate internal consistency in the present study ( $\alpha = .50$ ).

Results of a principle components analysis suggested two potential scales based on the scree plot (Cattell, 1966; Stevens, 1992). One appeared to reflect commitment and willingness to not drinking heavily and to reduce drinking. It included four items: "I am strongly committed to not drinking heavily", "Quite frankly, I don't care if I reduce my heavy drinking" (reverse coded), "It's unrealistic for me to expect to reach my heavy drinking goal" (reverse coded), and "Since it's not always possible to tell how hard something is until you've been working at it for a while, it's hard to take any heavy drinking reduction goal seriously" (reverse coded). The remaining three items appeared to reflect perceptions of the heavy drinking goal (e.g., I think my heavy drinking goal is a good goal to shoot for; it is quite likely that my goal regarding heavy drinking will change

depending on how things go this semester; it would not take much for me to change my goal concerning reduction in heavy drinking). The four item scale evidenced greater internal consistency ( $\alpha = .63$ ) than the three item scale ( $\alpha = .13$ ). However, neither of these subscales was adequate in terms of internal consistency.

Given these findings, the zero-order correlations between each subscale and future drinking, and each of the seven scale items and future drinking behavior was examined. The single item "I am strongly committed to not drinking heavily" correlated most highly with future drinking behavior ( $r = -0.48, p < .001$ ) compared to all other individual items and each of the two subscales ( $r$ 's range from  $-0.35$  to  $0.03$ ). Thus, this single item assessing commitment to not drinking heavily was utilized in all subsequent analyses.

Finally two exploratory questions assessed discrepancy between current behavior and desired drinking habits. These questions were designed to assess subjective discrepancy rather than objective discrepancy of goal-related success or failure. Subjects were asked to respond to the question "How large is the difference between your current drinking and your goal concerning heavy drinking?" on a scale ranging from 1 "not at all different" to 7 "very different"; and "What is the level of discomfort you experience concerning your current drinking habits?" on a scale ranging from 1 "no discomfort" to 7 "much discomfort" (see Appendix P). Both the intercorrelation between these two items ( $r = .33, p < .002$  at one month and  $r = .18, p > .05$  at two months) and average alpha level (average  $\alpha = .41$ ) were inadequate. Thus, the single item "How large is the difference between your current drinking and your goal concerning heavy drinking?" was

utilized as an indication of discrepancy in subsequent analyses. This item was chosen due to its face valid reference to heavy drinking behavior rather than general current drinking habits.

## Results

First, the effectiveness of randomization was tested with a Multivariate Analysis of Variance (MANOVA) utilizing baseline drinking measures of number of heavy drinking occasions and average quantity per occasion as dependent variables. Feedback (yes vs. no) and goal (no goal, proximal goal, distal goal) served as between subjects variables. No differences were found in baseline drinking measures as a function of goal (Pillais statistic = .04, approximate  $F(4, 140) = .71, p > .05$ ), feedback (Pillais statistic = .03, approximate  $F(2, 69) = 1.05, p > .05$ ), or the interaction of goal and feedback (Pillais statistic = .02, approximate  $F(4, 140) = .29, p > .05$ ). Results suggested no differences on baseline drinking measures between groups.

Next, the possibility of differential therapist effects were evaluated using a MANOVA approach to repeated measures (O'Brien & Kaiser, 1985). One therapist (Lisa Curtin) saw a total of 58 subjects: 10 in the no goal/no feedback condition, 11 in the no goal/feedback condition, 9 in the proximal goal/no feedback condition; 10 in the proximal goal/feedback condition, 8 in the distal goal/no feedback condition, and 10 in the distal goal/feedback condition. The other therapist (Sara Mattis) saw a total of 18 subjects: 3 in the no goal/no feedback condition, 2 in the no goal/feedback condition, 4 in the proximal

goal/no feedback condition, 3 in the proximal goal/feedback condition, 4 in the distal goal/no feedback condition, and 2 in the distal goal/feedback condition.

Two analyses were conducted utilizing frequency of heavy drinking occasions and average quantity per occasion at the initial session, one month follow-up and two month follow-up as dependent variables. The frequency of heavy drinking occasions was the primary target behavior of the present intervention and served as the primary dependent variable. In addition, average quantity per occasion was utilized as a dependent variable in outcome analyses given it is often used as a measure of heavy drinking in the literature (Baer et al., 1994; Cahalan et al., 1969). Therapist (two levels), goal (three levels: no goal, proximal goal, distal goal), and feedback (two levels: no feedback and feedback) served as between subjects variables, and time served as the within subjects variable with three levels (initial, 1 month, 2 months). A significant therapist by time interaction would indicate differential results in change across time as a function of therapist.

A significant multivariate effect of time was noted for both number of heavy drinking occasions, Pillais statistic = .35, approximate  $F(2, 55) = 14.87$ ,  $p < .001$ , and average quantity per occasion, Pillais statistic = .33, approximate  $F(2, 55) = 13.32$ ,  $p < .001$ . No effects were noted as a function of the main or interactive effects of therapist, goal, feedback or of the interaction between therapist, goal, feedback and time,  $p$ 's  $> .05$ . Subsequent analyses collapse across therapists.

### Outcome as a Function of Goal and Feedback Condition

Fifty of the 76 subjects were assigned a goal. Of these 50 subjects, 49 completed the one month follow-up. Thirteen (27%) of the 49 subjects met the assigned goal (8 were assigned proximal goals, 5 were assigned distal goals) and 36 (73%) did not meet the assigned goal. Of the 13 subjects who met the assigned goal at the one month follow-up, only six maintained this at the two month follow-up (4 were assigned proximal goals, 2 were assigned distal goals). On the other hand, of the 36 subjects who had not met the goal at the one month follow-up, five met the goal at the two month follow-up (2 were assigned proximal goals, 3 were assigned distal goals). Both the one and two month follow-ups assessed drinking during spring break for some subjects. This may have limited the number of subjects who reached the assigned goal. This potential confound will be discussed and addressed in subsequent analyses.

Hypothesis one predicted that subjects assigned to the proximal goal condition would achieve the greatest reduction in heavy drinking, followed by subjects in the distal goal condition, and finally by subjects in the no goal condition. In addition, hypothesis two predicted that the provision of feedback would be associated with even greater behavior change in the proximal and distal goal conditions relative to the no goal condition. Hypotheses one and two were addressed simultaneously. Outcome as a function of goal condition, feedback condition, and their interaction was tested using a MANOVA approach to repeated measures with goal assignment (no goal, proximal goal, distal goal) and feedback (feedback, no feedback) as the between subjects factors, and

time (initial, 1 month, 2 months) as the within subjects factor. A goal by feedback by time interaction with greatest reduction occurring in the proximal goal condition, followed by the distal goal condition, and finally the no goal condition would support hypothesis one. In addition, hypothesis two would be supported if reduction was greater in each of the active goal conditions with the addition of feedback. Separate analyses were conducted for the two dependent variables of frequency of heavy drinking occasions and average quantity per occasion.

Frequency of Heavy Drinking Occasions. A MANOVA using the number of heavy drinking occasions at the initial session, one month follow-up and two month follow-up as dependent variables yielded a significant goal by feedback by time interaction, Pillais statistic = .20, approximate  $F(4, 124) = 3.53, p < .01$ . In addition, a multivariate effect of time was found, Pillais statistic = .53, approximate  $F(2,61) = 34.43, p < .001$ . See Table 1 for means and standard deviations.

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Insert Table 1 about here

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Reduction in drinking across time was hypothesized to vary as a function of both goal and feedback condition with the greatest reduction associated with the combination of a proximal goal and feedback. In order to decompose the noted overall three-way interaction, separate repeated measures Analyses of Variance (ANOVA's) were performed to test for the time points at which reductions in drinking varied as a function

of goal condition and feedback condition. Three separate repeated measures ANOVA's were conducted with initial number of heavy drinking occasions and one month number of heavy drinking occasions; initial number of heavy drinking occasions and two month number of heavy drinking occasions; and one month number of heavy drinking occasions and two month number of heavy drinking occasions serving as repeated measures, respectively.

The goal by feedback by time interaction,  $F(2, 62) = 4.90, p < .01$ , and the main effect of time,  $F(1, 62) = 36.40, p < .001$ , emerged as significant in the analysis using initial number of heavy drinking occasions and one month number of heavy drinking occasions as dependent variables. All conditions significantly reduced their frequency of heavy drinking occasions between the initial session and one month follow-up (all  $p$ 's  $< .05$ ) with the exception of the no goal/no feedback condition,  $t(10) = 1.19, p > .05$ , and the proximal goal/feedback condition,  $t(11) = -0.09, p > .05$ .

Similarly, the ANOVA examining initial number of heavy drinking occasions and two month number of heavy drinking occasions yielded a significant goal by feedback by time interaction,  $F(2, 62) = 4.90, p < .01$ , and a significant main effect of time,  $F(1, 62) = 54.17, p < .001$ . Further evaluation of the interaction effect indicated that all conditions evidenced a reduction across time (all  $p$ 's  $< .05$ ), again with the exception of the proximal goal/no feedback condition,  $t(11) = 0.84, p > .05$ . Neither the goal by feedback by time interaction or the main effect of time emerged in the analysis using number of heavy



drinking occasions at one month and number of heavy drinking occasions at two months as the repeated measures factor, all  $p$ 's > .05.

These results suggest that subjects reduced their number of heavy drinking occasions between the initial session and one month session, that this reduction varied with goal assignment and feedback delivery, and that this pattern of reduction was maintained at the two month follow-up. Contrary to hypotheses, however, reduction in the number of heavy drinking occasions was not greatest in the proximal goal/feedback condition. In fact, further evaluation of the goal by feedback by time interaction revealed that subjects in this condition failed to significantly reduce their number of heavy drinking occasions between the initial session and one month session, as well as between the initial session and two month follow-up.

Inspection of Table 1 reveals a great degree of variability in the proximal goal/feedback condition relative to other conditions. This degree of variability would indeed render it difficult to detect change in this condition and potentially violates the assumption of homogeneity of variance. Although the MANOVA procedure is robust with regard to the assumption of multivariate sphericity, the above analysis was also conducted adjusting the denominator degrees of freedom by the conservative Greenhouse-Geisser epsilon (Stevens, 1992). Even with this adjustment which yields a less powerful but more conservative within subjects test, the goal by feedback by time interaction emerged,  $p < .05$ .

However, evaluation of the skewness (2.00) and kurtosis (5.85) of the distribution of heavy drinking occasions at baseline suggests considerable deviation from normality. Based upon the recommendation of Stevens (1992) as well as Tabachnick and Fidel (1989) the frequency of heavy drinking occasions was logarithmically transformed. An identical repeated measures MANOVA was conducted utilizing the logarithmic transformation as the within subjects factor. Logarithmic transformations were unable to be computed for three of the 68 total subjects due to their having zero heavy drinking occasions at one of the follow-up assessments. This analysis revealed a similar main effect of time, Pillais statistic = .46, approximate  $F(2, 58) = 24.77, p < .01$ . Repeated measures ANOVA's again revealed a significant difference between frequency of heavy drinking occasions at the initial session and one month follow-up,  $F(1, 58) = 33.21, p < .001$ , and between the initial session and two month follow-up,  $F(1, 58) = 47.39, p < .001$ . A significant difference was not found between the one month and two month follow-ups,  $F(1, 58) = 0.01, p > .05$ . Contrary to the untransformed analysis, no multivariate effects were found for the interaction of goal, feedback and time. Similar to the untransformed analysis no multivariate effects were found for the effects of goal and time, and feedback and time.<sup>1</sup>

Average Quantity per Occasion. An identical MANOVA was conducted utilizing average number of drinks per occasion as the dependent variable. Similarly, a significant multivariate effect of time, Pillais statistic = .39, approximate  $F(2, 61) = 19.44, p < .001$ , emerged. Again, a significant reduction in average number of drinks consumed was noted

between the initial assessment and the one month follow-up,  $F(1, 62) = 36.03, p < .001$ , and between the initial assessment and the two month follow-up,  $F(1, 62) = 21.48, p < .001$ . No differences were found between average quantity per occasion consumed at the one month and the two month follow-ups,  $F(1, 62) = 1.31, p > .05$ . Multivariate effects were not found for the interaction effects of goal and time, feedback and time, or goal, feedback and time. Means and standard deviations are presented in Table 2.

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Insert Table 2 about here

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The overriding hypothesis that reduction in heavy drinking occasions would vary reliably as a function of goal condition and feedback delivery was not confirmed. Although a goal by feedback by time interaction did emerge in the untransformed analyses of frequency of heavy drinking occasions, it actually indicated a reduction for all groups across time *except* the proximal goal/feedback condition. Although multivariate analyses of pretreatment differences on drinking variables did not indicate significant differences, pretreatment number of heavy drinking occasions as well as within group variability was greatest in the proximal goal/feedback condition. Further, analyses of the logarithmic transformation of frequency of heavy drinking occasions and all other drinking variables did not reveal the goal by feedback by time interaction. Further, the absence of a goal by time interaction failed to confirm the hypothesis that reduction in heavy drinking would be

greater with a goal assignment compared to no goal assignment, or greater with a proximal compared to a distal goal.

Perceptions of Goal. The effectiveness of goal setting has been noted to be influenced by perceptions of the goal (Locke, et al., 1981). The 50 subjects who were assigned goals were asked to respond true or false to two questions assessing their perception of the difficulty (“I was assigned a rather difficult goal concerning my number of heavy drinking occasions”) and reasonableness (“I was assigned a reasonable goal concerning my number of heavy drinking occasions”) of the assigned goals. Complete data was available for 45 of these 50 subjects. Two separate analyses were conducted using the MANOVA approach to repeated measures. Response to the reasonableness and difficulty questions (true vs. false) served as the between subjects factor and frequency of heavy drinking occasions at initial, one month, and two months served as the repeated measures factor.

A reasonable by time interaction or a difficult by time interaction would suggest that the effectiveness of the goal setting and/or feedback manipulation was reliably influenced by subject’s perceptions of the goal. Neither the MANOVA utilizing reasonableness as the between subjects factor (Pillais statistic = .08 approximate  $F(2, 42) = 1.72, p > .05$ ), or the MANOVA utilizing difficulty as the between subjects factor (Pillais statistic = .02, approximate  $F(2, 42) = .05, p > .05$ ) resulted in a significant interaction with time in reduction of heavy drinking occasions. Thus, subjects perceptions

of the difficulty and reasonableness of the assigned goals did not significantly impact change in heavy drinking behavior across time.

Effect Sizes. At the one month assessment, subjects across all conditions reduced their number of heavy drinking occasions by an average of 1.97 and their average quantity per occasion by 1.33 standard drinks. Within subject effect sizes were calculated by subtracting the post-treatment mean from the pretreatment mean and dividing by the pretreatment standard deviation (Rosenthal, 1991; Mullen, 1989). This within subjects effect size for both frequency of heavy drinking occasions and average quantity per occasion was .60. Similarly, at the two month assessment a 2.06 average reduction in number of heavy drinking occasions and a 1.06 reduction of average quantity per occasion was noted. The two month within subjects effect size was .63 for frequency of heavy drinking occasions and .48 for average quantity per occasion.

Between subjects effect sizes were calculated for goal and feedback conditions. Effect sizes were calculated by subtracting the mean of the no goal or no feedback condition, from the average mean of the goal (both proximal and distal) or feedback condition(s), respectively. This difference was then divided by the standard deviation of the no goal control condition or no feedback control condition (Rosenthal, 1984; Mullen, 1989). The average goal effect size for frequency of heavy drinking occasions was -.07 at one month, and -.11 at two months. The average feedback effect size for frequency of heavy drinking occasions was -.29 at one month, and -.29 at two months. Although small to close to zero, these effect sizes actually indicate a mitigating effect of goal-setting

and feedback relative to their controls. Given the distributional problems with the frequency of heavy drinking occasions variable in the proximal goal/feedback condition, effect sizes were also calculated excluding this condition. Effect sizes calculated excluding the proximal goal/feedback condition, were small (Cohen, 1977) and positive. These calculations yielded a goal effect size of .28 at one month and .32 at two months. The feedback effect size was .25 at both one and two months. Effect sizes were also calculated for average quantity per occasion. The average goal effect size for quantity per occasion was -.02 at both one month and two months. The average feedback effect size for quantity per occasion was -.44 at one month and -.55 at two months.

Overall, effect sizes for goal and feedback were close to zero or small (Cohen, 1977) and negative. The effect size for feedback was negative and small for frequency of heavy drinking occasions, and negative and small to moderate (Cohen, 1977) for quantity per occasion. The effect sizes for frequency of heavy drinking occasions remained small, but were more consistent with the hypotheses when the proximal goal/feedback condition was excluded from calculations.

### Prediction of Future Drinking from Self-Regulation Variables

Hypothesis three concerned the prediction of future drinking as a function of self-regulation variables. This was assessed utilizing correlational and multiple regression analyses. Correlations were computed between baseline drinking variables and self-regulation variables and the drinking outcomes at the one month follow-up. These analyses were repeated for drinking and self-regulation variables measured at one month,

and the two month drinking outcomes. See Tables 3 and 4 for zero-order correlations (r) between self-regulation variables and future drinking behavior.

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Insert Tables 3 and 4 about here

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As would be expected, drinking behavior was most highly correlated with drinking behavior one month later. In general and consistent with theory, both coping efficacy for not drinking heavily and commitment to not drinking heavily correlated negatively and significantly with drinking one month later. Thus, confidence in ability to utilize various coping strategies to avoid drinking heavily, and commitment to not drinking heavily was generally associated with less future drinking. Although situational efficacy did correlate negatively with future drinking, the relationship was not consistently significant.

Relationships between coping efficacy and future drinking variables were stronger and more consistent than those between situational efficacy and future drinking variables. On the other hand, subjective discrepancy between actual drinking behavior and heavy drinking goal revealed a positive, although not consistently significant, correlation with drinking one month later. According to theory (Bandura, 1986), subjective discrepancy should relate negatively with future heavy drinking, but only when combined with high levels of commitment and efficacy. A positive univariate relationship, therefore, is not necessarily theoretically inconsistent. Finally, initial session self-regulation variables were

more strongly related to drinking one month later than were self-regulation variables measured at one month.

Four hierarchical regression analyses were conducted to predict future number of heavy drinking occasions and average quantity per occasion from the self-regulation variables of efficacy, commitment and subjective discrepancy. Coping efficacy was used as a measure of confidence given its greater univariate relationship with future drinking and to limit collinearity with situational efficacy in regression analyses as situational efficacy and coping efficacy correlated on average .85 ( $p < .001$ ) across the one month and two month measures. Two regression analyses utilized predictor variables collected at the initial session to predict drinking at one month, and two used predictor variables collected at one month to predict drinking at two months. Such analyses allowed for an assessment of the main effect of the self-regulation variables, as well as an assessment of the interaction between coping efficacy, commitment and discrepancy in the prediction of future drinking.

Specifically, it was hypothesized that the interaction of greater efficacy, commitment and discrepancy would significantly add to the prediction of future drinking beyond that accounted for by both present behavior and these variables individually. Variables were entered into a hierarchical regression equation in steps in the following order: a) current drinking variable to control for behavior at the time of assessment b) main effects of efficacy, commitment and discrepancy c) interaction of efficacy, commitment and discrepancy created by computing a product of the z-scores of the three.



Z-score standardization allowed each variable to retain its distribution on identical scales with a mean of zero and a standard deviation of one. Dependent variables were number of heavy drinking occasions and average number of drinks measured at both the one month and two month follow-ups.

Tables 5 and 6 show the final regression models.<sup>2</sup> Frequency of heavy drinking occasions at baseline accounted for 49% of the variance in the frequency of heavy drinking occasions at one month,  $F(1, 72) = 68.87, p < .001$ . As a block, the main effects of efficacy, commitment and discrepancy entered the equation and accounted for an additional 13% of the variance in frequency of heavy drinking occasions one month later,  $F(3, 69) = 7.82, p < .001$ . Contrary to prediction, the interaction of the self-regulation variables of coping efficacy, commitment and discrepancy failed to enter the model and add to the prediction of future heavy drinking ( $p > .05$ ). Examination of Beta weights indicate negative relationships between coping efficacy, commitment and discrepancy, and the frequency of future heavy drinking occasions. Similar relationships were noted in both univariate and multivariate analyses with the exception of a positive univariate relationship between discrepancy and future drinking. When concurrent drinking, commitment and coping efficacy are controlled for, the relationship between discrepancy and future drinking is negative, although not significant.

In the prediction of frequency of heavy drinking at two months, frequency of heavy drinking occasions at one month accounted for 34% of the variance,  $F(1, 65) = 35.94, p < .001$ . After controlling for behavior at one month, neither the main effects or the

interaction of self-regulation variables measured at one month added to the prediction of frequency of heavy drinking occasions at the two month follow-up, all  $p$ 's  $> .05$ .

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Insert Table 5 about here

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Identical regression analyses were conducted to predict average number of alcoholic beverages per occasion at both the one month and the two month follow-up. Average quantity per occasion assessed at baseline accounted for 40% of the variance in average quantity per occasion reported at the one month follow-up,  $F(1,72) = 48.10$ ,  $p < .001$ . The main effects of efficacy, commitment and discrepancy, and their interaction failed to significantly add to the prediction of average quantity per occasion one month later, all  $p$ 's  $> .05$ . An identical regression analysis was conducted to predict average quantity per occasion reported at two months from average quantity per occasion and self-regulation variables measured at the one month assessment. Similarly, average quantity at one month accounted for 37% of the variance in average quantity reported at two months,  $F(1, 65) = 37.80$ ,  $p < .001$ . Again, self-regulation variables of efficacy, commitment and discrepancy, and their interaction, failed to account for significant variance in the average quantity at the two month follow-up.

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Insert Table 6 about here

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### Outcome and Predictive Analyses Excluding Spring Break Data

The present study was conducted during spring semester 1995. Thus, spring break, notoriously noted for heavy drinking, may represent an especially stringent test of the intervention(s) and theoretical hypotheses. It may make it more difficult to detect real differences between conditions, or may limit the salience and in turn the predictive utility of self-regulation variables. In addition, it was thought that if spring break drinking behavior was part of baseline drinking period, it might allow subjects into the study who otherwise would not meet criteria (i.e., generally drink much less) and, thus, magnify results in favor of the interventions. To control for this possibility, all subjects were screened prior to spring break. The one and two month follow-up data does, however, contain spring break drinking. To control for this possible confound, analyses were conducted excluding spring break drinking. The same pattern of results emerged in analyses of the goal and feedback manipulations, as well as the predictive analyses when controlling for spring break.

### Collateral reports

To assess the reliability of subject self-reports of drinking, estimates of subject drinking were obtained from collateral reporters. Collateral reporters were asked to estimate the number of days the subject used any alcohol at all, to estimate the number of alcoholic drinks she typically consumed when drinking, and to estimate how much alcohol she consumed in an average week during the past 30 days. Collateral responses were correlated with estimates from the subjects' own reports on the TLFB corresponding to

the same time period. The average quantity per occasion and number of drinking days reported by the subject was correlated with the collateral estimate. Subject report of total number of drinks consumed across the past 28 days was divided by four and correlated with the collateral's report of average number of drinks per week.

Collateral reports were collected at both the one month and two month follow-ups. Sixty-seven percent of collateral reporters ( $N = 51$ ) participated in the one month follow-up, and 80% of collateral reporters ( $N = 61$ ) participated in the two month follow-up. Correlations computed at the one month follow-up yielded the following relationships: average number of drinks per week ( $r = .60, p < .001$ ), average number of drinks per occasion ( $r = .46, p < .001$ ) and number of drinking days ( $r = .48, p < .001$ ). Relationships were less strong, but still significant at the two month follow-up. Correlations computed at the two month follow-up were as follows: average number drinks per week ( $r = .44, p < .001$ ), average number of drinks per occasion ( $r = .39, p < .001$ ) and number of drinking days ( $r = .38, p < .002$ ). Subjects reliably underreported compared to collateral reporters. See Table 7 for means and standard deviations of subject and collateral reports of drinking at the one and two month follow-ups.

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Insert Table 7 about here

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## Discussion

The present study tested self-regulatory principles (Bandura, 1986) within the context of a brief intervention (Bien et al., 1993) designed to reduce heavy drinking in college females. The design attempted to forge a balance between the internal validity of a controlled experimental study and the external validity of a secondary prevention intervention outcome study. The effect of assigned drinking reduction goals, drinking behavior feedback, and the interaction of goals with feedback on drinking behavior was examined. In addition, the utility of the self-regulation variables of efficacy, commitment and discrepancy, as well as their interaction, was evaluated in the prediction of future drinking behavior.

Contrary to hypotheses, the present study did not find goal-setting, the provision of feedback, or the combination of goal-setting and feedback to be superior to assessment and information in the reduction of heavy drinking. As predicted, the self-regulation variables of efficacy and commitment did relate negatively to future drinking behavior in univariate correlational analyses. However, counter to apriori prediction, the interaction of efficacy, commitment and discrepancy failed to add to the prediction of future drinking beyond that accounted for by current drinking behavior and the main effects of these self-regulation variables in hierarchical regression analyses. The theoretically derived hypotheses were not supported by the present study. Nevertheless, the findings and possible explanations are discussed.

Perhaps the most noteworthy finding was that, in general, subjects reduced heavy drinking behavior and maintained reductions two months later. Within the first month, subjects significantly decreased their number of heavy drinking occasions and average number of drinks per occasion. Examination of average drinking reduction and within subject effect sizes lends practical significance to the statistically significant reduction in drinking across time. The effect size results are similar to that noted in other college student intervention studies (Baer et al, 1992; Baer et al., 1994) and are consistent with the secondary prevention/harm reduction focus of the intervention. In addition, the within subjects effect sizes approximate that of .80 noted in Bien et al.'s (1994) meta-analytic review of brief interventions.

Although brief interventions have been found to result in significant reductions in drinking across time and to produce reductions similar to that of more lengthy interventions (Bien et al., 1994), the clinical meaningfulness of such reductions is not clear. The frequency of binge drinking in college students has been found to be related to negative health and behavioral consequences (Wechsler and Isaac, 1992), but these measures of functioning have not been consistently measured as dependent variables in outcome studies of brief interventions with clinical populations or college students. Baer et al. (1994) found a significant decrease in alcohol-related problems as well as a significant decrease in drinking across time in their evaluation of a brief secondary prevention interventions with heavy drinking college students. However, absolute safe levels of drinking or a safe frequency of binge drinking short of abstinence are not known.

Presumably any reduction in the frequency of excessive drinking lowers the probability of negative consequences. Brief interventions may also increase readiness for further change (Prochaska et al., 1992) and immediate results in terms of drinking reductions may not fully capture the benefits of the interventions.

### Failure of Goal-Setting and Feedback Manipulations

Although the overall change across time is comparable to other college student interventions, the failure of goal-setting and feedback delivery to enhance change is counter to theory (Bandura, 1986; Locke et al., 1981; Miller & Rollnick, 1991) and past findings (Bandura & Schunk, 1981; Bandura & Simon, 1977). It was hypothesized that the greatest reduction in heavy drinking would occur with the combination of goal-setting and feedback. Further, subjects assigned to the proximal goal condition were hypothesized to show the greatest reduction in heavy drinking, followed by subjects in the distal goal condition, and finally by subjects in the no goal condition. Analyses, however, suggested subjects who received the combination of a proximal goal and feedback failed to reduce their number of heavy drinking occasions relative to subjects assigned to the other goal and feedback combinations. In fact, goal and feedback effect sizes were negative and small or near zero. However, small positive effects for both goal-setting and feedback delivery emerged when excluding the proximal goal/feedback group for frequency of heavy drinking occasions.

Given the absence of a theoretical or methodological explanation, this finding is unclear. Differential reduction in drinking across time as a function of goal assignment

and feedback delivery was not found on identical analyses of quantity per occasion. The absence of change in frequency of heavy drinking occasions for the proximal goal/feedback condition suggests that this finding may reflect a statistical artifact. Although the difference was not significant, subjects assigned to the proximal goal/feedback condition reported a greater number of heavy drinking occasions at the initial session. There is also evidence of greater variability, and analyses of skewness and kurtosis further supported problems with the distribution in this condition. Further support for the possibility of the noted interaction being influenced by a distribution problem came from analyses of the logarithmic transformation of frequency of heavy drinking occasions. When frequency of heavy drinking occasions was logarithmically transformed, the proximal goal/feedback condition did not differ from other conditions in reduction across time.

One explanation for the frequency of heavy drinking occasions variable yielding a unique finding is the additional error inherent in this dependent variable. Although all measures contain error (Nunnally, 1967), this variable is influenced by three separate sources of error. One source of error is the error in the reporting of number of drinks on the TLFB. Another source of error is in the reporting of the duration of drinking occasions. Finally, the computer program (Markham & Miller, 1991) used to compute BAC estimates is also vulnerable to error. This program is less accurate at higher levels of drinking (Markham & Miller, 1991), potentially introducing a source of systematic as opposed to random error. Thus, measurement error specific to the frequency of heavy



drinking measure may contribute to the different pattern of findings. In addition, the frequency of heavy drinking occasions measure requires an arbitrary dichotomization between heavy drinking and non-heavy drinking using a BAC of .08% as the criterion. This dichotomization, by chance, may produce distributional anomalies not present in the average drinks per occasion measure.

### Goal-Setting: Procedural and Theoretical Influences

The lack of change in the proximal goal/feedback condition may be partially a statistical artifact. However, additional explanations must be found for the failure of goal and feedback conditions to produce greater change than the no goal/no feedback controls. Repeated measures MANOVA analyses and effect sizes did not evidence greater reduction in heavy drinking with the assignment of a goal over no goal, or with the assignment of a proximal over a distal goal. According to Bandura (1986) goals are motivational because they provide a standard against which performance is evaluated, and result in improved performance when explicit and challenging (Locke et al., 1981; Masters, Furman & Barden, 1977). Goals assigned in the present study were individualized and quite explicit. Subjects were provided verbally and in writing with a heavy drinking goal. On the other hand, subjects' perceptions of the challenge of the assigned goals were unclear.

Proximal goal assignment was manipulated with an experimenter assigned goal to reduce frequency of heavy drinking occasions by 50% across the first month. Subjects who achieved this level of reduction during the first month were instructed to then strive

for a 75% reduction across the next month. It is likely that the limited incremental increases in goal intensity compromised the true proximal nature of the goal-setting procedure, and, in turn, limited the propensity of the proximal goal to increase goal congruent behavior. For example, the current proximal goal manipulation differs greatly from that employed by Bandura and Simon (1977) in their evaluation of goal-setting targeting weight loss. Their proximal goal-setting procedure involved computation of food intake four times per day (Bandura & Simon, 1977), whereas the present study employed only one goal increase across a month. The single increase in goal intensity may limit its differentiation from the distal goal. Baumeister, Heatherton and Tice (1994) suggest that a combination of both proximal and distal goals may be most helpful in self-regulation efforts. This combination may provide for increases in self-efficacy as a result of proximal success experiences (Bandura & Schunk, 1981), and continual motivation as a result of the long-term distal goals.

Choice or participation in goal setting represents another potential variable that may have limited the impact of goal setting in this study. In an attempt to maintain consistency and control to preserve the internal validity of the present study, goals were assigned and not collaborative. Although the literature on goal setting does not clearly support an advantage of participative goals relative to assigned goals (Locke et al., 1981; Locke et al., 1984), some studies have noted a positive relationship between goal-related performance and participative goals (Erez & Arad, 1986). These studies, however, represent the findings of laboratory studies rather than attempts to change a behavior, such

as drinking, in a naturalistic context. The findings in substance abuse are, however, equally mixed. Collaborative goal-setting has been recommended in the clinical literature (Washton & Washton, 1990) and choice in goal setting has been found to relate positively to treatment outcome for heavy drinkers (Sanchez-Craig & Lei, 1986). Conversely, Alexy (1985) found greater decreases in alcohol use with a provider-set goal compared to a collaboratively set goal.

Perhaps, however, the absence of a goal-setting effect lies in the value subjects placed on the assigned goal. In a college environment, in which drinking is highly acceptable and very common (Baer, 1993; Leavy & Dunlosky, 1989; O'Hare, 1990) heavy drinking reduction may not be valued. In fact, it may be devalued. According to Bandura (1986), the value of a performance standard or goal impacts its utility in motivating behavior change. In addition, both social and personal comparisons act as standards that are then utilized in the personal judgment of behavior necessary for self-regulation (Bandura, 1986). Not only does the individual engage in evaluation of her behavior relative to her own standards/goals, but also in relation to social comparisons. In a laboratory study assessing the effect of assigned goals and normative information, Early and Erez (1991) found a greater effect for the impact of norms on performance compared to assigned goals. Social comparisons in a college environment likely support the acceptability of heavy drinking rather than drinking reduction. Such comparisons could mitigate activation of goal-behavior discrepancy, and in turn, the motivational utility of a goal.

In the present study, it is possible that peer models served to limit the effectiveness of the intervention. In essence, the present intervention may have attempted to challenge the norms of the group and environment by promoting heavy drinking reduction. Further, Miller and Brown (1991) note that heavy drinkers often socialize with other heavy drinkers which may bias their perception of normative drinking. Selectivity of peers and peer modeling may attenuate the success of an individual level intervention. Other secondary prevention interventions targeting college student drinking have also noted the need to change peer drinking norms (Baer et al., 1993; Kivlahan et al., 1990).

#### Feedback: Procedural and Theoretical Influences

In the context of college student drinking not only may a drinking reduction goal be devalued, but there may be competing feedback. Specifically, environmental feedback from peers and the college environment (parties, Greek organizations, numerous bars) may support heavy drinking rather than supporting drinking reduction. Further, feedback from peers occurs much more frequently than the intervention provided feedback. This interpretation is consistent with Perri and Richards' (1977) investigation of naturally occurring self-control in college students. Across the four behaviors of eating, smoking, dating and studying, they found that positive reinforcement from external sources (e.g., friends, parents) distinguished those who were successful in efforts toward self-regulation from those who were not successful. Feedback from peers may have actually punished subjects' attempts to reduce heavy drinking rather than reinforced such attempts.

A recent review and meta-analysis examining the relationship between feedback interventions and performance yielded a small to moderate positive effect of feedback on performance ( $d = .41$ ; Kluger & DeNisi, 1996). Despite this overall positive effect of feedback interventions, 38% of the effects evaluated were negative. The authors discuss many variables which may limit the effectiveness of feedback interventions including multiple standards and naturally occurring feedback, as discussed above. They hypothesize that the effectiveness of feedback interventions decreases as attention moves from the task and closer to the self. Examples of self-related feedback includes performance feedback on tasks proposed to reflect the individual's intelligence or personal career prospects. Thus, the extent to which college student drinking behavior is associated with self-concept may limit the effectiveness of a feedback intervention.

The study procedure may also have served to limit the effect of the feedback manipulation. All subjects were assessed at screening, the initial session, one month assessment and two month assessment. Many subjects, noted "paying attention" to her drinking to help with anticipated retrospective reporting and becoming more "aware" of her drinking as a function of participation in the present study. Thus, it is possible that the reduction noted in the present study was influenced by assessment or self-monitoring of drinking behavior. Assessment or self-monitoring may serve to increase awareness of behavior which is necessary for self-evaluation (Bandura, 1986; Baumeister et al., 1994). Self-awareness should only impact behavior if it activates self-evaluation which relies on goal standards in addition to feedback in order to generate subjective discrepancy.

However, it is likely that many, if not all subjects, approaching a study focused on behavior change have some self-determined goal that may account for change in the no goal/no feedback condition.

Although an assessment or monitoring effect is possible, it is not clearly supported by past evaluations of the effect(s) of self-monitoring on drinking behavior. Some studies using non-treatment seeking samples have noted reductions in drinking in response to self-monitoring (Albert & Hodgson, 1984; Garvin, Alcorn & Faulkner, 1990). Conversely, other tests of the reactivity of drinking in response to self-monitoring have failed to find reliable reductions (Rosenberg, 1988; Sobell, Gobardis, Schuller, Leo & Sobell, 1989).

Similar to the present findings, Kivlahan et al. (1990) failed to find a significant difference in drinking reduction across time in their comparison of skills training, alcohol information and assessment only. However, their sample size was quite small and trends favored skills training ( $N = 14$ ). On the other hand, Baer et al. (1994), with a much larger sample of college students, found a significant difference between assessment only and a brief intervention ( $N = 157$ ). Results favored the brief intervention, although both groups reliably decreased their drinking (Baer, 1994). Unfortunately, the absence of a wait list control group in the present study precludes examination of an assessment or monitoring effect.

#### Alternative Explanations for Drinking Reduction

Although an assessment effect offers one explanation, all subjects were provided with information, including a list of cognitive-behavioral strategies to reduce heavy

drinking and information on BAC as a function of number of alcoholic beverages, time period, and weight. In a review of college student alcohol prevention programs, Greaves (1994) noted the majority of college alcohol prevention programs target the individual through educational and awareness enhancing interventions. However, the majority of educational programs do not impact actual drinking behavior (see review by Greaves, 1994; Thorner, 1986). Better relationships between intervention exposure and behavior change are found when skills training is included in the program (Baer et al., 1992; Kivlahan, Marlatt, Fromme, Coppel & Williams, 1990). The information provided in the present intervention may represent a cross between skills training and traditional information. Although formal skills training was not included, the information provided to subjects involved cognitive-behavioral skills.

Another possible explanation for the decrease in drinking despite the general lack of differential decrease as a function of goal-setting and feedback concerns readiness for change (Prochaska, DiClemente & Norcross, 1992). Although readiness for change was not measured, subjects who participated in the present study responded to announcements for college women who were interested in learning about or changing their drinking patterns. Fifty-eight percent of subjects screened were classified as heavy drinkers and eligible for participation in the present study. This is notably higher than that found in random surveys of undergraduate students which identify 2% to 10% of the undergraduate population as heavy drinking females (Heck & Williams, 1995). It is likely that the employed recruitment strategies and advertisements selected for heavier drinkers

who may have been ready to change their drinking behavior. In fact, this change may have occurred even in the absence of the present intervention.

In this vein, yet a more parsimonious explanation for the lack of goal, feedback, or goal and feedback effects concerns the natural course of college student drinking. Just as spring break may account for an increase in heavy drinking, there may be natural "drinking reduction" times in the natural course of college student drinking. For example, drinking may be greater early in a semester compared to later in the semester due to fewer demands. Similarly, drinking may be significantly less at the end of a semester due to final examinations. All subjects entered the study prior to spring break and were reassessed throughout the semester. Again, without a wait-list control group, it is impossible to test the possibility that a natural history effect explained the observed results.

#### Limitation of Self-Regulation in the Context of Drinking

In a naturalistic drinking situation there are a variety of variables which may contribute to a breakdown in self-regulation of behavior. One concerns conflicting goals. In a drinking situation an individual may hold both their own drinking reduction goal as well as the goal to have a "fun evening". A goal of a "fun evening" may be connotative with alcohol for college students. Expectancies of alcohol use have been found to relate to future drinking behavior (Brown, 1985; Leigh, 1989). Further, a person perception study found college students to rate heavier drinking protagonists presented in vignettes as having more "fun" than their moderate drinking or abstaining peers (Lang, Winiarski & Curtin, 1992). Baumeister et al. (1994) note that self-regulation is hampered in the face of



conflicting standards (e.g., drinking reduction and “fun” evening). Consistent with this hypothesis, conflicting goals have been found to activate rumination rather than action and in turn limit progress toward goals (Emmons & King, 1988).

Drinking may also contribute to self-regulation failure by decreasing the encoding of information about the self which may disrupt self-evaluation processes (Hull, 1981). A reduction in self-awareness as a function of alcohol consumption inherently limits self-observation. Self-observation is necessary for successful self-regulation (Bandura, 1986; Baumeister et al., 1994). Performance standards must be actively attended to in order for people to direct behavior, adjust strategies, and evaluate progress.

#### Self-Regulation Variables in Prediction of Future Drinking

In addition to testing the impact of goal-setting and feedback on reduction in heavy drinking, the present study also tested the utility of self-regulation variables in predicting future drinking behavior. Regression analyses were conducted to predict frequency of heavy drinking and future average quantity one month later from the main effects and interaction of the self-regulation variables of efficacy, commitment and discrepancy.

In all cases current drinking behavior accounted for the greatest amount of variance in future drinking behavior. Only in the prediction of frequency of heavy drinking occasions at the one month assessment did the main effects of the self-regulation variables enter the regression equation. They accounted for an additional 13% of the variance in future heavy drinking. Significant Beta weights were noted for coping efficacy and commitment. These findings were consistent with the univariate correlations which

revealed a consistently significant and negative relationship between coping efficacy and future heavy drinking occasions, and between commitment and future heavy drinking occasions. Thus, the greater the subject's perceived ability to employ coping strategies and the greater the subject's commitment to not drinking heavily, the fewer heavy drinking occasions the subject reported one month later. These findings are consistent with past findings supporting the predictive utility of efficacy expectancies (McKay, Maisto & O'Farrell, 1993; Rychtarik, Prue, Rapp & King, 1992; Stephens, Wertz & Roffman, 1995) and commitment (Hall et al., 1990; Hall et al, 1991) in substance abuse research. The self-regulation variables, however, failed to enter the regression equations and account for variance in future drinking beyond current drinking in any other analyses. Efficacy and commitment were specifically operationalized in relation to "heavy drinking". The match between the operationalization of these measures and the criterion variable frequency of heavy drinking occasions may account for the predictive utility compared to the prediction of quantity per occasion. However, this better match between operationalization of commitment and efficacy and the criterion variable did not contribute to improved prediction of frequency of heavy drinking occasions at the two month follow-up.

Further, contrary to hypotheses, the interaction of efficacy, commitment and discrepancy consistently failed to add to the prediction of future drinking behavior. Theoretically (Bandura, 1986), drinking reduction should be greatest with the combination of subjective discrepancy between current drinking and desired drinking patterns, and high levels of efficacy for and commitment to not drinking heavily. Both the measurement of

commitment and discrepancy were exploratory in the present study. In fact, both commitment and discrepancy were measured with single-item, face-valid questions. Although a 7-item commitment measure was adapted from prior research (Hollenbeck et al., 1989), a single item was utilized in the present study after examining the factor structure and zero-order correlations. Thus, inadequate measures of commitment and discrepancy may have limited their predictive utility. In addition, the same person and contextual variables discussed as limitations for detecting goal and feedback effects may equally limit the predictive usefulness of the self-regulation variables of efficacy, commitment and discrepancy.

Finally, regression analyses controlled for past behavior and then tested for the incremental predictive utility of the self-regulation variables. It is important to note that this is a very conservative test of the model and self-regulation variables. Theoretically, self-efficacy for reducing heavy drinking and commitment to reducing heavy drinking are at least partly based on past behavior (Bandura, 1986; Locke & Latham, 1990). Thus, the shared variance and non-independence between past behavior and these self-regulation variables makes for a strict test of Bandura's (1986) self-regulation model.

### Conclusions and Limitations

The present study provides some insight into the utility and the limitations of self-regulation interventions in the reduction of heavy drinking in college women. However, some caution should be exercised when considering the results. The small sample size and large variability in drinking measures likely limited the power to detect true between

subjects differences. This may be especially so given the small to close to zero between subjects effect sizes previously discussed. The lack of a wait list control group further limits the findings from the present study. Without such a control group it is impossible to know whether drinking reductions reflect the assessment, experiment contact and/or information, or a natural history or selection factor.

Another limitation which has been discussed concerns measurement. Measures of commitment and discrepancy were exploratory and thus potentially limited in terms of their predictive utility. Further, in analyses of heavy drinking episodes, the primary target in the present intervention, is derived from a number of sources and thus vulnerable to numerous sources of error.

In addition, although the relationship between collateral reports and self-reports were consistently and significantly positively correlated, the relationships were not very strong. Further, collateral informants consistently overreported drinking compared to subjects. However, collateral reporters have not typically been utilized in college student intervention studies (Kivlahan et al., 1990, Baer et al., 1992). It is likely that college student collaterals have less contact with subjects compared to clinical samples which often employ significant others as collateral reporters (Sobell et al., 1986). Lack of contact with collateral informants may explain some disagreement in reports (Babor, Stephens & Marlatt, 1987). In addition, subject reports were assessed in person using daily estimates, whereas collateral reports were assessed in telephone interviews using average/weekly estimates. These different methods of assessment may have also

introduced additional error (Campbell & Fiske, 1957). On the other hand, a recent college student intervention study found stronger correlations and no significant differences between subject and collateral reports (Greaves, 1996). The present study differs in that it employed only heavy drinking females as subjects. It is possible that stigma associated with female heavy drinking or some other factor unique to this population accounts for apparent underreporting. Future research is needed to further validate the self-reports of college students and to determine both the intrapersonal and environmental factors that effect their veracity.

### Future Research

It is suggested that adjunct interventions be considered in an effort to increase the effect size of similar interventions. For example, daily self-monitoring of drinking behavior rather than periodic assessments may serve to increase awareness across time. In addition, frequent contacts from experimenters may also serve to prompt self-awareness, behavior change or goal adherence (Lombard, Lombard & Winett, 1995; McConnell, Biglan & Severson, 1984). Frequent contact or prompting may prove economically and clinically useful in enhancing the efficacy of behavior change interventions. In fact, research in the exercise adherence literature (Lombard et al., 1995) suggests that frequent "touching base" (pg. 164) prompts may be as effective as prompts incorporating goal setting and feedback. This finding is consistent with a self-regulation framework which suggests behavior change is promoted by maintained self-awareness (Curtin, 1994).

Community-level interventions also hold promise in secondary prevention interventions with college students. As discussed, the college environment and acceptability of heavy drinking may limit the impact of individual level interventions. Interventions delivered to cohorts in dormitories, fraternities and sororities may increase the impact of such interventions. Such interventions, especially if delivered by peer models (Bandura, 1986; Rogers, 1983), may function to alter normative attitudes and the everyday environment in relation to heavy drinking. Collateral reporters could be enlisted not only to validate self-reports of drinking, but also enlisted as part of the intervention package. Peers, even in the role of collateral reporters, could function as mediators of drinking reduction interventions by promoting public commitment to drinking reduction and/or providing support for drinking reduction. Changes in the physical and social environment such as sponsoring of nonalcoholic activities (sporting events, parties) and enforcement of harsher rules and regulations pertaining to alcohol use among students, may also prove helpful (Burrell, 1990). Individual level interventions to decrease drinking in college students have resulted in small effects (Baer, et al., 1992; Baer, et al., 1994; Kivlahan, et al., 1990) and questionable clinical meaningfulness. Other approaches which seek to radically change the environment in which college drinking occurs may prove more effective than current individual interventions. The differential effectiveness of individual and environmental level interventions for college student drinking reduction remains unknown and needs to be evaluated in future research.

In addition, improved measurement of commitment and discrepancy provided by psychometric studies are warranted in future investigations of self-regulation interventions. Measurement of readiness to change, depression and self-esteem may also add to our understanding of individual and environmental influences in heavy drinking behavior in college females. Evidence suggests that the context of heavy drinking for college females differs from that of males. There is some suggestion that college females drink heavily more frequently in the context of coping with feelings of depression and low self-esteem compared to college males who drink heavily more frequently in the context of social facilitation (Thombs, Beck & Mahoney, 1993). In addition, measuring alcohol-related problems across time, visits to health care professionals and psychosocial adjustment may expand our understanding of variables related to heavy drinking in college women.

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### Footnotes

<sup>1</sup>Identical repeated measures MANOVA analyses were conducted on other drinking variables including average BAC and total number of drinks consumed during the prior month. The feedback by goal by time interaction failed to even approach significance on analyses of each of these variables, all  $p$ 's > .05.

<sup>2</sup>Regression analyses were also conducted using the logarithmic transformation of frequency of heavy drinking occasions. The same pattern of results found with the untransformed variable emerged.

Appendix A

Recruitment Flyer/Advertisement

Appendix A

*Do you sometimes drink more than you planned?*

*Do you wish you didn't drink as much as you do?*

*Are you concerned about your drinking?*



The Department of Psychology  
is looking for

## **Female Students**

interested in learning about their drinking patterns

Please call Lisa at 231-7631

You may be compensated up to \$20 for your time



## Appendix B

### Consent Form: Screening Session

## **Appendix B**

### **VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY**

#### **Female College Drinking Patterns--Part 1**

#### **SUBJECT CONSENT FORM**

##### **I. Purpose of this research/project**

The purpose of this study is to assess the drinking practices of college females, to assess the influence of suggested drinking control strategies on future heavy drinking, and to assess the accuracy of recall of drinking behavior.

##### **II. Procedures**

Participation in this study will involve completion of questionnaires concerning your drinking habits and related problems today. Completing the questionnaires will take approximately one-half hour. You will be asked to provide your name and phone number on this form to allow us to contact you if you qualify for further participation.

Your eligibility to participate in this research will be based on the information you provide on these preliminary questionnaires. If you qualify you will be contacted and invited back. If invited back you will be asked to complete a battery of questionnaires. These questionnaires will relate to your drinking practices and your perception of those drinking habits. Upon completion of all questionnaires, you will be provided with some information concerning drinking. Also at this time, you will be asked to schedule two additional appointments at one-month intervals. You will be compensated \$10.00 for each of these additional appointments at that time. The initial appointment and each of these follow-up appointments will take approximately one hour.

In addition, you will be asked to provide the name and address of a friend whom we can contact at the same time as your follow-up appointments. We will ask your friend to provide an independent estimate of your frequency and quantity of alcohol. Under no circumstances will any of the information you provide be shared with this friend.

You may experience some discomfort concerning your responses to the questionnaires or the information provided by the researchers. Safeguards that will be used to minimize your risk or discomfort are: all questionnaires and identifying information are stored in locked filing cabinets; questionnaires only have an identifying number rather than your name; only research staff, trained in handling of confidential information, have access to this information; you are free to withdraw at any time; and professional referrals are available if needed to help cope with any adverse psychological reactions to participation. You are encouraged to talk with the investigators anytime you have a concern about the research or your drinking behavior.

### III. Benefits of this project

Your participation in this project will help provide information concerning female college student drinking and the variables which influence drinking. In addition, accuracy of recall of drinking behavior will be addressed by comparing your recall and your informant's recall of your drinking if you are invited to participate further. If invited back, participation will offer you information concerning drinking behavior. If desired, you may receive a summary of this research when completed. To do so, please leave a self-addressed envelope.

### IV. Extent of anonymity and confidentiality

The identity of participants will be kept strictly confidential. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. This consent form will be the only information you provide that will have your name. All other information gathered will only have an identifying number. Consent forms and questionnaires will be stored in locked filing cabinets in separate locations.

### V. Compensation

If you participate in this initial session through the psychology department research subject pool, you will receive one research participation credit to be applied to any class which allows for such credit. If invited to participate in the rest of the study, you will receive \$10.00 for each of the two follow-up appointments. These appointments will occur at one-month and two-months after you receive materials designed to help you make changes in your drinking.

### VI. Freedom to withdraw

You are free to withdraw from this study at any time without penalty.

### VII. Approval of research

This research project has been approved by the Human Subjects Research Committee and the Institutional Review Board. Any questions may be addressed to the investigator, Lisa Curtin at 231-7631, faculty advisor, Dr. Robert S. Stephens at 231-6304 or Dr. Richard Eisler, chair of the Human Subjects Committee, at 231-6914. You may also contact Ernest Stout, chair of Virginia Tech's Institutional Review Board at 231-9359.

VIII. Subject's responsibilities

I know of no reason I cannot participate in this study. I hereby agree to voluntarily participate in the research project described above and under the conditions described above.

I have read and understand the informed consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Please print the following information:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Phone #: \_\_\_\_\_

Days/Times  
to call:

Monday \_\_\_\_\_

Tuesday \_\_\_\_\_

Wednesday \_\_\_\_\_

Thursday \_\_\_\_\_

Friday \_\_\_\_\_

Saturday \_\_\_\_\_

Sunday \_\_\_\_\_

## Appendix C

### Demographics and General Information Questionnaire

**Appendix C**

SUBJ# \_ \_\_\_\_\_

**General Information Questionnaire**

Please answer the following by filling in the blank or circling your response:

1. How old are you? \_\_\_\_\_
2. Which category best describes your race?
  - a) Caucasian
  - b) Hispanic
  - c) African-American
  - d) Asian
  - e) \_\_\_\_\_
3. What is your marital status?
  - a) single
  - b) married
  - c) divorced/separated
  - d) other \_\_\_\_\_
4. What are your current living arrangements?
  - a) dormitory/on campus
  - b) off campus (apartment, house)
  - c) sorority house
  - d) with parent(s)
5. Are you a member of a sorority?

Yes    No
6. Are you a little sister for a fraternity?

Yes    No
7. How much do you weigh? \_\_\_\_\_ lbs.

## Appendix D

### Consent Form: Initial Session

## Appendix D

### VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

#### Female College Drinking Patterns--Part 2

#### SUBJECT CONSENT FORM

##### I. Purpose of this research/project

The purpose of this study is to assess the drinking practices of college females, to assess the influence of suggested drinking control strategies on future heavy drinking, and to assess the accuracy of recall of drinking behavior.

##### II. Procedures

Your eligibility to participate in this research was based on the information you provide on the preliminary questionnaires. At this time you will be asked to complete another battery of questionnaires. These questionnaires will relate to your drinking practices and your perception of those drinking habits. Upon completion of all questionnaires, you will be provided with some information concerning drinking. Also at this time, you will be asked to schedule two additional appointments at one-month intervals. You will be compensated \$10.00 for each of these additional appointments at that time. Today's appointment and each of these follow-up appointments will take approximately one hour.

In addition, as informed during the scheduling phone call, you will be asked to provide the name and address of a friend whom we can contact at the same time as your follow-up appointments. We will ask your friend to provide an independent estimate of your frequency and quantity of alcohol. Under no circumstances will any of the information you provide be shared with this friend.

You may experience some discomfort concerning your responses to the questionnaires or the information provided by the researchers. Safeguards that will be used to minimize your risk or discomfort are: all questionnaires and identifying information are stored in locked filing cabinets; questionnaires only have an identifying number rather than your name; only research staff, trained in handling of confidential information, have access to this information; you are free to withdraw at any time; and professional referrals are available if needed to help cope with any adverse psychological reactions to participation. You are encouraged to talk with the investigators anytime you have a concern about the research or your drinking behavior.



### III. Benefits of this project

Your participation in this project will help provide information concerning female college student drinking and the variables which influence drinking. In addition, accuracy of recall of drinking behavior will be addressed by comparing your recall and your informant's recall of your drinking. Participation will offer you information concerning drinking behavior. If desired, you may receive a summary of this research when completed. To do so, please leave a self-addressed envelope.

### IV. Extent of anonymity and confidentiality

The identity of participants will be kept strictly confidential. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. This consent form will be the only information you provide that will have your name. All other information gathered will only have an identifying number. Consent forms and questionnaires will be stored in locked filing cabinets in separate locations.

### V. Compensation

You will receive \$10.00 for each of the two follow-up appointments. These appointments will occur at one-month and two-months after you receive materials designed to help you make changes in your drinking.

### VI. Freedom to withdraw

You are free to withdraw from this study at any time without penalty.

### VII. Approval of research

This research project has been approved by the Human Subjects Research Committee and the Institutional Review Board. Any questions may be addressed to the investigator, Lisa Curtin at 231-7631, faculty advisor, Dr. Robert S. Stephens at 231-6304, or Dr. Richard Eisler, chair of the Human Subjects Committee, at 231-6914. You may also contact Ernest Stout, chair of Virginia Tech's Institutional Review Board at 231-9359.

VIII. Subject's responsibilities

I know of no reason I cannot participate in this study. I hereby agree to voluntarily participate in the research project described above and under the conditions described above.

I have read and understand the informed consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Please print the following information:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Phone #: \_\_\_\_\_

Days/Times  
to call:

Monday \_\_\_\_\_

Tuesday \_\_\_\_\_

Wednesday \_\_\_\_\_

Thursday \_\_\_\_\_

Friday \_\_\_\_\_

Saturday \_\_\_\_\_

Sunday \_\_\_\_\_

Appendix E  
Collateral Consent Form

## Appendix E

### VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

#### Female College Drinking Patterns

#### COLLATERAL CONSENT FORM

##### I. Purpose of this research/project

The purpose of your participation in this study is to assess the accuracy of recall of drinking behavior.

##### II. Procedures

Your friend has identified you as a person who can provide an estimate of her alcohol consumption. Comparisons between estimates of an individual's reported drinking and a friend's estimate of that person's drinking are commonly used to address the reliability of reported drinking practices. We realize you will not be able to provide us with precise drinking information concerning your friend, but rather your best estimate of her drinking habits.

Participation in this study will involve completion of two brief telephone interviews. In the event that the researchers are unable to reach you on the phone, you will be mailed a brief questionnaire, provided with a stamped/addressed envelope and asked to return the questionnaire in a timely manner. Both the phone interview and questionnaire format will take approximately 10 to 15 minutes. At these times you will be asked to report on how much and how often your friend consumes alcoholic beverages. Under no circumstances will any of the information you provide be shared with your friend. Several precautions will be instituted to assure the confidentiality of the information you provide. These include the following: all questionnaires and identifying information are stored in locked filing cabinets; questionnaires only have an identifying number rather than your name; only research staff, trained in handling of confidential information, have access to this information; and you are free to withdraw from participation at any time.

##### III. Benefits of this project

Your participation in this project will help test the accuracy of recall of drinking behavior by comparing your recall and your friends recall of her drinking. If desired, you may receive a summary of this research when completed. To do so, please send a self-addressed envelope to: Lisa Curtin, Department of Psychology, Virginia Tech, Blacksburg, VA 24060.

#### IV. Extent of anonymity and confidentiality

The identity of participants will be kept strictly confidential. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. This consent form will be the only information you provide that will have your name. All other information gathered will only have an identifying number. Consent forms and questionnaires will be stored in locked filing cabinets in separate locations.

#### V. Freedom to withdraw

You are free to withdraw from this study at any time without penalty.

#### VI. Approval of research

This research project has been approved by the Human Subjects Research Committee and the Institutional Review Board. Any questions may be addressed to the investigator, Lisa Curtin at 231-7631; faculty advisor, Dr. Robert S. Stephens at 231-6304; or Dr. Richard Eisler, chair of the Human Subjects Committee, at 231-6914. You may also contact Ernest Stout, chair of Virginia Tech's Institutional Review Board at 231-9359.

VII. Subject's responsibilities

I know of no reason I cannot participate in this study. I hereby agree to voluntarily participate in the research project described above and under the conditions described above.

I have read and understand the informed consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Please print the following information:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Phone #: \_\_\_\_\_

Days/Times  
to call:

Monday \_\_\_\_\_

Tuesday \_\_\_\_\_

Wednesday \_\_\_\_\_

Thursday \_\_\_\_\_

Friday \_\_\_\_\_

Saturday \_\_\_\_\_

Sunday \_\_\_\_\_

## Appendix F

### Drinking Reduction Information: Strategies and BAC Tables

## **Appendix F**

### **STRATEGIES FOR AVOIDING HEAVY DRINKING**

1. Keep track of the number of drinks you consume.
2. Avoid drinking with those who pressure me to drink.
3. Confine drinking to certain times of the day
4. Substitute other means for feeling friendly or sociable
5. Purposely take slow sips on my drink
6. Avoid drinking during boring or repetitious activities
7. Not keep alcohol at home
8. Use body sensations to let me know when I should slow my drinking down
9. Eat before drinking
10. Drink beer from a bottle or can instead of kegs or pitchers
11. Participate in activities such as tennis, running, etc., when I feel like drinking
12. Limit the amount of money I carry
13. Set a limit on the number of drinks I have in a sitting
14. Avoid playing drinking games
15. Drink nonalcoholic beverages
16. Select drinks I drink slowly
17. Drink only after a certain hour in the day
18. Set time limits for how long I'll drink
19. Avoid drinking with heavy drinkers



20. Avoid drinking after stressful events
21. Select drinks lower in alcohol content
22. Engage in activities during drinking such as dancing, talking, etc
23. Avoid drinking in places where I overdrink
24. Reward myself for not drinking
25. Drink less when I am going to drive
26. Refuse unwanted drinks
27. Stop drinking any alcohol for some period of time
28. Ask for family support to limit my drinking
29. Think about the consequences of my drinking
30. Avoid drinking on occasions when I tend to overdrink
31. Punish myself for failing to limit my drinking
32. Substitute other means for dealing with stress, depression, and anxiety
33. Avoid drinking wine or liquor from the bottle
34. Get friends to help me limit my drinking

**Blood Alcohol Level (BAL)** is the ratio of alcohol to blood in the bloodstream determined by calculating the milligrams of alcohol per 100 milliliters of blood. BAL is usually reported as a percentage; e.g. .10% = 100 mg = one part alcohol for every thousand parts of blood. In the state of Virginia an individual is legally presumed to be "Driving While Intoxicated" if found to be driving with a BAL equal to or greater than .08%.

There are several interesting aspects to these tables. First, and most importantly, BAL is quite individualized due to your weight, sex and how quickly you drink. The same number of drinks, drunk by different people in different ways, can result in markedly different BALs.

Several other points about BAL are noteworthy. Women will have higher BALs than men, assuming they have equal weights and number of drinks. This is because women have a lower overall fluid content in their bodies, so that the proportion of alcohol in their blood is comparatively greater. As a result, women experience more alcohol effects from each drink. Consider also that women tend to weigh less than men. It may not be surprising, then, that most women will be affected more by the same number of drinks as their male counterparts.

Also notice that the number of drinks that you can consume per hour to maintain a constant BAL decreases with each hour. The liver can only break down a small amount of alcohol each hour (about .016% BAL), and as you continue to drink, the alcohol builds up in your bloodstream. So, if your BAL reaches .10%, it will take approximately 6 hours for all the alcohol to be oxidized. Again, eating before and during drinking will slow down the effect of alcohol because the rate of absorption decreases, but eventually all the alcohol gets through.

People often believe that exercise (like dancing) will counteract the effects of alcohol; they think they can drink more without feeling the effects. This is not true. Alcohol is only broken down in the liver, at a standard rate, and exercise does nothing to speed up this process. It appears, in contrast, that exercise serves to distract people from the effects of alcohol.

**CAUTION:** Do not use the BAL tables to assure yourself that you can legally drive! These are ESTIMATES only; real blood alcohol levels will vary a great deal from person to person, and could be considerably higher than the tables indicate. You should always estimate a lower BAL than the given number of drinks would indicate, to be sure that you are not above the point you want to be.

Approximate Blood Alcohol Levels as a Function of Number of Drinks and Time  
FOR A 100-POUND FEMALE

		NUMBER OF HOURS							
NUMBER OF DRINKS	1	2	3	4	5	6	7	8	
1	.029	.013	0	0	0	0	0	0	
2	.074	.058	.042	.026	.010	0	0	0	
3	.119	.103	.087	.071	.055	.039	.023	.007	
4	.164	.148	.132	.116	.100	.084	.068	.052	
5	.209	.193	.177	.161	.145	.129	.113	.097	
6	.254	.238	.222	.206	.190	.174	.158	.142	
7	.299	.283	.267	.251	.235	.219	.203	.187	
8	.344	.328	.312	.296	.280	.264	.248	.232	
9	.389	.373	.357	.341	.325	.309	.293	.277	
10	.434	.418	.402	.386	.370	.354	.338	.322	
11	.479	.463	.447	.431	.415	.399	.383	.367	
12	.524	.508	.492	.476	.460	.444	.428	.412	

Approximate Blood Alcohol Levels as a Function of Number of Drinks and Time  
FOR A 120-POUND FEMALE

		NUMBER OF HOURS							
NUMBER OF DRINKS	1	2	3	4	5	6	7	8	
1	.021	.005	0	0	0	0	0	0	
2	.059	.043	.027	.011	0	0	0	0	
3	.096	.080	.064	.048	.032	.016	0	0	
4	.134	.118	.102	.086	.070	.054	.038	.022	
5	.171	.155	.139	.123	.107	.091	.075	.059	
6	.209	.193	.177	.161	.145	.129	.113	.097	
7	.246	.230	.214	.198	.182	.166	.150	.134	
8	.284	.268	.252	.236	.220	.204	.188	.172	
9	.321	.305	.289	.273	.257	.241	.225	.209	
10	.359	.343	.327	.311	.295	.279	.263	.247	
11	.396	.380	.364	.348	.332	.316	.300	.284	
12	.434	.418	.402	.386	.370	.354	.338	.322	

Approximate Blood Alcohol Levels as a Function of Number of Drinks and Time  
FOR A 140-POUND FEMALE

NUMBER OF DRINKS	NUMBER OF HOURS							
	1	2	3	4	5	6	7	8
1	.016	0	0	0	0	0	0	0
2	.048	.032	.016	0	0	0	0	0
3	.080	.064	.048	.032	.016	0	0	0
4	.112	.096	.080	.064	.048	.032	.016	0
5	.144	.128	.112	.096	.080	.064	.048	.032
6	.176	.160	.144	.128	.112	.096	.080	.064
7	.208	.192	.176	.160	.144	.128	.112	.096
8	.240	.224	.208	.192	.176	.160	.144	.128
9	.272	.256	.240	.224	.208	.192	.176	.160
10	.304	.288	.272	.256	.240	.224	.208	.192
11	.336	.320	.304	.288	.272	.256	.240	.224
12	.368	.352	.336	.320	.304	.288	.272	.256

Approximate Blood Alcohol Levels as a Function of Number of Drinks and Time  
FOR A 160-POUND FEMALE

NUMBER OF DRINKS	NUMBER OF HOURS							
	1	2	3	4	5	6	7	8
1	.012	0	0	0	0	0	0	0
2	.024	.016	.008	0	0	0	0	0
3	.036	.024	.016	.008	.004	0	0	0
4	.048	.032	.024	.016	.012	.008	0	0
5	.060	.040	.032	.024	.018	.012	.008	.004
6	.072	.048	.036	.028	.020	.014	.010	.006
7	.084	.056	.040	.032	.024	.016	.012	.008
8	.096	.064	.048	.036	.028	.020	.014	.010
9	.108	.072	.056	.044	.032	.024	.016	.012
10	.120	.080	.064	.052	.040	.032	.024	.016
11	.132	.088	.072	.060	.048	.040	.032	.024
12	.144	.096	.080	.068	.056	.048	.040	.032

Approximate Blood Alcohol Levels as a Function of Number of Drinks and Time  
FOR A 180-POUND FEMALE

		NUMBER OF HOURS							
NUMBER OF DRINKS		1	2	3	4	5	6	7	8
1		.009	0	0	0	0	0	0	0
2		.034	.018	.002	0	0	0	0	0
3		.059	.043	.027	.011	0	0	0	0
4		.084	.068	.052	.036	.020	.004	0	0
5		.109	.093	.077	.061	.045	.029	.013	0
6		.134	.118	.102	.086	.070	.054	.038	.022
7		.159	.143	.127	.111	.095	.079	.063	.047
8		.184	.168	.152	.136	.120	.104	.088	.072
9		.209	.193	.177	.161	.145	.129	.113	.097
10		.234	.218	.202	.186	.170	.154	.138	.122
11		.259	.243	.227	.211	.195	.179	.163	.147
12		.284	.268	.252	.236	.220	.204	.188	.172

Approximate Blood Alcohol Levels as a Function of Number of Drinks and Time  
FOR A 200-POUND FEMALE

		NUMBER OF HOURS							
NUMBER OF DRINKS		1	2	3	4	5	6	7	8
1		.006	0	0	0	0	0	0	0
2		.029	.013	0	0	0	0	0	0
3		.051	.035	.019	.003	0	0	0	0
4		.074	.058	.042	.026	.010	0	0	0
5		.096	.080	.064	.048	.032	.016	0	0
6		.119	.103	.087	.071	.055	.039	.023	.007
7		.141	.125	.109	.093	.077	.061	.045	.029
8		.164	.148	.132	.116	.100	.084	.068	.052
9		.186	.170	.154	.138	.122	.106	.090	.074
10		.209	.193	.177	.161	.145	.129	.113	.097
11		.231	.215	.199	.183	.167	.151	.135	.119
12		.254	.238	.222	.206	.190	.174	.158	.142

Appendix G  
Feedback Form

SUBJ# \_\_\_\_\_  
DATE \_\_\_\_\_

**PERSONAL FEEDBACK SHEET**

**Alcohol Consumption:**

Number of standardized "drinks" you  
consume per week \_\_\_\_\_ drinks  
\_\_\_\_\_ percentile  
(American adult norms)

Average number of "drinks" you consume  
on a single occasion \_\_\_\_\_ drinks

Average number of "heavy drinking days"  
(.08 BAC level) during past month \_\_\_\_\_ heavy drinking days

Estimated BAC peak during past month \_\_\_\_\_ mg%

**BAC LEVELS:**

- .02 = Light & moderate drinkers begin to feel effect
- .04 = Most people begin to feel relaxed
- .06 = Judgment somewhat impaired
- .08 = Definite impairment of muscle coordination  
Legally intoxicated in VA
- .10 = Clear deterioration of reaction time and control
- .30 = Many people lose consciousness
- .40 = Most people lose consciousness, some die
- .45 = Fatal dose for average person

Appendix H  
Collateral Interview



Collateral Respondent Interview

Subject # \_\_\_\_\_

Collateral 1 or 2

- \_\_\_\_\_ 1. What is your relationship to (Subject)?  
1. Spouse-girlfriend    4. Friend  
2. Parent                    5. Romance  
5. Other: specify \_\_\_\_\_
- \_\_\_\_\_ 2. How long have you known (Subject)?  
(Record in number of months)
- \_\_\_\_\_ 3. What is the degree of contact you have had  
with (Subj.) during the past 8 months?  
1. Daily                      3. Monthly  
2. Weekly                    4. Occasionally  
5. Other \_\_\_\_\_
- \_\_\_\_\_ 4. What is the nature of your contact during this time?  
1. Live together in the same dwelling  
2. Work or business contact  
3. Social contact  
4. Other \_\_\_\_\_

Now I'm going to ask you some questions about (Subject's) ALCOHOL use over the past thirty days. HOW MANY DAYS during the past thirty days did (Subject):

5. Use any alcohol at all?                    \_\_\_\_\_ Number of days  
    \_\_\_\_\_ Observed (O) or Gussed (G)
6. Drink to intoxication?                    \_\_\_\_\_ Number of days  
    \_\_\_\_\_ Observed (O) or Gussed (G)
7. When (Subject) drinks alcohol, how much alcohol does s/he typically consume (in drinks)?  
\_\_\_\_\_ Number of drinks                    \_\_\_\_\_ Observed (O) or Gussed (G)

CONFIDENCE RATING (for interviewer)    1 = YES            2 = NO

Is the above significantly distorted by:

- \_\_\_ Informant's misrepresentation?  
\_\_\_ Informant's inability to understand?  
\_\_\_ Informant's apparent non-serious guessing?

COMPARED TO (Subject's) OVERALL LEVEL OF DRINKING LAST FALL, would you say his/her current level reflects an increase, a decrease, or is about the same?

\_\_\_ No response            \_\_\_ Decrease            \_\_\_ Same            \_\_\_ Increase

Appendix I  
Timeline Follow-Back

## STANDARD DRINK CONVERSION

1 Standard Drink is equal to:



12 oz. (341 ml) of regular (5%) BEER



5 oz. of regular (12-17%) WINE

3 oz. of FORTIFIED WINE  
(e.g., port or sherry)



1-1/2 oz. of 80-proof HARD LIQUOR

1 Standard Drink represents  
13.6 grams of absolute alcohol



### WINE.

1 Bottle (25 oz./ 750 ml) = 5 Standard Drinks  
1 Bottle (40 oz./ 1.14 L) = 8 Standard Drinks  
1 Bottle Fortified (25 oz) = 8 Standard Drinks



### HARD LIQUOR

1 Mickey (12 oz.) = 8 Standard Drinks  
1 Bottle (25 oz./ 750 ml) = 17 Standard Drinks  
1 Bottle (40 oz./ 1.14 L) = 27 Standard Drinks

For light beer or light wine, standard drinks are calculated in terms of a ratio. For example, 12 oz. of a 2.5% light beer is equal to 0.5 SD, while 12 oz. of a 4% light beer is 0.8 SD.

Sun. Mar. 3, 1996	Mon. Mar. 4, 1996	Tue. Mar. 5, 1996	Wed. Mar. 6, 1996	Thu. Mar. 7, 1996	Fri. Mar. 8, 1996	Sat. Mar. 9, 1996
Sun. Mar. 10, 1996	Mon. Mar. 11, 1996	Tue. Mar. 12, 1996	Wed. Mar. 13, 1996	Thu. Mar. 14, 1996	Fri. Mar. 15, 1996	Sat. Mar. 16, 1996
Sun. Mar. 17, 1996	Mon. Mar. 18, 1996	Tue. Mar. 19, 1996	Wed. Mar. 20, 1996	Thu. Mar. 21, 1996	Fri. Mar. 22, 1996	Sat. Mar. 23, 1996
Sun. Mar. 24, 1996	Mon. Mar. 25, 1996	Tue. Mar. 26, 1996	Wed. Mar. 27, 1996	Thu. Mar. 28, 1996	Fri. Mar. 29, 1996	Sat. Mar. 30, 1996
Sun. Mar. 31, 1996						

Appendix J

Rutgers Alcohol Problem Index

**INSTRUCTIONS**

**RAPI Form**

SUBJECT #

Different things happen to people while they are **DRINKING ALCOHOL** or as a **RESULT** of their **ALCOHOL** use. Some of these things are listed below. Please indicate **how many times** each has happened to you **during the past six months** while you were drinking alcohol or as the result of your alcohol use. Please circle the most accurate response use the rating system provided below.

0					Never	<p align="center"><b>HOW MANY TIMES DID THE FOLLOWING THINGS HAPPEN TO YOU WHILE YOU WERE DRINKING ALCOHOL OR BECAUSE OF YOUR ALCOHOL USE DURING THE PAST SIX MONTHS?</b></p>
1		One to two times				
2		Three to five times				
3		Six to ten times				
4		More than ten times				
0	1	2	3	4	Not able to do your homework or study for a test?	
0	1	2	3	4	Got into fights, acted bad, or did mean things?	
0	1	2	3	4	Missed out on other things because you spent too much money on alcohol?	
0	1	2	3	4	Went to work or school high or drunk?	
0	1	2	3	4	Caused shame or embarrassment to someone?	
0	1	2	3	4	Neglected your responsibilities?	
0	1	2	3	4	Relative avoided you?	
0	1	2	3	4	Felt that you needed more alcohol than you used to use in order to get the same effect?	
0	1	2	3	4	Tried to control your drinking by trying to drink only at certain times of the day or certain places?	
0	1	2	3	4	Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking?	
0	1	2	3	4	Noticed a change in your personality?	
0	1	2	3	4	Felt that you had a problem with alcohol?	
0	1	2	3	4	Missed a day (or part of a day) of school or work?	
0	1	2	3	4	Tried to cut down or quit drinking?	
0	1	2	3	4	Suddenly found yourself in a place that you could not remember getting to?	
0	1	2	3	4	Passed out or fainted suddenly?	
0	1	2	3	4	Had a fight, argument or bad feelings with a friend?	
0	1	2	3	4	Had a fight, argument or bad feelings with a family member?	
0	1	2	3	4	Kept drinking when you promised yourself not to?	
0	1	2	3	4	Felt you were going crazy?	
0	1	2	3	4	Had a bad time?	
0	1	2	3	4	Felt physically or psychologically dependent on alcohol?	
0	1	2	3	4	Was told by a friend or neighbor to stop or cut down drinking?	
0	1	2	3	4	Drove shortly after having more than 2 drinks?	
0	1	2	3	4	Drove shortly after having more than 4 drinks?	

Appendix K

Michigan Alcoholism Screening Test

Appendix K

SUBJ# \_\_\_\_\_

MAST

Please circle either Yes or No for each item as it applies to you.

- |     |    |  |
|-----|----|--|
| Yes | No | 1. Do you feel you are a normal drinker?   |
| Yes | No | 2. Have you ever awakened the morning after some drinking the night before and found that you could not remember a part of the evening before? |
| Yes | No | 3. Does your spouse or your parents ever worry or complain about your drinking?  |
| Yes | No | 4. Can you stop drinking without a struggle after one or two drinks?   |
| Yes | No | 5. Do you ever feel bad about your drinking?   |
| Yes | No | 6. Do friends or relatives think you are a normal drinker?   |
| Yes | No | 7. Do you ever try to limit your drinking to certain times of the day or to certain places?  |
| Yes | No | 8. Are you always able to stop drinking when you want to?  |
| Yes | No | 9. Have you ever attended a meeting of Alcoholics Anonymous (AA) because of your own problem drinking?   |
| Yes | No | 10. have you gotten into fights when drinking?   |
| Yes | No | 11. Has drinking ever created a problem between you and your family members?   |
| Yes | No | 12. Has your spouse or other family member ever gone to anyone for help about your drinking?   |
| Yes | No | 13. Have you ever lost friends or boyfriends because of drinking?  |



- |     |    |  |
|-----|----|--|
| Yes | No | 14. Have you ever gotten into trouble at work because of drinking?   |
| Yes | No | 15. Have you ever lost a job because of drinking?  |
| Yes | No | 16. Have you ever neglected your obligations, your family, or your work for two or more days in a row because you were drinking?   |
| Yes | No | 17. Do you ever drink before noon?   |
| Yes | No | 18. Have you ever been told you have liver trouble? Cirrhosis?   |
| Yes | No | 19. Have you ever had delirium tremens (DT's), severe shaking, heard voices, or seen things that weren't there after heavy drinking?   |
| Yes | No | 20. Have you every gone to anyone for help about your drinking?  |
| Yes | No | 21. Have you ever been in a hospital because of drinking?  |
| Yes | No | 22. Have you ever been a patient in a psychiatric hospital or on a psychiatric ward of a general hospital where drinking was part of the problem?  |
| Yes | No | 23. Have you ever been seen at a psychiatric or mental health clinic, or gone to a doctor, social worker, or clergyman for help with an emotional problem in which drinking had played a part? |
| Yes | No | 24. Have you ever been arrested, even for a few hours, because of drunk behavior?  |
| Yes | No | 25. Have you ever been arrested for drunk driving after drinking?  |

Appendix L  
Health Screening

**Appendix L**

SUBJ # \_\_\_\_\_

**HQ**

1. Are you currently under the regular care of a physician?

Yes \_\_\_\_\_

No \_\_\_\_\_

If so, for what condition? \_\_\_\_\_

2. Describe all medications that you currently use:

Medication	Dosage	Frequency	Purpose
------------	--------	-----------	---------

---

---

3. Have you ever had:

- |                                     |           |          |
|-------------------------------------|-----------|----------|
| a) A heart attack or stroke?        | Yes _____ | No _____ |
| b) Any indication of heart trouble? | Yes _____ | No _____ |
| c) High blood pressure?             | Yes _____ | No _____ |
| d) Diabetes?                        | Yes _____ | No _____ |
| e) Liver disease?                   | Yes _____ | No _____ |

For any items answered "Yes", please give a brief description of the disorder and the dates:

4. Are you currently pregnant or is there any possibility that you may be pregnant at this time? Yes \_\_\_\_\_ No \_\_\_\_\_

5. In terms of your use and reactions to alcoholic beverages, have you ever had:

a) An experience of fainting or a seizure after drinking alcohol?

- |   |           |          |
|---|-----------|----------|
| b) Unusual flushing of the skin?          | Yes _____ | No _____ |
| c) Problems with your liver?              | Yes _____ | No _____ |
| d) Severe/unusual psychological reaction? | Yes _____ | No _____ |

For any items answered "Yes", please give a brief description of the reaction/disorder and the approximate dates:

Appendix M

Situational Confidence Questionnaire

## Appendix M

### SCQ

Listed below are a number of situations or events in which some people experience a drinking problem. Imagine yourself in each of these situations. Indicate on the scale provided how confident you are that you would be able to not drink heavily in that situation.

I would be able to not drink heavily:

	not at all confident			very confident		
1. if I felt uneasy in the presence of someone	0	20	40	60	80	100
2. if I unexpectedly found a bottle of my favorite booze	0	20	40	60	80	100
3. if I were at a party and other people were drinking	0	20	40	60	80	100
4. if I felt I had let myself down	0	20	40	60	80	100
5. if I broke up with my significant other	0	20	40	60	80	100
6. if I were talking to an attractive member of the opposite sex						
7. if I suddenly had the urge to	0	20	40	60	80	100
8. if I were angry at the way something had turned out	0	20	40	60	80	100
9. if other people didn't seem to like me	0	20	40	60	80	100
10. if I were at a friend's place and they were playing drinking games	0	20	40	60	80	100
11. if someone had pressured me to be a "good sport" and have a drink	0	20	40	60	80	100
12. if I was at a fraternity party	0	20	40	60	80	100

I would be able to not drink heavily:

	not at all confident					very confident
13. if someone criticized me	0	20	40	60	80	100
14. if I were on a date and my date was drinking	0	20	40	60	80	100
15. if I had just finished a long day of classes or work	0	20	40	60	80	100
16. if it was a weekend	0	20	40	60	80	100
17. if I felt lonely	0	20	40	60	80	100
18. if I was at a casual get together	0	20	40	60	80	100
19. if I had some extra money	0	20	40	60	80	100
20. if a friend was buying me drinks	0	20	40	60	80	100
21. if I felt anxious and wanted to relax	0	20	40	60	80	100
22. if I had an argument with a friend or roommate	0	20	40	60	80	100
23. if I were in a restaurant and the people with me ordered pitchers of beer and mixed drinks	0	20	40	60	80	100
24. if I were at a tailgate party for a football game	0	20	40	60	80	100
25. if someone I was attracted to was drinking	0	20	40	60	80	100
26. if there were problems at work or school	0	20	40	60	80	100

I would be able to not drink heavily:

	not at all confident					very confident
27. if other people made me tense	0	20	40	60	80	100
28. if I was with friends watching TV	0	20	40	60	80	100
29. if I were at a happy hour with a group of friends.	0	20	40	60	80	100
30. if I was bored	0	20	40	60	80	100
31. if I had just gotten a good grade on a test	0	20	40	60	80	100
32. if I were at a bar having a good time	0	20	40	60	80	100
33. if I was at a party where I didn't know many people	0	20	40	60	80	100
34. if I wanted to celebrate with a friend	0	20	40	60	80	100
35. if I was talking to someone I didn't know well	0	20	40	60	80	100
36. if I were enjoying myself at a party and wanted to feel even better	0	20	40	60	80	100

Appendix N  
Alcohol Coping Efficacy Scale



## Appendix N

### ACES

Listed below are a number of behaviors that individuals report engaging in when they want to control their drinking.

Indicate on the scale provided how confident you are that you can perform the given behavior in order to avoid drinking heavily

	not at all confident					very confident
1. Keep track of the number of drinks I consume	0	20	40	60	80	100
2. Avoid drinking with those who pressure me to drink.	0	20	40	60	80	100
3. Confine drinking to certain times of the day	0	20	40	60	80	100
4. Substitute other means for feeling friendly or sociable	0	20	40	60	80	100
5. Purposely take slow sips on my drink	0	20	40	60	80	100
6. Avoid drinking during boring or repetitious activities	0	20	40	60	80	100
7. Not keep alcohol at home	0	20	40	60	80	100
8. Use body sensations to let me know when I should slow my drinking down	0	20	40	60	80	100
9. Eat before drinking	0	20	40	60	80	100
10. Drink beer from a bottle or can instead of kegs or pitchers	0	20	40	60	80	100

I would be able to perform the following behavior in order to avoid drinking heavily

	not at all confident			very confident		
11. Participate in activities such as tennis, running, etc., when I feel like drinking	0	20	40	60	80	100
12. Limit the amount of money I carry	0	20	40	60	80	100
13. Set a limit on the number of drinks I have in a sitting	0	20	40	60	80	100
14. Avoid playing drinking games	0	20	40	60	80	100
15. Drink nonalcoholic beverages	0	20	40	60	80	100
16. Select drinks I drink slowly	0	20	40	60	80	100
17. Drink only after a certain hour in the day	0	20	40	60	80	100
18. Set time limits for how long I'll drink	0	20	40	60	80	100
19. Avoid drinking with heavy drinkers	0	20	40	60	80	100
20. Avoid drinking after stressful events	0	20	40	60	80	100
21. Select drinks lower in alcohol content	0	20	40	60	80	100
22. Engage in activities during drinking such as dancing, talking, etc.	0	20	40	60	80	100
23. Avoid drinking in places where I overdrink	0	20	40	60	80	100
24. Reward myself for not drinking	0	20	40	60	80	100

I would be able to perform the following behavior in order to avoid drinking heavily

	not at all confident			very confident		
25. Drink less when I am going to drive	0	20	40	60	80	100
26. Refuse unwanted drinks	0	20	40	60	80	100
27. Stop drinking any alcohol for some period of time	0	20	40	60	80	100
28. Ask for family support to limit my drinking	0	20	40	60	80	100
29. Think about the consequences of my drinking	0	20	40	60	80	100
30. Avoid drinking on occasions when I tend to overdrink	0	20	40	60	80	100
31. Punish myself for failing to limit my drinking	0	20	40	60	80	100
32. Substitute other means for dealing with stress, depression, and anxiety	0	20	40	60	80	100
33. Avoid drinking wine or liquor from the bottle	0	20	40	60	80	100
34. Get friends to help me limit my drinking	0	20	40	60	80	100

Appendix O  
Commitment Questionnaire

**Appendix O**

**CQ**

SUBJ # \_\_\_\_\_

**CIRCLE THE MOST CORRECT ANSWER IN RELATION TO YOUR HEAVY DRINKING GOAL**

1. I am strongly committed to not drinking heavily.

TRUE

FALSE

2. Quite frankly, I don't care if I reduce my heavy drinking.

TRUE

FALSE

3. It is quite likely that my goal regarding heavy drinking will change depending on how things go this semester.

TRUE

FALSE

4. It would not take much for me to change my goal concerning reduction in heavy drinking.

TRUE

FALSE

5. It's unrealistic for me to expect to reach my heavy drinking goal.

TRUE

FALSE

6. Since it's not always possible to tell how hard something is until you've been working at it for a while, it's hard to take any heavy drinking reduction goal seriously.

TRUE

FALSE

7. I think my heavy drinking goal is a good goal to shoot for.

TRUE

FALSE

Appendix P  
Discrepancy Questions

Appendix P

SUBJ # \_\_\_\_\_

DQ

1. How large is the difference between your current drinking and your goal concerning heavy drinking?

1      2      3      4      5      6      7  
not at      very  
all different      different

2. What is the level of discomfort you experience concerning your drinking habits?

1      2      3      4      5      6      7  
no      much  
discomfort      discomfort

Table 1.

Frequency of Heavy Drinking Occasions as a Function of Feedback and Goal Conditions Across Time

	<u>INITIAL</u>	<u>1 MONTH</u>	<u>2 MONTH</u>
Feedback			
No Goal	6.92 (2.91)	4.25 (3.65)	4.58 (2.43)
Proximal Goal	9.25 (5.53)	9.33 (5.31)	8.58 (5.38)
Distal Goal	6.82 (1.99)	3.91 (2.43)	3.82 (2.60)
No Feedback			
No Goal	7.36 (2.94)	6.27 (4.29)	5.73 (3.04)
Proximal Goal	7.18 (2.60)	4.09 (2.84)	3.91 (2.30)
Distal Goal	6.64 (2.01)	4.36 (2.80)	5.09 (2.88)
Entire Sample	7.38 (3.27)	5.41 (2.88)	5.32 (3.59)



Table 2.

Average Quantity per Occasion as a Function of Feedback and Goal Conditions Across Time

	<u>INITIAL</u>	<u>1 MONTH</u>	<u>2 MONTH</u>
Feedback			
No Goal	5.99 (1.89)	5.11 (2.11)	5.17 (1.90)
Proximal Goal	7.83 (2.68)	6.49 (2.74)	7.39 (2.38)
Distal Goal	6.48 (2.38)	4.95 (2.08)	4.86 (1.81)
No Feedback			
No Goal	5.93 (1.74)	5.10 (1.73)	5.55 (1.50)
Proximal Goal	6.37 (2.13)	4.16 (1.32)	4.37 (1.30)
Distal Goal	6.25 (2.22)	5.04 (2.18)	5.06 (1.70)
Entire Sample	6.49 (2.22)	5.16 (2.13)	5.43 (2.00)

Table 3.

Zero-order Correlations between Self-Regulation Variables and Drinking Behavior at 1 Month

	<u>One Month Drinking Variables</u>	
	<u>Heavy Drinking Occasions</u>	<u>Average Quantity</u>
<b><u>Baseline</u></b>		
Heavy Drinking Occasions	.699 ***	-----
Average Quantity	-----	.633 ***
Situational Efficacy	-.238 *	-.072
Coping Efficacy	-.568 ***	-.341 ***
Commitment	-.525***	-.440***
Discrepancy	.134	.276**

\*\*\* p < .001

\*\* p < .01

\* p < .05

Table 4.

Zero-Order Correlations Between 1 Month Self-Regulation Variables and Drinking Behavior at 2 Months

	<u>Two Month Drinking Variables</u>	
	<u>Heavy Drinking Occasions</u>	<u>Average Quantity</u>
<b><u>1 Month</u></b>		
Heavy Drinking Occasions	.583 ***	-----
Average Quantity	-----	.609 ***
Situational Efficacy	-.171	-.062
Coping Efficacy	-.357 *	-.157
Commitment	-.272 **	-.364 ***
Discrepancy	.249 *	.154

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\*\*\* p < .001

\*\* p < .01

\* p < .05

Table 5.

Summary of Hierarchical Regression Analyses for Variables Predicting Future Frequency of Heavy Drinking Occasions

Variable	1 Month Beta	2 Month Beta
<b>Step 1</b>		
Current heavy drinking	.55 ***	.61 ***
<b>Step 2</b>		
Coping Efficacy	-.16	.02
Commitment	-.32 ***	.07
Discrepancy	-.12	-.17
<b>Step 3</b>		
Interaction of Self-Regulation Variables	.03	.22
<b>Total R<sup>2</sup></b>	<b>.62</b>	<b>.38</b>

\*\*\* p < .001

\*\* p < .01

\* p < .05

Table 6.

Summary of Hierarchical Regression Analyses for Variables  
Predicting Future Average Quantity per Drinking Occasion

Variable	1 Month Beta	2 Month Beta
<b>Step 1</b>		
Current Quantity per Occasion	.50 ***	.58 ***
<b>Step 2</b>		
Coping Efficacy	-.07	.01
Commitment	-.24 **	-.11
Discrepancy	.05	-.02
<b>Step 3</b>		
Interaction of Self- Regulation Variables	-.02	-.07
<b>Total R<sup>2</sup></b>	.46	.38

\*\*\* p < .001

\*\* p < .01

\* p < .05

Table 7.

Mean Alcohol Consumption as Reported by Subjects and Collaterals

	<u>Subject</u>	<u>Collateral</u>
<b>1 Month</b>		
Weekly Average	12.45* (9.50)	19.60* (18.32)
Average Quantity	5.15 (2.14)	6.40 (4.01)
Drinking Days	9.01* (4.26)	10.13* (4.73)
<b>2 Month</b>		
Weekly Average	12.22* (8.97)	19.93* (15.51)
Average Quantity	5.48* (2.03)	6.34* (3.06)
Drinking Days	8.71* (4.11)	10.15* (5.66)

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\* Significant difference between means in the same row,  $p < .05$   
Standard deviations in parentheses.

## CURRICULUM VITA

Lisa Curtin  
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(401) 434-3400 ext. 275 (work)

## EDUCATION

### Candidate, Doctor of Philosophy

Clinical Psychology

Virginia Polytechnic Institute and State University

Doctoral Dissertation (in progress):

### Goal-Setting in Reduction of Heavy Drinking in Females

Robert S. Stephens, Ph.D., Chair

Predoctoral Internship (July 1995 - July 1996):

Brown University Clinical Psychology Training Consortium

### Master of Science, April 1991

Clinical Psychology

University of Central Florida

Thesis: Perception of Males as a Function of Alcoholic Beverage  
Preference

Randy D. Fisher, Ph.D., Chair

### Bachelor of Science, December 1988

Major: Psychology

Minor: Philosophy

Florida State University

## PROFESSIONAL AFFILIATIONS

American Psychological Association

Student Affiliate

Association for Advancement of Behavior Therapy

Student Affiliate

## RESEARCH EXPERIENCE

### Research Assistant -- January 1994 - August 1994

Dr. Roger A. Roffman  
School of Social Work (off site)  
University of Washington  
909 N.E. 43rd  
Seattle, WA 98105

Supervisor: Dr. Robert S. Stephens, Virginia Tech

Duties included primary responsibility for data coding, data management and data analyses for an NIMH funded grant investigating the efficacy of a cognitive-behavioral intervention for AIDS prevention in homosexual men. Additional duties include collaborating on the writing of manuscripts.

### Research Assistant -- August 1991 - December 1993

Dr. Robert S. Stephens  
Department of Psychology  
Virginia Polytechnic Institute and State University  
Blacksburg, VA 24061  
(540) 231-6304

Duties included data collection, data management, data analysis, and manuscript writing for a NIDA funded grant investigation of treatment programs for marijuana dependence.

### Research Assistant -- August 1991 - August 1994

Dr. George Clum  
Department of Psychology  
Virginia Polytechnic Institute and State University  
Blacksburg, VA 24061  
(540) 231-5701

Responsibilities included presentation of papers at conferences as well as preparation of manuscripts for publication for an NIMH funded investigation of treatment for adolescent suicide ideators.



Research Assistant -- August 1987 - April 1989

Dr. Alan R. Lang  
Department of Psychology  
Florida State University  
Tallahassee, FL 32306  
(904) 644-6065

Assisted in an NIAAA grant study evaluating the link between Attention Deficit Disorder and alcohol abuse, in addition to other ongoing projects. Duties included running subjects, data management and data analysis.

## CLINICAL EXPERIENCE

Clinical Psychology Intern -- July 1995 - present

Brown University Clinical Psychology Training Consortium  
Box G-BH  
Providence, RI 02912  
(401) 863-1650

Supervisors: Ivan Miller, Ph.D.; (401) 455-6348  
Richard Brown, Ph.D.; (401) 455-6254  
Karin Dodge-Magee, Ph.D.; (401) 434-3400 x 235

Predoctoral internship including full-time rotations in acute inpatient treatment, outpatient alcohol and drug treatment, and integrated psychiatric/educational treatment with preschool children and families. Part-time rotations include admission evaluations, psychological consultation, and research placement.

Graduate Clinician -- August 1991 - May 1992; Jan 1994 - May 1995

Psychological Services Center (Virginia Tech)  
3110 Prices Fork Road  
Blacksburg, VA 24061  
(540) 231-6914

Supervisors: Robert S. Stephens, Ph.D.  
Jack W. Finney, Ph.D.  
Richard M. Eisler, Ph.D.  
Russell T. Jones, Ph.D.

Clinical responsibilities included short and long-term individual and family treatment, psychological assessment, and individual and group supervision.

NIMH Grant Therapist -- August 1991 - August 1994

Dr. George Clum  
Department of Psychology  
Virginia Polytechnic Institute and State University  
Blacksburg, VA 24061  
(540) 231-5701

Duties included leading protocol-driven treatment groups for an NIMH supported study on the prevention of suicidality in adolescent ideators.

Graduate Clinician -- November 1992 - April 1993

Department of Psychology  
Virginia Polytechnic Institute and State University  
Blacksburg, VA 24061  
(540) 231-6304

Supervisors: Robert S. Stephens, Ph.D., (540) 231-6304  
Steve Lash, Ph.D., (703) 982-2463/ext. 2593

Conducted objective assessment and feedback sessions with inpatient substance abuse patients at Veterans Administration Hospital.

Veterans Administration Summer Trainee -- June 1992 - August 1992

Department of Veterans Affairs  
Medical Center  
Salem, VA 24153

Supervisors: J.D. Gilmore, Ph.D., (703) 982-2461/ext. 2607  
Andrew Millar, Ph.D., (no longer at the VA)

Full-time rotation in the inpatient substance abuse treatment program and a minor rotation in the outpatient clinic.

Therapeutic Program Assistant -- June 1991 - August 1991  
Florida Camelot, Inc.  
Seminole, FL 34646  
(813) 949-7491

Assistant Administrator: Sandra Bowman, MS

Duties included implementation of therapeutic and recreational programs at a children's residential psychiatric hospital.

Outpatient Therapist (practicum) -- August 1990 - April 1991  
Lake/Sumter Mental Health Center and Hospital  
P.O. Box 49100  
Leesburg, FL 34749-1000

Supervisor: Tim Camp, MS

Clinical duties included individual and couples counseling as well as participation in staff meeting, peer reviews and weekly supervision.

## TEACHING EXPERIENCE

Graduate Instructor -- August 1994 - May 1994  
Department of Psychology  
Virginia Polytechnic Institute and State University  
Blacksburg, VA 24061

Teaching Mentor: Robert S. Stephens, Ph.D.

Responsible for planning and teaching an undergraduate course in abnormal psychology.

Teaching Assistant -- August 1990 - April 1991  
Department of Psychology  
University of Central Florida  
Orlando, FL 32816  
(407) 823-2216

Course Instructors: Tom Guest, Ph.D.  
Sandy Houston, Ph.D.

Duties included grading intellectual and personality testing protocols for first year clinical psychology assessment courses.

## PUBLICATIONS

Stephens, R.S. & Curtin, L. (1995). Alcohol and depression: Effects on mood and biased processing of self-relevant information. Psychology of Addictive Behaviors, *9*, 211-222.

Stephens, R.S., Curtin, L., Simpson, E.E. & Roffman, R.A. (1994). Testing the Abstinence Violation Effect construct with marijuana cessation. Addictive Behaviors, *19*, 23-32.

Clum, G.A. & Curtin, L. (1993). Validity and reactivity of a system of self-monitoring suicide ideation. Journal of Psychopathology and Behavioral Assessment, *15*, 375-385.

Curtin, L. & Fisher, R. (1993). Perception of men as a function of alcoholic beverage preference. Journal of Studies on Alcohol, *54*, 315-319.

Lang, A.R., Winiarski, M.G. & Curtin, L. (1992). Person perception as a function of drinking behavior, gender and sex role stereotypes. Journal of Studies on Alcohol, *53*, 225-232.

## MANUSCRIPTS SUBMITTED FOR PUBLICATION

Curtin, L., Stephens, R.S. & Roffman, R.A. (under review). Utility of the Abstinence Violation Effect in predicting safe-sex goal violation. Manuscript submitted for publication.

Roffman, R.A., Stephens, R.S. & Curtin, L. (under review). Relapse prevention as an interventive model for HIV risk-reduction in gay and bisexual men.

## GRANTS AWARDED

Curtin, L. (April, 1995). Goal setting in reduction of heavy drinking in females. NIAAA awarded grant for beginning alcohol treatment researchers, RFA AA-94-07.

## PRESENTATIONS

Curtin, L., Stephens, R.S., Mattis, S.G., Campe, D., Rao, S. & Poister, C. (1995). Goal setting and feedback in the reduction of heavy drinking in women college students. Paper presented at Association for Advancement of Behavior Therapy, Washington, DC, November 1995.

Stephens, R.S., Roffman, R.A., Cleaveland, B.L., Curtin, L. & Wertz, J.S. (1995). Self-efficacy and marijuana effects expectancies in the prediction of posttreatment marijuana use. Paper presented at Association for Advancement of Behavior Therapy, Washington, DC, November 1995.

Stephens, R.S., Roffman, R.A., Cleaveland, B.S., Curtin, L. & Wertz, J.S. (1994). Extended versus minimal intervention with marijuana dependent adults. Paper presented at Association for Advancement of Behavior Therapy, San Diego, CA, November 1994.

Febbraro, G.A.R., Clum, G.A., Curtin, L. & Miller, K.M. (1994). A critical examination of claustrophobia: Do subtypes exist? Paper presented at Association for Advancement of Behavior Therapy, San Diego, CA, November 1994.

Curtin, L., Stephens, R.S., Cleaveland, B.S. & Roffman, R.A. (1993). Pretreatment substance abuse attrition: Implications for methodology, generalizability and outreach. Paper presented at Association for Advancement of Behavior Therapy, Atlanta, GA, November 1994.

Roffman, R.A., Stephens, R.S., Curtin, L. & Cleaveland, B.A. (1993). Differential attrition from brief and extended interventions for marijuana dependent adults. Paper presented at Association for Advancement of Behavior Therapy, Atlanta, GA, November, 1993.

Curtin, L., Stephens, R.S. & Greaves, C.K. (1992). Relative utility of self-efficacy and outcome expectancies in predicting readiness for change in drinking behavior. Paper presented at Association for Advancement of Behavior Therapy, Boston, MA, November 1992.

Greaves, C.K., Stephens, R.S. & Curtin, L. (1992). Measuring efficacy for behavioral coping strategies in college drinking. Paper presented at Association for Advancement of Behavior Therapy, Boston, MA, November 1992.

Clum, G.A., Curtin, L., Priester, M.J., Weaver, T.L., Weise, K. & Yang, B. (1992). Preliminary assessment data from an adolescent sample of chronic suicide ideators. Paper presented at Association for Advancement of Behavior Therapy, Boston, MA, November 1992.

Clum, G.A., Priester, M., Weaver, T., Putnam, D., Pickett, C., Gould, R., Yang, B., Weise, K. & Curtin, L. (1992). Group problem solving and group social support treatments for suicide ideation. Paper presented at the XXVth International Congress of Psychology, Brussell, Belgium 1992.

Curtin, L. & Clum, G. (1992). Validity and reactivity of a system of self-monitoring for suicide ideation. Paper presented at a symposium at the annual meeting of the Virginia Psychological Association, Roanoke, VA, 1992.

Curtin, L. & Fisher, R. (1991). Perception of males as a function of alcoholic beverage preference. Paper presented at the Southeastern Psychological Association, New Orleans, LA, March 1991.

## REFERENCES

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