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Abstract

Alcohol consumption among college students has become an increasing problem that requires attention from college administrators, staff, and researchers. Despite the physiological differences between men and women, college women are drinking at increasingly risky rates, placing them at increased risk for negative consequences. The current study tested a group motivational enhancement approach to the prevention of heavy drinking among 1st-year college women. Using a randomized design, the authors assigned participants either to a group that received a single-session motivational enhancement intervention to reduce risky drinking that focused partly on women's specific reasons for drinking ($n = 126$) or to an assessment-only control group ($n = 94$). Results indicated that, relative to the control group participants, intervention participants drank fewer drinks per week, drank fewer drinks at peak consumption events, and had fewer alcohol-

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related consequences over a 10-week follow-up. Further, the intervention, which targeted women's reasons for drinking, was more effective in reducing consumption for participants with high social and enhancement motivations for drinking.

Keywords

college drinking; first-year women; motivational enhancement; reasons for drinking

Alcohol misuse and abuse is a significant problem on college campuses. Forty percent of college students report engaging in heavy drinking within the prior month (O'Malley & Johnston, 2002), and alcohol-related consequences range from poor academic performance to fighting, injuries, and even death (Hingson, Heeren, Winter, & Wechsler, 2005). The National Institute on Alcohol Abuse and Alcoholism (NIAAA) Task Force on College Student Drinking (2002) stated that first-year students are a high-risk group. Female college students are especially at risk for alcohol-related negative consequences, including sexual assault (Young, Morales, McCabe, Boyd, & D'Arcy, 2005). Due to the inherent physiological differences between men and women in both experiencing the effects of and metabolizing alcohol (Perkins, 2000), even when controlling for weight, women require less alcohol than do men to reach higher blood alcohol concentrations and to experience the intoxicating effects of alcohol (NIAAA, 2002).

Despite these physiological differences, college women have steadily increased their levels of alcohol consumption (O'Malley & Johnston, 2002). From 1993 to 2001, the percentage of college women who drank on 10 or more occasions in the past 30 days rose significantly (from 12.3% to 16.8%), as did the percentage of those who reported being drunk three or more times in the past 30 days (from 18.9% to 24.6%) and those who reported drinking to get drunk (from 35.6% to 42.4%). Further, a higher percentage of women were also classified as frequent binge drinkers (defined as binge drinking three or more times in past 2 weeks; from 17.1% to 20.9%). Although women and men often drink for similar reasons, including relaxing, fitting in, and experiencing decreased inhibition, women also may drink because of a desire for having intimate relationships. Women may view alcohol as a means of facilitating communication and sexual expression, including initiating a relationship, finding intimacy, or coping with the loss or failure of an existing relationship (Gleason, 1994a, 1994b). In turn, women may be placing themselves at higher risk for sexual assault (Young et al., 2005); in fact, over 50% of all sexual assaults on college campuses involve alcohol (Abbey, 2002). Thus, physiological differences, increases in drinking among women, and the increased risk attached to the first year of college underscore the need for interventions targeted to 1st-year women.

The NIAAA (2002) recommends the use of motivational enhancement interventions that simultaneously address alcohol attitudes and behaviors, counter misperceptions about peer attitudes regarding drinking, and increase motivation to change drinking habits. Motivational interviewing (MI; Miller & Rollnick, 1991) is a therapeutic style that seeks to increase motivation to reduce drinking by using client-centered techniques in a nonconfrontational manner, borrowing from relationship-building principles of humanistic

therapy (Rogers, 1951) and active cognitive-behavioral strategies. Interventions involving adaptations of MI (AMIs) maintain the fundamental spirit of MI but also include additional techniques, such as a feedback component, and appear promising (see the meta-analysis by Burke, Arkowitz, & Menchola, 2003). Programs that combine these approaches have demonstrated effectiveness in reducing problematic drinking among heavy drinkers, including male and female college students (e.g., LaBrie, Lamb, Pedersen, & Quinlan, 2006).

The current study examined alcohol use among incoming female students through a randomized trial examining the effectiveness of a single-session, brief AMI intervention that focused on female-specific reasons for drinking and that incorporated several elements of MI interventions. It was anticipated that participants in the intervention group would drink at lower levels and experience lower numbers of alcohol-related negative consequences during the 10 weeks of follow-up than the assessment-only control group. We also explored drinking motives as a potential moderator of intervention effectiveness. On the basis of previous research that demonstrates that social and enhancement motives influence drinking (Cooper, 1994; Cronin, 1997; Stewart & Chambers, 2000), and due to the focus of the intervention on female-specific motives, we predicted that the intervention would be more effective with female students with higher social and enhancement motives than it would be with female students with lower social and enhancement motives.

Method

Participants

During the summer before their initial semester of college, all incoming first-year women ($N = 661$) received letters asking them to participate in “a study on women’s values and attitudes toward drinking and health issues.” Any incoming freshman female student was eligible to participate in the project and during the second week of classes received an e-mail regarding participation in the study. If the student chose to participate, she clicked on a link directing her to the initial online questionnaire where she electronically “signed” a local institutional review board-approved informed consent form. At the end of the initial questionnaire, the participant was asked to select 1 of 25 groups to attend, with enrollment on a first-come, first-served basis. Groups had been randomly assigned by research staff to be in either the intervention or the control group, but each participant chose a group being blind to group status.

Study enrollment terminated after 5 days, as all of the allotted spaces in the groups were taken. A sample of 261 female students enrolled in the study and completed the initial questionnaire. Of these, 220 attended a group session, including 11 control ($n = 94$; 43%) and 14 intervention ($n = 126$; 57%) sessions. Of the 41 female students who completed the questionnaire but did not attend a group, 8 never signed up for a group session, and 33 (25 in the intervention condition, 8 in the control condition) failed to attend their scheduled group. There were no differences on any demographic variables between the 41 who failed to attend a group and those who participated in the groups. Participants received a stipend of \$40 for completing the initial online questionnaire and attending their scheduled group, as well as an additional \$10 per week for follow-up participation over the next 10 weeks.

Participants averaged 18.10 ($SD = 0.37$) years of age. Fifty-two percent of the participants identified themselves as White/Caucasian, whereas the remaining 48% consisted of different ethnicities (17% Hispanic, 11% “more than one race,” 6% African American, 6% “other,” 4% Asian, 3% Hawaiian/Pacific Islander, and 1% Native American). Retention rates were 100% and 98% for the intervention and control groups, respectively, with all 126 intervention participants and 92 of 94 control participants completing all 10 follow-up diaries.

Design and Procedure

The study consisted of an online questionnaire, a group session (intervention or control) held 1–2 weeks after taking the baseline questionnaire, and 10 weeks of online follow-up assessment.

Measures

The questionnaire assessed demographic questions, including age, ethnicity, and family income, and was also a baseline measure of drinking attitudes and consequences. Measures used included the following:

Alcohol attitudes—Motivations for drinking alcohol were assessed using the 20-item Drinking Motives Questionnaire (Cooper, 1994) and its four subscales of Conformity Motives ($\alpha = .79$), Coping Motives ($\alpha = .85$), Enhancement Motives ($\alpha = .93$), and Social Motives ($\alpha = .93$).

Alcohol-related negative consequences—The Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989) was used to assess problems encountered during the prior month while drinking or as a result of alcohol use ($\alpha = .87$ for the 23 RAPI items).

Alcohol use—During group sessions, participants reported alcohol use over the past 3 months by completing the Timeline Follow-Back (TLFB; Sobell & Sobell, 1992) or calendar of drinking behaviors. Using the TLFB, variables for number of drinks per week, number of drinking days, average number of drinks, maximum number of drinks consumed at one time, and number of binge drinking events (consuming four or more drinks in a row) were constructed.

Intervention

Groups consisted of 8–12 first-year female college students, and group meetings were held near the end of the 1st month of the academic year. The groups were supervised and led by a doctoral-level clinician and cofacilitated by a research assistant. Both facilitators were women and received extensive training in MI. The session lasted 2 hours and consisted of an individual TLFB assessment and self-confrontation with personal drinking over the previous 3 months, an introductory discussion of alcohol expectancies and the “good things” and “not-so-good things” about drinking, normative feedback, information on blood alcohol concentration and alcohol effects specific to women, a discussion of reasons for drinking, a decisional balance exercise weighing the pros and cons of drinking, and the setting of personal behavioral goals.

Intervention Fidelity

In order to ensure adherence to MI principles and protocol, the group sessions were audio recorded and rated by coders trained in the use of the Motivational Interviewing Treatment Integrity (MITI) rating system (Moyers, Martin, Catley, Harris, & Ahluwalia, 2003). All participants consented to the recording and coding of their group sessions. Three sessions (representing groups held at the beginning, middle, and end of the intervention time frame) were coded in their entirety, and for other sessions, randomly selected 20-min increments were coded, consistent with recommendations for use of the MITI. The MITI codes for empathy and spirit are scored on a 7-point scale. The majority of sessions coded received a score of 5 or higher on both empathy and spirit, indicating competency for MI. Overall, results indicated therapists were largely consistent with MI principles and practice.

Control Group

Control group participants attended a 30-min scheduled group session in which they completed an in-group TLFB assessment. There was no facilitated group discussion, and participants were asked to complete the TLFB independently to discourage group interaction. These participants were given a packet of alcohol-related information specific to women along with their compensation for attending.

Follow-Up Assessment

All participants completed weekly online drinking diaries for the 10 weeks following the group session, recording the number of drinks they consumed each day in the past week. At the end of the 4th and 10th weeks, participants completed the RAPI to assess consequences in the past month. The 10-week time frame for follow-up assessments ended just prior to the holiday break, allowing for data collection of drinking behaviors during the entire first semester of the academic year.

Results

Analysis Strategy

A general linear model approach was used to evaluate statistical assumptions and variable distributions. Outcomes at multiple follow-ups were specified as repeated measures. Outcomes at baseline were specified as a covariate. Intervention group (coded 1 for intervention, 0 for control) was specified as the independent variable. Thus, main effects for intervention represent overall differences between groups after accounting for baseline behavior. Moderation hypotheses were tested by adding the proposed moderator and its product with the intervention term into the model. We used Cohen's *d* to measure effect sizes.

Three drinking variables were calculated from the past month of the TLFB—number of drinks per week, maximum number of drinks consumed at one time, and number of binge drinking episodes. A series of *t* tests were used to evaluate potential baseline differences between groups in drinking and proposed moderators. The intervention and control groups did not differ at baseline on any variable of interest, including participant age and ethnicity. With respect to moderation analyses, it is important to note that, although both social and

enhancement motives were positively associated with drinking at all time points (r s ranged from .26 to .53), no interaction was present between either of these variables and the intervention condition in predicting baseline drinking.

Primary Analyses: Intervention Efficacy

Alcohol consumption—Table 1 presents means and standard deviations on variables of interest at baseline. Using Wechsler and colleagues' (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994; Wechsler, Lee, Kuo, & Lee, 2000) drinker classification for the 2 weeks prior to attending a group, 23.2% ($n = 51$) of the sample were nondrinkers, 38.2% ($n = 84$) were non-binge drinkers, 23.2% ($n = 51$) were binge drinkers, and 15.5% ($n = 34$) were frequent binge drinkers.

General linear model analyses were used to evaluate intervention efficacy. Number of drinks per week during Weeks 1 through 10 postintervention was specified as a repeated measure. Number of drinks per week at baseline was specified as a covariate. Intervention group was specified as the independent variable. Within-subjects effects revealed no overall time effect, $F(9, 1809) = 0.33, p = .96, d = .02$, and no Time \times Intervention interaction effect, $F(9, 1809) = 0.92, p = .45, d = .05$. There was, however, a main effect for intervention, indicating that across all 10 follow-up time points, participants in the intervention group drank fewer drinks per week than did participants in the control group, $F(1, 201) = 5.82, p < .05, d = .34$ (See Figure 1).

Results for the intervention's effect on the maximum number of drinks consumed across the 10 weeks of follow-up were similar to those for the number of drinks consumed per week. Within-subjects effects again revealed no overall time effect, $F(9, 1809) = 0.59, p = .78, d = .04$, and no Time \times Intervention interaction effect, $F(9, 1809) = 0.95, p = .46, d = .05$. The intervention effect on maximum number of drinks controlling for maximum number of drinks at baseline approached significance, $F(1, 201) = 3.65, p < .06, d = .27$. Means (and standard deviations) at baseline, 4 weeks, and 10 weeks for maximum number of drinks were 4.11 (3.73), 1.95 (2.89), and 1.47 (2.52) versus 4.00 (3.86), 2.05 (2.91), and 1.87 (3.00) for intervention and control groups, respectively.

Finally, similar analyses were conducted for binge drinking episodes at two postintervention time periods (1 month postintervention and the last 4 weeks of follow-up) with binge episodes in the month prior to entering the study serving as a covariate. Within-subjects effects revealed no overall effect for time, $F(1, 202) = 0.01, p = .94, d = .01$, and no Time \times Intervention interaction, $F(1, 202) = 0.16, p = .69, d = .06$. There was a main effect for intervention, indicating that participants in the intervention group had fewer binge episodes than participants in the control group at the two follow-up points, $F(1, 202) = 8.75, p < .01, d = .42$. Means (and standard deviations) at baseline, 4 weeks, and 10 weeks for intervention and control groups, respectively, were 1.87 (2.85), 1.40 (2.19), and 1.08 (1.77) versus 1.85 (3.19), 2.08 (3.57), and 1.62 (2.94) and are contained in Figure 2.

Alcohol-related consequences—RAPI scores at 4 weeks and 10 weeks were examined as a repeated measure and evaluated as a function of intervention group, controlling for baseline RAPI scores. A main effect for intervention, $F(1, 193) = 3.90, p = .05, d = .28$,

suggested that consequences were lower postintervention in the intervention group than in the control group. Means (and standard deviations) at baseline, 4 weeks, and 10 weeks were 2.12 (3.04), 2.30 (3.34), and 1.94 (3.10) versus 2.35 (3.90), 2.97 (4.46), and 2.76 (4.45) for the intervention and control groups, respectively (see Figure 2).

Moderation Analyses

The four subscales of the Drinking Motives Questionnaire were each evaluated as moderators of intervention efficacy. Neither conformity nor coping motives interacted with intervention group in predicting number of drinks per week or RAPI scores. Further, neither social nor enhancement motives moderated intervention effects on alcohol-related consequences (RAPI). An interaction was evident between social motives and intervention group for both number of drinks per week, $F(1, 194) = 9.43, p < .001, d = .44$, and maximum number of drinks, $F(1, 194) = 5.97, p < .05, d = .35$. Interactions were graphed and interpreted on the basis of predicted cell means derived from parameter estimates as outlined by Aiken and West (1991). Results suggest that the intervention effect was strongest among women with stronger social motivations for drinking (see Figure 3). The interaction for maximum number of drinks paralleled that for number of drinks per week. Similarly, there was an interaction between enhancement motives and intervention group for both number of drinks per week, $F(1, 194) = 5.73, p < .05, d = .34$, and maximum number of drinks, $F(1, 194) = 5.37, p < .05, d = .33$. The intervention was more effective among women with stronger enhancement drinking motives (see Figure 3). Again, the interaction for maximum number of drinks was similar to that for number of drinks per week.

Subsequent Analyses

Subsequent analyses were conducted to evaluate the potential influence of abstainers on the results presented above. In this sample, 21.4% of women reported no drinking at baseline or at any of the follow-up assessments. We reran all of the above-described analyses excluding these women. Despite having somewhat lower power, the results remained relatively unchanged, and our interpretation of the results did not change in any case. We also conducted subsequent analyses evaluating racial differences in drinking during follow-up assessments that controlled for baseline drinking, that evaluated whether intervention efficacy varied as a function of ethnicity. Given relatively small subsamples of specific ethnic minorities, we compared Caucasian participants and participants of any ethnic minority. We also limited these analyses to an examination of the primary outcome variable, number of drinks per week. Results indicated no main effect of ethnicity on follow-up drinking, nor was there an interaction between intervention condition and ethnicity.

Discussion

The current study was a randomized clinical trial assessing the effectiveness of a brief, one-session selective prevention AMI alcohol intervention with first-year female college students. Consistent with our hypotheses, there was a significant main effect for the intervention, as participants receiving the intervention drank fewer drinks per week, had fewer binge drinking episodes per month, and reported fewer alcohol consequences than assessment-only control participants. In addition, the main effect for maximum number of

drinks consumed at one time approached significance. Effect sizes for the intervention fell within the small-to-medium range ($d = .27-.42$). Further, the intervention's effect was moderated by social and enhancement drinking motives. Although social and enhancement motives were positively associated with drinking at all time points, there were no differences in the relationship between these motives and condition at baseline. Differences in drinking between intervention and control participants emerged only after the intervention and only among women who were higher in social or enhancement motives. Moreover, the intervention appeared to have a protective effect for increased drinking among women higher in social and enhancement motives.

Although several empirically supported motivational enhancement interventions exist to reduce college drinking (Larimer, Cronce, Lee, & Kilmer, 2004), this is the first documented female-specific group intervention in this population. The intervention combines several motivational enhancement components in a group discussion setting and attempts to motivate participants to reduce the risk associated with drinking or to continue abstinence. Further, the intervention targeted women-specific reasons for drinking, particularly drinking in order to find or enhance relationships. As such, the moderation effects of social and enhancement motives on intervention effectiveness appear to be consistent with intervention design. Neither coping nor conformity motives moderated the intervention's effect. In order to reduce risk in college women who drink for coping or conformity motives, it may be necessary to design interventions addressing these specific drinking styles. Finally, exploratory analyses revealed that ethnicity did not moderate intervention efficacy. These findings may have been due to low power, and as such, further work examining potential treatment differences among different ethnicities is warranted.

This study has several strengths, including the innovation of testing a brief, group-based prevention intervention for first-year college women, a population at increasing risk for developing heavy alcohol use patterns and experiencing negative consequences. Further, this intervention utilized motivational enhancement techniques and weekly Web-based follow-up data collection to assess the entire first semester of college drinking for incoming freshmen women. Findings provide potentially important implications for the prevention of high-risk alcohol use during this critical transitional period. Finally, the results suggest that targeted interventions among specific cohorts of college students are promising.

Despite these strengths, limitations exist. For example, although participants blindly self-selected into randomized intervention or control groups, a true random sample cannot be assumed, because the first-come, first-served basis may have catered to highly motivated individuals. Likewise, retrospective data collection has been criticized for limited accuracy. However, the use of TLFB and weekly drinking diaries has been shown to be a reliable and valid method of data collection for alcohol use among college students (Searles, Helzer, Rose, & Badger, 2002). Also, because participants were paid for their involvement in the study, there may have been demand characteristics to report lower drinking patterns. However, it is unlikely that this would account for intervention effects, given that intervention and control participants received the same incentives. Further, the same facilitators implemented both the intervention and assessment-only control groups, which

may have led to other demand characteristics, such that participants' responses may have been affected by subtle cues indicating the experimenter's own expectations.

Although the intervention group drank consistently less over the 10-week follow-up, there was a unique increase in drinking among intervention participants during the 6th week of follow-up. This increase is most likely due to a specific campus event held around the time of Halloween. Although group sessions were spread evenly over a 3-week period, the intervention participants who were in their 4th week of follow-up over Halloween appeared to account for the increase. Further, the brief follow-up period did not allow us to assess the lasting effects of the intervention. Nonetheless, the 10-week design coincided with the first semester, allowing for the examination of drinking patterns during this critical time. Finally, this study lacked a true control group, which would have provided an examination of the natural history of change during the transition into college. The control group used was an assessment-only group that performed a TLFB of drinking in the group setting. Although the TLFB might have created its own set of demand characteristics and raised participants' awareness of their own drinking, observed differences in drinking and alcohol problems between intervention and control groups highlight the potential effectiveness of this intervention in reducing drinking beyond any demand.

Finally, because the intervention included multiple components, it is impossible to determine the specific mechanism of change. Future studies might isolate various components of the intervention to determine unique contributions to behavior change, including a specific examination of whether the reasons-for-drinking discussion enhances the efficacy of the intervention. Nonetheless, this selective group prevention intervention targeting first-year female students appears successful in preventing the establishment of heavy drinking patterns during the first semester of college. The utility of this intervention lies in the group design, which utilizes fewer campus resources than individual interventions, and in the structure of the group dynamic, which specifically addressed reasons for drinking and issues relevant to college women. With the noted increase in drinking patterns for college women nationwide, preventative interventions implemented within the first 6 weeks of college, such as this one, may contribute to reducing heavy consumption patterns and associated risk.

Acknowledgments

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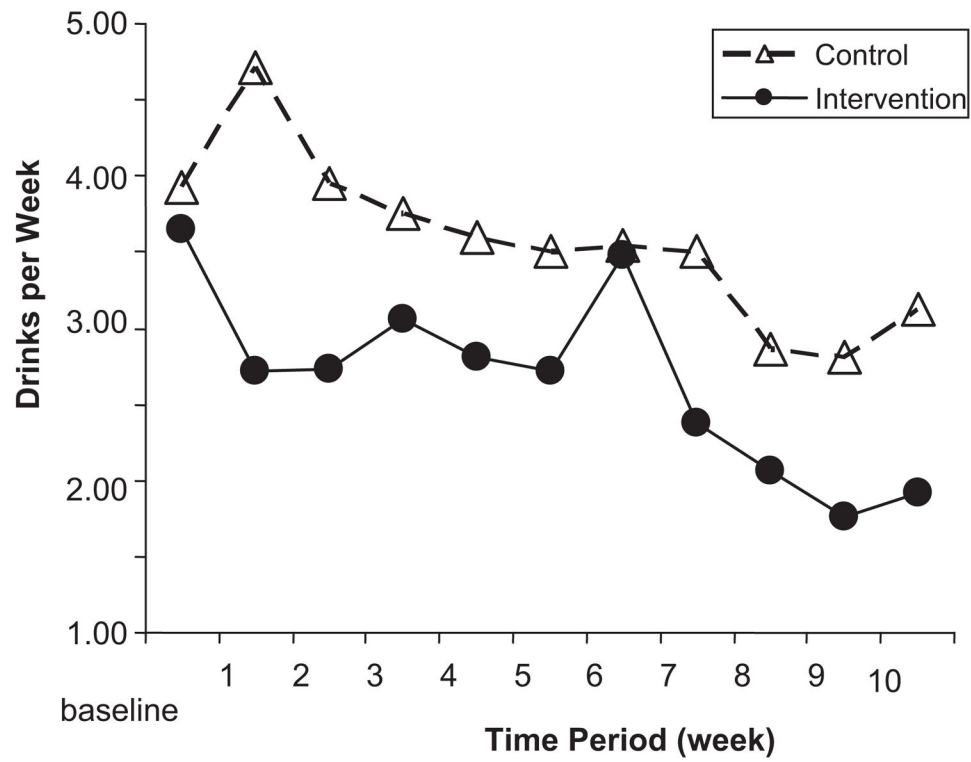


Figure 1.
Main intervention effect for follow-up weeks by intervention and control groups.

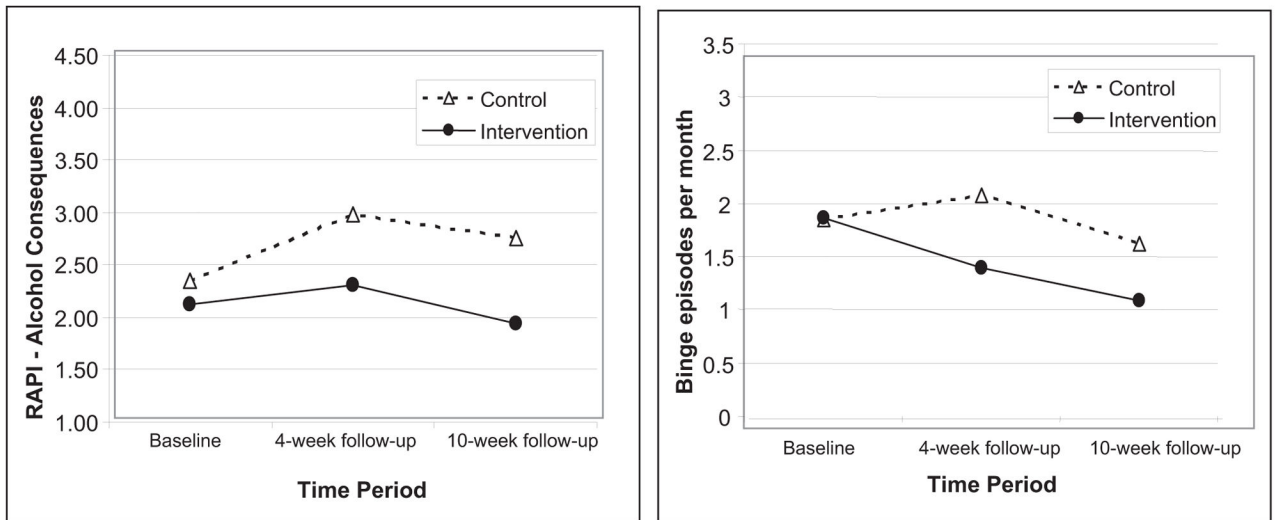


Figure 2.
Binge episodes and Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989) consequences for follow-up weeks by intervention and control groups.

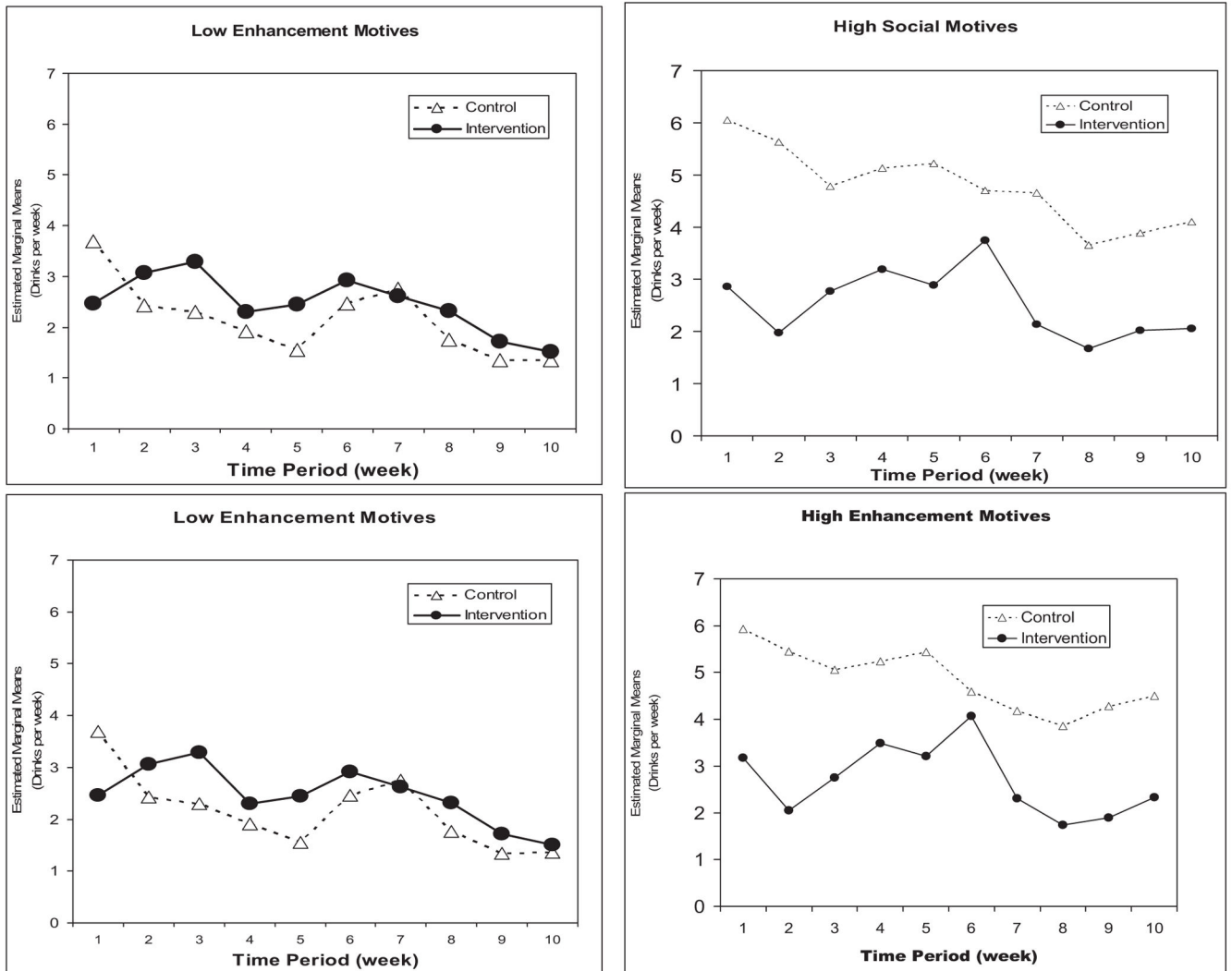


Figure 3. Social and enhancement motives as a moderator of intervention efficacy. Each panel represents estimated marginal means of numbers of drinks per week across the 10 weeks of follow-up, controlling for baseline drinking. Further, no differences in baseline means between the intervention and control groups existed for low social motives, $t(116) = .21, p = .84$; high social motives, $t(94) = .43, p = .67$; low enhancement motives, $t(133) = .04, p = .97$; or high enhancement motives, $t(77) = .44, p = .66$.

Table 1

Means and Standard Deviations for Intervention and Control Groups on Alcohol-Related Variables at Baseline

Variable	Intervention group (<i>n</i> = 126)		Control group (<i>n</i> = 94)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
RAPI	2.12	3.05	2.35	3.90
DMQ Coping Motives	6.69	2.87	7.28	3.41
DMQ Conformity Motives	5.79	1.70	6.12	2.08
DMQ Social Motives	9.80	5.44	9.92	5.21
DMQ Enhancement Motives	9.23	5.41	9.95	5.95
No. of drinking days (past month)	3.06	3.55	3.36	4.28
No. of drinks per week	3.62	5.42	3.93	6.57
Average no. of drinks	2.75	2.79	2.73	2.51
Maximum no. of drinks at one time	4.05	4.32	4.15	4.36
No. of binge episodes (past month)	1.86	2.84	1.85	3.61

Note. RAPI = Rutgers Alcohol Problem Index (White & Labouvie, 1989); DMQ = Drinking Motives Questionnaire (Cooper, 1994).