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# A Randomized Trial Evaluating a Parent Based Intervention to Reduce College Drinking

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## Abstract

This study evaluated the effectiveness of a parent based intervention (PBI) in reducing drinking among first year college students ( $N = 443$ ). Students were assigned to one of three conditions: PBI, PBI plus booster brochures (PBI-B), and an assessment only control group (CNT). At a 4-month post-intervention follow-up, results indicated students in the PBI-B group reported significantly less drinking to intoxication and peak drinking relative to the PBI group and CNT group. No significant differences were found between the PBI group and CNT group. Results provide further support for PBIs to reduce college student drinking and suggest that a booster brochure increases the effectiveness of PBIs.

**Keywords:** first year students; alcohol; heavy drinking; parent based intervention

## 1. Introduction

Heavy drinking and the associated consequences represent a significant problem on college campuses nationwide. National survey data indicate nearly 70% of U.S. college students report drinking (Johnston, O'Malley, Bachman, & Schulenburg, 2006) and 40-45% report engaging in at least one heavy drinking episode in the past two weeks (Wechsler et al., 2002). Heavy drinking is associated with multiple social problems such as arguing with friends, unplanned sexual activity, drinking and driving, getting into trouble with the law, and academic difficulties (Hingson, Heeren, Winter, & Wechsler, 2005). Additionally, severe consequences such as unintended injuries, sexual and physical abuse, assault, and alcohol-related fatalities have been reported (Hingson, Edwards, Heeren, & Rosenbloom, 2009).

Relative to the general college student population, first year students have been identified as a high-risk group for heavy drinking (National Institute on Alcohol Abuse and Alcoholism, 2002). Research indicates that in comparison to upperclassmen, first year students drink more drinks, engage in heavy drinking episodes more frequently (Turrisi, Padella, & Wiermsa, 2000), and are more likely to be arrested for alcohol-related incidents (Thompson, Leinfelt, & Smyth, 2006). This high-risk status has been attributed to the increase in freedom, decrease in social control, and increase in stress experienced in higher education relative to high-school (Arnett, 2005). Research indicates leaving home and going to college are significantly related to increases in frequency of alcohol use and heavy episodic drinking (White et al., 2006). This heavy drinking may be related to the weakening of parental monitoring and increase in peer relationships (Borsari & Carey, 2001). Taken together, these studies suggest that implementing early intervention strategies in the first year of college are crucial.

Contrary to the widely held belief that parents lose their ability to influence their children in adolescence as peer relationships become primary, adolescent and college student drinking is influenced by parents. Specifically, research indicates that adolescent and college student alcohol use are inversely associated with parental monitoring (Abar & Turrisi, 2008; Turrisi & Ray, 2010; van der Vorst, et al., 2006, Wood et al., 2004). Additionally, parental attitudes toward drinking (Abar, Abar, & Turrisi, 2009; Turrisi, Jaccard, Taki, Dunnam, & Grimes, 2001; Wood et al., 2004) and parent-child communication (Abar, Fernandez, & Wood, 2011; Abar, Morgan, Small, & Maggs, 2012; Turrisi et al., 2000) are related to college student drinking. Taken together, these studies indicate that parents do continue to exert an influence on their children's alcohol use through adolescence and young adulthood and that interventions provided to parents may be useful in reducing drinking in first year college students.

A growing body of research suggests that parent based interventions (PBIs) may be effective in reducing heavy drinking in first year college students (Ichiyama et al., 2009; Turrisi, Abar, Mallett, & Jaccard, 2010; Turrisi et al., 2001). Based on research examining college student decision making and parent-child communication (Turrisi, Padilla, & Wiersma, 2000; Turrisi, Wiersma, & Hughes, 2000), Turrisi and colleagues (2001) developed a PBI aimed at reducing heavy drinking in first year students by providing a handbook to parents prior to the beginning of the fall semester. The handbook provides important information about college drinking and encourages parents to communicate with their student about drinking. Results from this study indicated students of mothers receiving a parent handbook in the summer before college reported less alcohol use and fewer alcohol-related consequences at a 3 month follow-up than those in the control group (Turrisi et al., 2001). In a follow-up article, Turrisi and colleagues (2010) reported small to medium intervention effects which were mediated by attitudes and beliefs towards drinking, in addition to attitudes toward non-drinking alternatives (Turrisi et al., 2010). In another study comparing the efficacy of PBIs with a control group receiving other educational materials, Ichiyama et al. (2009) found that students randomly assigned to the PBI group were less likely to transition into drinking and there was less growth in number of weekly drinks consumed for females at the 8 month follow-up. Findings for heavy episodic drinking and alcohol-related consequences, however, were not significant.

Research has also provided some evidence to support the efficacy of PBIs in combination with brief motivational interventions (BMIs) (Cleveland, Lanza, Ray, Turrisi, & Mallett, 2012; Turrisi et al., 2009; Wood et al., 2010). In a study examining the relative efficacy of PBI, BMI, and a combined approach with high school athletes, Turrisi and colleagues found a significant intervention effect for the combined approach for both alcohol consumption and alcohol-related consequences at a 10 month follow-up. Further analyses by Cleveland and colleagues (2012) revealed that participants in the parent and peer conditions were least likely to transition to the heavy drinkers status. Results also indicated that the PBI condition was most effective at preventing baseline nondrinkers from transitioning to heavy drinkers whereas the peer condition was most effective at preventing escalation of use among weekend non-binge drinkers. Additionally, Wood and colleagues (2010) examined the relative efficacy of a PBI emphasizing a harm-reduction approach, BMI, and a combined approach. Results indicated the PBI did not reduce growth or delay the onset of heavy episodic drinking or consequences, but the combined approach was effective in reducing alcohol-related consequences, although the effect size was small in magnitude, but not the transition to heavy episodic drinking, at 10 and 22 month follow-ups.

Taken together, the above studies provide some support for the efficacy of PBIs, particularly during the fall semester (Turrisi et al., 2010; Turrisi et al., 2001). Results with longer-term follow-up periods, however, are mixed, with some studies finding reductions in drinking-related harm reduction strategies and weekly drinking, but not heavy episodic drinking or consequences (Donovan et al., 2012; Ichiyama et al., 2009) and others finding support for both a combined PBI-BMI approach or PBI alone for both alcohol consumption and consequences (Turrisi et al., 2009) or for consequences only (Wood et al., 2010). Additionally, important questions remain in understanding the effectiveness of PBIs for first year students. Thus, the aim of the current study is to extend the literature in two primary ways.

First, prior research evaluating the efficacy of PBIs has provided a check of intervention fidelity by asking parents to summarize each chapter or to rate variables such as the amount of handbook read, satisfaction with handbook, or whether or not they discussed the handbook information with their child (Ichiyama et al., 2009; Turrisi et al., 2010; Turrisi et al., 2001; Turrisi et al., 2009; Wood et al., 2010). Although providing fidelity procedures is important in establishing the efficacy of the intervention, in actual practice colleges implementing PBIs are unlikely to ask parents to complete questionnaires or provide monetary incentives to parents to do so. Thus, it is important to assess the effectiveness of PBIs using a procedure that is more likely to be implemented. That is, sending the handbook to parents in the summer prior to the first year and encouraging parents to read the handbook and discuss the contents with their college-bound child.

In addition, although research to date provides some support for the efficacy of PBIs, reported intervention effects are generally in the small to medium range. This study extends the literature by examining whether adding booster brochures to the PBI intervention increases the effectiveness of the intervention. To date, prior research has provided a handbook to parents prior to the beginning of the fall semester. It is possible that sending booster brochures to parents during the fall semester will encourage parents to continue discussing the handbook contents with their college student throughout the semester, thereby increasing the effectiveness of the intervention.

To achieve our aims, students were randomly assigned to one of three groups: 1) parent based intervention (PBI), 2) parent based intervention plus booster brochures (PBI-B), or 3) assessment-only control group (CNT). We hypothesized that students in the PBI and PBI-B groups would report lower levels of drinking compared to those in the CNT group and that students in the PBI-B group would report lower levels of drinking relative to those in the PBI group. Based on prior research (Ichiyama et al., 2009), we also hypothesized that sex would moderate treatment effects, with the PBI and PBI-B being more effective for females than males.

## 2. Method

### 2.1. Participants

Twelve hundred students were randomly selected from orientation rosters. Of these, 443 students (30.5% male; 69.5% female) completed the baseline assessment prior to the handbook being sent to parents. Of these, 141 (31.8%) were randomly assigned to the PBI group, 153 (34.5%) to the PBI-B group, and 149 (33.6%) to the CNT group (see Figure 1). Participants completed measures of drinking quantity and frequency. Based on these responses, 75% of the students ( $n = 335$ ) endorsed drinking. Ages of the students ranged from 17-20 ( $M = 17.97$ ,  $SD = 0.47$ ). The majority of students were Caucasian (88%), with 2.7% Asian-American, 0.2% African-American, 0.2% Native American, and 8.9% other. This sample is representative of first year students at the university. A series of chi square analyses and one-way analyses of variance (ANOVAs) confirmed there were no differences between the three groups in sex, age, ethnicity, or any drinking variables at baseline.

### 2.2. Procedures

Participants were recruited from first year summer orientation at a large metropolitan university in the Northwest. Students were recruited in June and completed baseline measures approximately 2 months prior to the start of the fall semester. Students were mailed a notification letter briefly describing the research and inviting their participation. A pin number and the URL for participation, email address, and phone number to contact us with questions or to decline participation was included. This letter was followed by an email, in which the URL of the survey was embedded, along with a contact email address and phone number. Participants who logged on were first directed to a welcome screen describing the research and were asked to enter their PIN number. Once they entered the PIN, they were presented with the informed consent statement describing the study procedures and were asked to indicate their consent by typing their name. They were then given the option of printing a copy of the consent document. If participants indicated their willingness to continue, they were routed to a baseline survey, which was completed immediately or at the participants' convenience within the next two weeks. Email and post-card reminders were sent during the recruitment period to remind students of their option to participate.

For students under 18 years of age, parents were contacted via letter by mail at their permanent addresses provided by the registrar's office. Enclosed in the letter was a project-addressed, stamped decline postcard. If a parent did not want their child to participate in the research project, they were asked to print their name and student's name and return the postcard indicating their option to decline. In addition, a phone number and email address were provided so that parents could decline their children's participation via phone or email. If the parent did not send in a decline postcard, call, or email, students under the age of 18 were sent the same invitation letters as described above (with pin numbers and URLs).

The baseline survey took approximately 15 minutes to complete. Upon completion of the survey, students were randomized to one of three groups: PBI, PBI-B, or CNT. Parents of students in the PBI and PBI-B groups were sent, via U.S. mail, a parent handbook prior to the beginning of the fall semester. Parents of students in the PBI-B group also received three booster brochures throughout the fall semester. Students were asked to complete a 4 month 15 minute follow-up assessment during the month of November. They were sent a pre-notification email alerting them they would receive an email. Participants then received an email invitation in which the URL of the follow-up survey was embedded, along with their unique PIN. Email reminders were sent throughout the next two weeks.

Participants were offered a chance to win a \$500 VISA gift card as compensation for their participation. All participants were treated according to established ACA (American Counseling Association, 2005) ethical standards and the research was approved by the University Institutional Review Board.

### *2.3. Measures*

Recommendations by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) Task Force include assessing patterns of alcohol consumption in addition to the average number of drinks consumed (NIAAA, 2003). We included four measures to assess alcohol consumption: typical weekly drinking quantity, frequency of drinking to intoxication, peak drinking quantity, and frequency of binge drinking. These variables were selected to reflect typical drinking behavior as well as heavy episodic drinking. These variables are standard measures of drinking and have been used in previous studies examining parental influences on student drinking and the efficacy of PBIs (e.g., Cleveland et al., 2012; Ichiyama et al., 2009; Turrisi et al., 2010; Turrisi et al., 2001; Turrisi et al., 2009).

First, quantity of weekly drinking was assessed using a modified version of the Daily Drinking Questionnaire (DDQ, Collins, Parks, & Marlatt, 1985). This item asks participants to indicate how much they typically drink with the following prompt: "Given that it is a typical week, please write the number of drinks you probably would have each day." A response scale is provided for each day of the week (e.g., Monday\_\_\_\_, Tuesday\_\_\_\_, etc.). Weekly drinking was calculated by combining the reports for the seven days of the week. Second, frequency of drinking to intoxication was assessed by the question "During the past 30 days (about 1 month), how many times have you gotten drunk, or very high from alcohol?" This item was rated on a 6-point scale with the anchors 0, 1 to 2, 3 to 4, 5 to 6, 7 to 8, or more than 9 times. Third, peak drinking quantity was assessed by the question "What is the most number of drinks that you have consumed on any given night in the past three months?" Fourth, binge drinking was defined as having 5 or more drinks in a row for males (4 or more for females) in a 2 hour period (NIAAA, 2004; Wechsler et al., 1994).

### *2.4. Intervention*

#### *2.4.1. PBI*

The handbook used in this study is an empirically based parent intervention (Turrisi et al., 2001). The letter sent to the parents provided overall information indicating drinking issues are a growing problem on college campuses and that parental discussions prior to starting college lead to lower alcohol use during the first year. The letter specifically asked parents to read the handbook and discuss the information with their college student prior to the fall semester.

The handbook used in this study was 26 pages and contained four chapters. Chapter 1 included information about binge drinking and alcohol-related consequences. Chapter 2 covered communication, including beginning a conversation, how to react to what your child says, how to respond to inquiries about your behavior at their age, how to deal with criticism, making deals, and how to improve relationships. Chapter 3 informed parents about assertiveness techniques for things such as peer pressure. Finally, chapter 4 relayed information about communicating with children about alcohol, including statistics about drinking, physical and psychological responses to alcohol, how to set boundaries, and potential warning signs of alcohol issues. Each chapter concluded with information on what parents should think about and do to put the handbook to good use. The university's alcohol policy, enforcement and assistance information was also included at the end of the handbook for parental review.

#### *2.4.2. PBI-B*

Parents of the students in the PBI-B condition received the same letter and handbook as those in the PBI condition. In addition to the handbook, the parents in the PBI-B group received three brochures sent early in the fall semester. These booster brochures were intended to reinforce material presented in the handbook. Each brochure contained information reminding parents of the importance of encouraging protective behaviors, discouraging risky behaviors, and keeping the lines of communication open. These brochures contained additional information on how to maintain open communication with their student, further tips for how to react to their student, as well as references and reminders to continue to review the handbook for ways to initiate and improve communication about alcohol use with their student.

The first brochure, titled "Checking In on the Phone and E-mail", was sent out the second week of August, just before the start of the fall semester. This brochure contained information encouraging parents to use phone and email communication once their teen is in college, guidelines for effective communication, establishing times for checking in, and a reminder that parental approval of alcohol consumption is a very important predictor of alcohol abuse and harm in college students. The second brochure, titled "Checking In at Home", was sent out at the end of August, just after the start of the fall semester. This brochure contained information including the importance of proactive communication, specific communication tips, and a reminder that underage college students whose parents allow them to use alcohol at home are more likely to engage in heavy drinking in college and that parents who engage in positive communication and avoid negative communication have teens that drink less. The final brochure, titled "Checking in on Campus", was sent the second week of September. This brochure suggested that parents visit their teen on campus to see their teen in their new environment, meet their teen's new friends, and communicate about important topics like alcohol use, and provided reminders about the importance of positive communication and specific communication tips.

### 3. Results

#### 3.1. Attrition

Overall, 60% ( $n = 268$ ) of the 443 participants completed the 4 month follow-up. For the final sample, 28% ( $n = 76$ ) were in the PBI group, 37% ( $n = 98$ ) were in the PBI-B group, and 35% ( $n = 94$ ) were in the CNT group (see Figure 1). There was no difference in the rate of attrition across the three groups,  $\chi^2(444) = 4.12, p = .13$ . In addition, chi-square and one-way analyses of variance (ANOVAs) revealed no differences in demographic or baseline drinking variables between participants who completed and did not complete the follow-up assessment.

#### 3.2. Statistical Analyses

We first examined the data for extreme cases that might impact the results of the analyses. Outliers were defined as those that were more than 3.3 standard deviations from the mean on any of the drinking measures at baseline. Rather than eliminating outliers from the analyses, outliers at each time point were adjusted to 3.3 standard deviations above the mean (Tabachnik & Fidell, 2001) for all drinking variables. Using this process, 6.5% ( $n = 29$ ) of participants had at least one variable at baseline or at follow-up transformed, with 9 participants in the PBI group, 9 in the PBI-B group, and 11 in the CNT group. All baseline and follow-up variables contained outliers and for each variable, 2%-3% of cases were adjusted.

Three repeated measures analyses of variance (ANOVAs) were conducted to examine differences among the three groups from baseline to the 4 month follow-up assessment for weekly drinking quantity, frequency of drinking to intoxication, and peak drinking quantity. The three independent variables were Time (baseline; 4 month follow-up), Group (PBI; PBI-B; CNT), and Sex (male; female). Sex was included as an independent variable to examine sex as a moderator of treatment effect based on previous research indicating differential intervention effects for males and females (Ichiyama et al., 2009).

#### 3.3. Intervention Effects

Means for each of the dependent variables by group and sex are shown in Table 1. Results of the repeated measures ANOVAs indicated a significant main effect for Time, Wilks' Lambda = .89,  $F(1, 262) = 31.99, p < .001, \eta^2_p = .09$ , and significant interaction effect for Time x Group, Wilks' Lambda = .97,  $F(2, 262) = 3.76, p < .02, \eta^2_p = .03$ , for frequency of drinking to intoxication. Similarly, results indicated a significant main effect for Time, Wilks' Lambda = .91,  $F(1, 262) = 24.76, p < .001, \eta^2_p = .09$ , and a significant interaction effect for Time x Group, Wilks' Lambda = .98,  $F(2, 262) = 3.17, p < .04, \eta^2_p = .02$ , for peak drinking quantity. In contrast, for weekly drinking, the main effect for Time was significant, Wilks' Lambda = .89,  $F(1, 262) = 31.53, p < .001, \eta^2_p = .11$ , but no interaction effects were significant. Similarly, for binge drinking, the main effect for Time was significant, Wilks' Lambda = .94,  $F(1, 262) = 17.05, p < .001, \eta^2_p = .06$ , but no interaction effects were significant.

Post-hoc analyses were conducted to determine which differences between the three intervention groups were significant. Repeated measures analyses of variance (ANOVAs) were conducted for frequency of drinking to intoxication and peak drinking quantity comparing means between the PBI-B group and CNT group, PBI-B group and PBI group, and PBI group and CNT group. When comparing the PBI-B group to the CNT group, results indicated a significant Time x Group interaction for frequency of drinking to intoxication, Wilks' Lambda = .97,  $F(1, 188) = 6.41, p < .01, \eta^2_p = .03$ , and peak drinking quantity, Wilks' Lambda = .98,  $F(1, 188) = 4.20, p < .04, \eta^2_p = .02$ . Similarly, when comparing the PBI-B group to the PBI group, the Time x Group interaction was significant for drinking to intoxication, Wilks' Lambda = .97,  $F(1, 177) = 4.42, p < .04, \eta^2_p = .02$ , and peak drinking quantity, Wilks' Lambda = .97,  $F(1, 177) = 6.11, p < .01, \eta^2_p = .03$ . In contrast, when comparing the PBI group to the CNT group, there were no significant main effects or interaction effects. These results indicate there was significantly less increase frequency of drinking to intoxication and peak drinking quantity for students in the PBI-B group relative to students in the CNT group and PBI group (see Figure 2).

Calculations of the differences between baseline and 4 month follow-up means in Table 1 indicate students in the PBI-B group reported a 35% increase in frequency of drinking to intoxication compared to greater than a 100% increase in the both the PBI group and the CNT group. Similarly, students in the PBI-B group reported a 30% increase in peak drinking quantity compared to a 90% increase in the PBI group and the CNT group. Although not significant, the pattern was similar for binge drinking with students in the PBI-B group reporting a 30% increase in binge drinking quantity compared to a 56% increase in the PBI group and the CNT group. In contrast, for weekly drinking, students in the PBI and PBI-B group reported an increase of 50-70% compared to greater than a 125% in the CNT group.

#### 4. Discussion

The aim of this study was to evaluate the effectiveness of a parent based intervention (PBI) in reducing heavy drinking among first year university students. The efficacy of PBIs in reducing drinking in this population has been demonstrated either as a stand-alone intervention (Cleveland et al., 2012; Ichiyama et al., 2009; Turrisi et al., 2010; Turrisi et al., 2001) or in combination with a BMI (Cleveland et al., 2012; Turrisi et al., 2009; Wood et al., 2010). These studies asked parents to complete assessments and provided incentives to parents to ensure that parents would read the handbook. This study extends the literature by examining the effectiveness of PBIs by using a procedure more likely to be used by colleges and universities. Additionally, this study adds to the literature by examining whether or not adding booster brochures throughout the fall semester increases the effectiveness of PBIs.

Findings from the current study confirmed our hypothesis that students in the PBI-B group would report significantly less heavy drinking than students in the PBI and CNT groups. However, contrary to our hypothesis, students in the PBI group did not report less heavy drinking than those in the CNT group. Specifically, students in the PBI-B group reported a 30% to 35% increase in heavy drinking compared to a 90% to greater than 100% increase in the PBI and CNT group. Also in contrast to our hypotheses, there was no significant difference in changes in weekly drinking and binge drinking across the groups. Although not significant, the pattern was similar for binge drinking, with students in the PBI-B group reporting a 30% increase in binge drinking quantity compared to a 56% increase in the PBI group and the CNT group. In contrast, for weekly drinking, students in the PBI and PBI-B groups reported an increase of 50-70% compared to a 125% increase in the CNT group.

In general, the intervention effects of the PBI-B demonstrated in this study are consistent with research indicating PBIs are effective in reducing alcohol consumption in first year college students (Cleveland et al., 2012; Ichiyama et al., 2009; Turrisi et al., 2010; Turrisi et al., 2001). However, we did not find the same effects for the PBI condition. In fact, students in the PBI group reported increases in heavy drinking similar to the control group. One possible interpretation of this finding is that parents in the PBI group did not read the handbook. In contrast to prior research examining the efficacy of PBIs, we chose not to ask parents to complete any information regarding the handbook, nor did we provide incentives to parents, to test the effectiveness of PBIs using a procedure more likely to be used by colleges and universities. Thus, the lack of intervention effects for the PBI condition may be due to parents not reading the handbook.

Students in the PBI-B condition, however, did report less of an increase in drinking than the PBI and CNT groups. The brochures were designed to reinforce material presented in the handbook, reminding parents of the importance of encouraging protective behaviors, discouraging risky behaviors, and keeping the lines of communication

open. The brochures also contained additional information on how to maintain open communication with their student, including specific communication tips, as well as references to specific pages in the handbook to review. Thus, receiving the brochures may have prompted parents to review the handbook. It is also possible that parents in the PBI-B condition did not read the handbook but that the information in the brochures was sufficient to encourage parents to talk to their teens and provided enough information and communication tips to be effective. Alternatively, the brochures may have prompted parents who did not read the handbook to read it.

It should also be noted that in contrast to prior research identifying sex differences in PBI intervention, with females responding more favorably to PBIs than males (Ichiyama et al., 2009), we did not find any evidence to support sex as a moderator of intervention effects. The Group x Time x Sex interaction was not significant in any of the analyses conducted. Thus, our results indicate that in this sample of students, there were no sex differences in intervention effectiveness, but that male and female students responded similarly to the PBI and PBI-B interventions.

#### *4.1. Limitations and Directions for Future Research*

Although this study provides additional empirical support for a PBI combined with booster brochures, there are several limitations. First, the participants in this study were primarily Caucasian and female, thus limiting the generalizability of the results. Research demonstrating the efficacy of PBIs has largely been conducted with Caucasian samples and future research should examine PBIs with more diverse samples to assess whether or not this intervention generalizes to other groups of students.

Second, the duration of the 4 month follow-up was fairly short. Although effects of PBIs alone or in combination with BMIs have been shown to last for up to 8 – 10 months on alcohol use (Ichiyama et al., 2009; Turrisi et al., 2009) and alcohol-related consequences (Turrisi et al., 2010), other research examining drinking variables as 10 and 22 month follow-ups indicates no significant effects for the PBI alone and small effects for the PBI in combination with a BMI at 10 and 22 month follow-ups (Wood et al., 2010). Further, meta-analysis results suggest intervention effects, in general, may decline after 6-months in college and university students (Carey et al., 2007). Thus, future research with longer follow-up periods is suggested to provide additional information regarding the efficacy of PBIs.

Third, the response rate for the 4-month follow-up (60%) was lower than expected. Although there were no differences between students who dropped out and completed the study in demographic or drinking variables, 40% of students did not complete follow-up surveys. One explanation for this rate of attrition is that the chance to win a \$500 VISA gift card was not an adequate incentive for these students. Response rates may be improved by paying participants \$10-\$20 for each survey completed.

Finally, in order to better approximate how PBIs might typically be delivered on a college campus, we did not ask parents to complete follow-up questionnaires to ensure the reading of the handbook and/or brochures nor did we provide incentives to the parents. Because of this methodology, it is unclear if parents read the handbook or brochures and if failure to read the material impacted the lack of effectiveness found in the PBI condition. Additionally, it is unclear if the booster brochures prompted parents to read or review the handbook, or if receiving the booster brochures was enough to encourage parents to talk with their students. Future research might include a third condition, booster brochures only, to provide more information regarding why the PBI-B condition was effective relative to the PBI condition. Additionally, although we selected this design to better approximate how this intervention may be realistically delivered in a college setting, this may have impacted effect sizes in this study. The intervention effects, although significant, were small. Providing tighter controls over intervention fidelity would likely result in larger effect sizes. Thus, future research in which parents are asked if they read the handbook and/or brochures may improve effect size magnitude as well as help explain differential intervention effects.

#### *4.2. Clinical Implications*

Results of this study have important implications for prevention and intervention efforts aimed at reducing drinking among first year college students. First, 75% of this sample was classified as drinkers at the baseline assessment, indicating more than two thirds of the students in this sample reported engaging in drinking. Additionally, first year students, including those in the intervention groups, increased their drinking over the course of the fall term. Coupled with prior research indicating first year students increase their alcohol use over the academic year (Borsari, Murphy, & Barnett, 2007) and are at risk for alcohol-related consequences throughout the academic year (Doumas &

Anderson, 2009), college counselors need to remain aware that the majority of students are drinking prior to entering college and that this drinking may become heavier as the academic year progresses.

Additionally, campuses may want to consider incorporating PBIs into a comprehensive strategy including community, campus environment, and individual-level programs. For example, Sullivan and Risler (2002) suggest college counselors develop a multi-systemic intervention approach that includes social marketing, risk reduction, sex specific recovery groups, and brief motivational interventions. Environmental strategies such as community and campus alcohol policies targeting responsible drinking need to be implemented. Additionally, PBIs may be more effective when combined with BMIs (Turrisi et al., 2009; Wood et al., 2010). Because research indicates effect sizes for PBIs are generally in the small to medium range, PBIs should be viewed as part of a larger overall campus strategy to reduce heavy drinking.

This study also may have implications for high school counselors who serve a role in alcohol prevention services. Alcohol use remains widespread among high school students with nearly three quarters of students reporting alcohol use by the end of high school (Johnston et al. 2009). For some youth, heavy drinking and the associated consequences increase during the transition from high school to college, however most determinants for heavy drinking occur before these students begin college (Arria et al., 2008). Thus, high school students may benefit from interventions shown to be effective on college campuses (Sher & Rutledge, 2007). Unfortunately, results of a recent national survey indicate high school counselors do not believe they can identify students with substance abuse issues or work effectively with these students (Burrow-Sanchez & Lopez, 2009). These findings suggest that high school counselors are in need of training in screening, assessment and brief interventions for substance abuse.

Parental monitoring and intervention during the last year of high school can also reduce drinking in the first year of college (Arria et al, 2008). Although evidence-based prevention strategies require meaningful and ongoing consultation with parents, school personnel often find it difficult to involve parents in prevention efforts (Hogan et al., 2003). Research indicates combined parental and student interventions are effective in reducing adolescent drinking (Konig et al., 2009). Thus, PBI's may be incorporated into comprehensive high school prevention programs. Effective PBI's could be implemented during student registration and via electronic mailings throughout the year, providing parents with the information and tools to communicate effectively with their adolescents regarding alcohol use.

Finally, results of this study have implications for clinicians practicing outside of the school or college setting. With the high prevalence of alcohol use with adolescents and young adults it is important that clinicians be prepared to work with young clients regarding their substance use. Treatment outcome research indicates that the involvement of families during the active treatment process leads to better client outcomes (Winters, Botzet, & Fahnhorst, 2011) and that parental monitoring is directly related to youth in treatment abstaining from substance use (Henderson, Rowe, Dakof, Hawes, & Liddle, 2009). While the majority of clinicians are aware of the importance of family involvement in adolescent therapy and wellness, many do not incorporate family members into therapy once clients reach the age of 18 due to issues of confidentiality and autonomy. Results of this study provide further evidence for the benefits of including parents in adolescent alcohol treatment.

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*Table 1*  
Differences in Alcohol Consumption by Group and Sex

Group	Time	Sex					
		Male (n = 73)		Female (n = 195)		Total (n = 268)	
Weekly Drinking Quantity							
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
PBI	Baseline	2.56	4.70	1.38	2.91	1.72	3.53
	4 Month	4.86	8.62	2.28	3.66	3.03	5.63
PBI-B	Baseline	1.41	3.88	1.81	3.81	1.70	3.81
	4 Month	2.19	4.54	3.26	5.73	2.98	5.44
CNT	Baseline	2.22	4.46	1.13	3.43	1.42	3.74
	4 Month	5.08	8.19	2.71	5.50	3.34	6.37
Drinking to Intoxication							
PBI	Baseline	0.50	0.91	0.30	0.61	0.36	0.71
	4 Month	1.03	1.55	0.61	0.86	0.73	1.11
PBI-B	Baseline	0.35	0.75	0.46	0.90	0.43	0.86
	4 Month	0.35	0.80	0.67	1.03	0.58	0.98
CNT	Baseline	0.40	0.87	0.26	0.75	0.30	0.78
	4 Month	0.93	1.29	.58	1.02	0.68	1.10
Peak Drinking Quantity							
PBI	Baseline	2.45	3.93	1.66	2.81	1.89	3.17
	4 Month	4.86	6.26	3.20	3.94	3.68	4.74
PBI-B	Baseline	2.57	4.25	2.21	3.39	2.30	3.62
	4 Month	2.30	5.23	3.33	4.85	3.06	4.94
CNT	Baseline	2.27	3.95	1.40	3.14	1.64	3.37
	4 Month	4.80	6.55	2.71	4.57	3.26	5.22

### Binge Drinking Frequency

PBI	Baseline	0.27	0.70	0.19	0.65	0.22	0.66
	4 Month	0.64	1.17	0.44	0.88	0.50	0.97
PBI-B	Baseline	0.28	0.78	0.33	0.87	0.32	0.85
	4 Month	0.31	0.68	0.50	1.00	0.45	0.93
CNT	Baseline	0.24	0.66	0.20	0.72	0.21	0.70
	4 Month	0.60	1.04	0.45	0.98	0.49	0.99

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Figure 1. Participation Flow Diagram

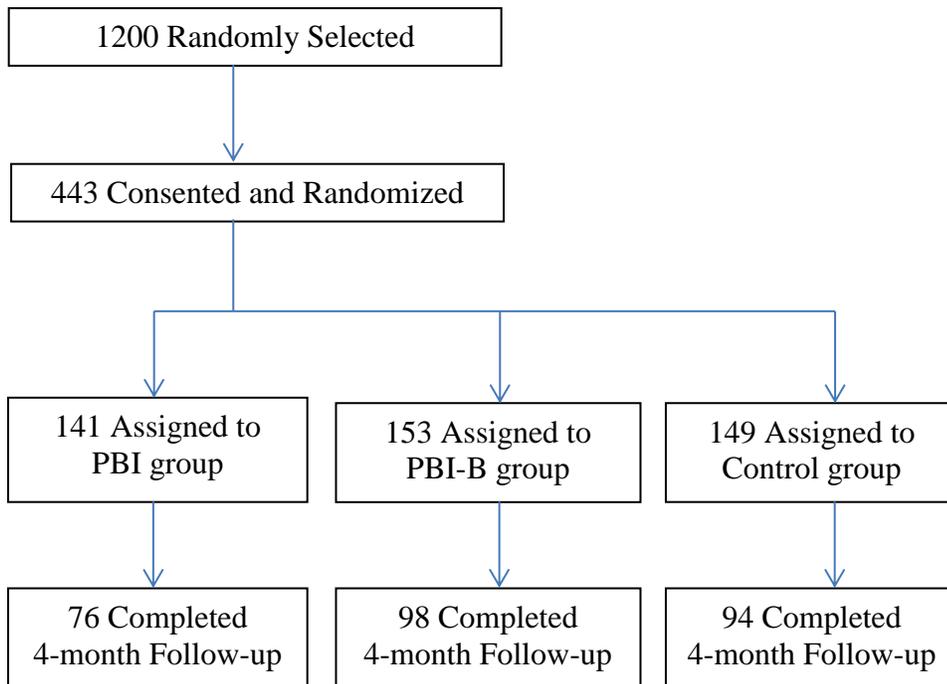


Figure 2. Changes in Drinking to Intoxication and Peak Drinking by Intervention Group

