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An Examination of the Mediational Effects of Cognitive and Attitudinal Factors of a Parent Intervention to Reduce College Drinking

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Abstract

As part of a parent intervention to reduce heavy-drinking, college freshmen were assessed for their attitudes toward drinking and reasonable alternatives to drinking on the weekends, as well as cognitive variables underlying attitudinal variables. Intervention parents received a handbook the summer prior to college entrance with information about college drinking and best practices for parent-teen communication. Results revealed that the association between intervention condition and drinking outcomes was mediated by attitudes favorable to drinking and reasonable alternatives to drinking, as well as beliefs about alcohol related behavior. This parent program was shown to be efficacious for changing high-risk drinking in college. Findings are discussed regarding the further development of college drinking prevention programs involving parents.

Keywords

College Students; Alcohol; Parent; Intervention

It has been well established that college students experiment in a disproportionately high number of risk behaviors including smoking, drinking, illicit drug use, and unprotected sexual activity (Dowdall & Wechsler, 2002; Maggs & Schulenberg, 2006; Hingson, Heeren, Winter, & Wechsler, 2005; O'Malley & Johnston, 2002). In particular, heavy episodic drinking (defined as consuming 5 or more drinks during a single occasion for men and 4 or more drinks for women) and negative consequences associated with alcohol use represent the most significant concerns on our nation's college campuses (Hingson et al., 2005; Johnston, O'Malley, Bachman, & Schulenberg, 2007; Kahler et al., 2004; NIAAA, 2006; Perkins, 2002; Perkins, Haines, & Rice, 2005; Wechsler, Seibring, Lui, & Ahl, 2004). In addition, heavy drinking in college has long been recognized as a contributing factor to negative consequences including academic impairment, property damage, legal costs, personal injuries, traffic fatalities, relationship problems, unplanned sexual activity, and sexual assault (Abbey, 2002; Abbey, Saenz, & Buck, 2005; Cooper, 2002; Dawson, Grant, Stinson, & Chou, 2004; Hawkins, Catalano, & Miller, 1992; Maggs & Schulenberg, 2006; Mallett et al., 2006).

In response to the breadth of research coupling college alcohol misuse with a range of negative outcomes, both social scientists and college administrators have increased their

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efforts in addressing college heavy drinking tendencies (Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Hingson & Howland, 2002; Perkins 2002). An attempt to understand the contextual, individual, and interpersonal influences on college drinking behavior has been, and continues to be, central to the construction of efficacious campus interventions to curb alcohol consumption (see Larimer & Cronce, 2002; 2007). Individual factors such as gender, ethnicity, personality, and family history (Baer, 2002; Sher et al., 2007; Wechsler et al., 2004), alcohol expectancies and motives for drinking (Carey & Correia, 1997; Goldman, Greenbaum, & Darkes, 1997; Wood, Sher, & Rutledge, 2007), availability and attractiveness of alternative activities (Turrisi, 1999; Turrisi et al., 2001; Vuchinich & Tucker, 1988), and ecological factors including alcohol availability, price, academic class and exam schedules, and residence (Baer, 2002; Hawkins et al., 1992) have each been implicated in the etiology of alcohol misuse among college students. In addition, drinking attitudes and the behaviors and influence of peers are among the strongest correlates of adolescent alcohol use and abuse (Hawkins et al., 1992).

While peer interactions undoubtedly play an important role in socialization into substance use, the developmental literature has clearly identified the importance of the family network in adolescent substance use, even as late as college (Ary, Tildesley, Hops, & Andrews, 1993; Dielman, 1995; Hansen et al., 1987; Hawkins et al., 1992; Jaccard & Turrisi, 1999; Kafka & London, 1991; Read, Wood, & Capone, 2005; Reifman et al, 1998; Sher, Bartholow, & Nanda, 2001; Turner, Larimer, & Sarason, 2000; Turrisi, Wiersma, & Hughes, 2000; Wood, Read, Palfai, & Stevenson, 2001). Although some of this literature has suggested the salience of parental influences declines as individuals develop into young adults (Kandel & Andrews, 1987; Windle, 2000; Wood et al., 2001), there is considerable research that suggests parents are quite active in the plans of students as they prepare for college, and they maintain influence after the student has moved to campus across domains such as academic, social, emotional, financial functioning, and health information (American College Health Association, 2003; Amerikaner, Monks, Wolfe, & Thomas, 1994; Brack, Gay, & Matheny, 1993; Galotti & Mark, 1994; Kashubeck & Christensen, 1995). Turner and colleagues (2000) found parent-child conflict at entrance to college was positively related to heavier alcohol consumption and negative consequences one year later for fraternity and sorority members. In addition, Wood and colleagues (2000) discovered parental modeling and monitoring were related to lowered use, problems, and moderated peer influences on drinking outcomes. These findings illustrate parental influences continue to be relevant to decision making regarding alcohol use, even as students enter college.

A parent intervention, designed with these parameters in mind, utilized an intervention approach in an attempt to reach teens via their parents before they left for college (Turrisi et al., 2001). The intervention provided parents with a handbook that summarized strategies for positive parenting practices, developing good communication patterns, and initiating conversations with teens. The handbook also provided in-depth coverage on methods parents can use to: (1) teach their teens how to avoid high risk drinking behaviors and increase alternative non-drinking behaviors, and (2) make teens more resistant to external social influences that encourage high-risk drinking behaviors (Turrisi, 2003). A sample of incoming freshman college students whose parents implemented the intervention materials were contrasted with a comparison sample during their first semester in college on drinking outcomes, perceptions about drinking activities, perceived parental and peer approval of drinking, and drinking-related consequences, and were found to differ significantly in the predicted directions (Turrisi et al., 2001). Despite the fact that all teen respondents were below the legal age for drinking, 70% indicated that they had gotten drunk at least one time in the past year, 30% indicated that they had consumed five or more drinks two weeks prior to the data collection period, and 30% indicated that they drank alcohol weekly. Turrisi et al. (2001) observed significantly lower weekend drinking, drunkenness frequency, and number

of occasions consuming 5 or more drinks in a sitting for the intervention group relative to the comparison condition.

When such an intervention produces desired results, it is often assumed that the program worked through producing changes in the variables targeted by the intervention. Mediation analyses can be used to assess whether observed program effects are a result of changes in targeted individual level variables (e.g., attitudes and beliefs). The present study was an extension of Turrisi et al. (2001) that examined the mediational processes of the full sample of the parent intervention. The mediating variables we chose to examine in the present study are based on the core concepts from the Behavioral Alternative Model (Turrisi, 1999; Turrisi & Jaccard, 1992) and studies linking expectancies to behavioral tendencies (Baer, 1994; Baer et al., 1992; Darkes & Goldman, 1993; Marlatt, Baer, & Larimer, 1995; Turrisi et al., 2000). According to the model, on a typical weekend evening a college student may consider whether or not to engage in a drinking activity (e.g., go to a bar and get drunk). This decision is influenced, in part, by the way the individual construes the act of drinking as well as the alternative courses of action that are available. An effective analysis of drinking for the typical college student involves not only a consideration of the behavioral alternative focused on a drinking activity (e.g., going to a bar and getting drunk), but on other alternatives as well, such as going to a movie, going to a coffee house, and so on (Turrisi, 1999). In order to reduce risky drinking behaviors effectively in young adults, this model suggests it is important to decrease both positive attitudes toward risky drinking behaviors and to increase the perceived favorableness toward reasonable healthy alternatives in the targeted population. Thus, the first set of mediator variables we focused on were attitudes toward different drinking and non-drinking activities. We hypothesized that individuals in the treatment condition will have more negative attitudes toward drinking activities and more positive attitudes toward non-drinking activities than individuals in a comparison group.

Second, this model suggests beliefs, such as alcohol can make positive transformations, alcohol can enhance social behavior, alcohol can result in negative affect, normative approval, and alcohol interferes with a healthy lifestyle, need to be addressed and potentially modified. Previous studies have shown evidence for the relationships between such cognitive constructs and attitudes toward behavioral alternatives in the college student drinking domain (e.g., Turrisi, 1999; Turrisi et al., 2000), however the data were correlational in nature. Thus, the second set of mediator variables we focused on were beliefs about the effects of alcohol. We hypothesized that individuals in the treatment condition will have more negative beliefs toward drinking and more positive beliefs toward healthy lifestyle orientation relative to a comparison group.

In sum, the goal of the present research was to examine whether the parent intervention program's effects on drinking tendencies were mediated by students' attitudes regarding drinking and alternative activities consistent with the Behavioral Alternative Model and the literature on alcohol expectancies.

Method

Sample

Respondents consisted of 656 incoming freshman attending colleges in the United States and who resided near mid-sized north eastern and mid-sized north western cities just prior to attending college. Four hundred thirty one respondents were in an intervention group (their parents received intervention materials during the summer months prior to their teen's first semester in college), and 225 were in the comparison group (their parents did not receive intervention materials). Students completed measures assessing drinking and drunkenness

tendencies, attitudes about drinking activities, attitudes about drinking alternatives, and drinking related beliefs approximately 90 days into their first semester in college. Despite the fact that 99.8% of the respondents were below the legal age for drinking, 43% indicated they had consumed five or more drinks 2 weeks prior to the data collection period, and 57% indicated that they drank regularly on the weekends. The demographic composition of the sample was as follows: 43% male, 57% female; 33% liberal, 45% moderate, and 22% conservative; 83% Caucasian, 5% Hispanic, 3% African American, 4% Asian, and 5% other; 35% Catholic, 12% Protestant, 5% Jewish, 12% Church of Latter Day Saints, 1% Muslim, 20% other, and 15% no religion. The mean age was 18.14 years.

Intervention group recruitment—Students' names were randomly selected from all high school yearbooks purchased from public and private high schools in the sampling areas and matched to local phone directories. Parents of the students in the intervention group were contacted by telephone.. Approximately 550 (85%) of the eligible parents (having a teen going to college) agreed to have a letter sent to their home (N = 468). Four-hundred and forty-four (95%) of the parents who were sent letters subsequently agreed to participate in the research. No significant differences were observed between parents who agreed to participate and those who were unwilling when questioned about general health questions during the initial phone contact.

In the fall semester, students in the intervention group were sent a letter that asked them to complete a survey for which they would receive $30. A week later they were contacted by telephone to confirm participation and were mailed a written consent form, the survey, and a postage-paid return envelope. Ultimately, we obtained a 97% return rate (N = 431).

Comparison group recruitment—We initially recruited the comparison group using the same approach used for the intervention group by contacting parents first, but early on in our recruitment we observed this method resulted in parents in this group requesting information from us so that they could initiate discussions about drinking. We questioned a small sample of the teens, and they indicated that their parents did begin to talk about drinking even in the absence of intervention materials. Although this was a positive sign that parents were motivated to talk to their teens, it did affect having a “treatment as usual control”. Thus, we shifted our approach and recruited comparison respondents from the first-semester freshmen in the psychology 101 participant pools at the two major universities in the two cities where we drew our intervention sample from. We felt the comparison group drew students from the same population as the intervention group based on the following: 1) Respondents in our intervention group were primarily drawn from these two schools (approximately 70%); 2) Similar proportions of college students attending these schools were from areas outside the region (37%) as those attending high schools in the cities that left the area for colleges away from home (thus the groups were similar in regional diversity); 3) our observation that seniors in high school drinking norms tend to be similar to the freshman college norms within a smaller city or town (Abar & Maggs, 2007), and 4) in our previous studies have not found differences between our freshman samples on various drinking outcomes using diverse recruitment approaches (e.g., Taylor, Johnson, Voas, & Turrisi, 2006; Turrisi, 1999; Turrisi et al., 2000; Turrisi et al., 2007; Voas et al., 2008). We also examined differences between the intervention and comparison groups on demographics that might be indicative of differences in the ability to attend colleges outside of these cities (gender, age, GPA, SES, religion, political affiliation, residence) and found no significant differences between the groups. Frequency of drinking (e.g., 29%, 62%, and 63% reported consuming at least one drink on a Thursday, Friday, and Saturday, respectively) and mean drinks per week (M = 9.42, se = .56) of the comparison group were also similar to recent studies conducted by other researchers examining diverse samples of college students (e.g., Benton, Benton, & Downey, 2006; Collins, Carey, & Sliwinsky, 2002; Fromme & Corbin, 2004; Paschall,

Kypri, & Saltz, 2006). Thus, although we used slightly different recruitment procedures, the comparison individuals represent a good contrast with the intervention group because of their lack of prior knowledge of the research, regional and demographic correspondence, and their reasonable similarity to other freshman college students in the East and West United States, as well as those in our intervention group. All assessments of the comparison group were made at the same time as the intervention sample with the same incentives.

Materials and Procedure

Parents were given the intervention materials during the summer between their son/daughter's high school graduation and first year in college (academic years 2000 and 2001). Parents were asked to read all the materials and implement the intervention with their son/daughter before they started college.

Content of the intervention—The format of the intervention was a parent handbook approximately 35 pages long. We conducted pilot work with a small sample of parents (N = 25), which suggested this length was acceptable. Each chapter was written in clear language and provided practical approaches to dealing with the problem in question.

Chapter 1 was intended to motivate parents to engage in conversations with their teens. It provided parents with an overview of the incidences and consequences associated with college student alcohol consumption and heavy episodic drinking using a combination of anecdotal reports from actual college students' experiences and statistics from the empirical literature. Chapter 2 focused on providing parents with specific strategies they could use to improve communication channels, techniques for initiating a conversation (even when communication has been minimal), common negative reactions, orientations that parents could adopt to facilitate good communication, common non-constructive parental responses, and techniques for giving and receiving criticism. Chapter 3 discussed methods parents could use to teach their son/daughter assertiveness skills, how to deal with peer pressure, and common pressure lines college students were likely to hear. Chapter 4 was a discussion of college student alcohol consumption that was guided by perspectives from behavioral alternative model and findings from the college drinking literature. For example, in the section on reasons why teens drink it, describes some teens perceive drinking activities as a good way to add to a celebration and ways that parents can address alternative ways to celebrate (e.g., “Some teens believe that drinking is one way to celebrate a special occasions. A friend may suggest to your teen that they have a few beers as a way to celebrate a team's victory or finishing an important assignment. It is important that you talk with your teens about alternative ways of celebrating special occasion. Some of these might include offering to get your teen and a friend tickets to a movie, concert or event…”).

The section also addresses positive transformations, enhanced social behavior, negative affect, and normative approval and ways parents can help their teen in each of these areas.

For example, for positive transformations the following is offered:

> “Many teens believe that alcohol will help them get in a better mood. Parents can suggest constructive ways of dealing with sad or stressful times and trying to raise their spirits without drinking alcohol. Examples include seeing a movie, participating in an activity that is enjoyable, or having a friend come over. In addition, it is important for teens to know that it is normal to feel sad and stressed at times. Of course, parents can help to set a good example for their teen rather than coming home after an especially stressful day at work and having a drink before dinner, they might go on a short run or walk. Exercise is a good alternative way to

> help improve one's mood. It is also important to explain to your teen that the “high” from alcohol is accompanied by extreme lows as well.”

For enhanced social behavior the following is offered:

> “Another reason teens give for drinking is that they believe that alcohol help make it easier to express feelings or talk with potential sexual partners. Parents need to be sensitive to how difficult it can be for teens to communicate in a new environment where they are unlikely to know anybody. Increasing your teen's self-esteem will help with teen self-expression. In addition, parents can point out while releasing inhibition, alcohol could cloud judgments, making teens think they are communicating better when, in fact, they are not. Another perspective to consider is when you rely on drinking to communicate, then other people really do not know the real you they only get to know the intoxicated you. Ultimately, friendships are established by getting to know what someone is really like and drinking gets in the way of this.”

In the sections why teens choose not to drink we addressed alternatives to drinking activities (e.g., going to a sporting event or coffee shop) and healthy lifestyle orientations (e.g., being healthy and physically fit is more important to me than most people).

For healthy lifestyle orientations the following is offered:

> “Teens today are much more aware of the benefits of a healthy lifestyle than in the past. Many teens choose to become vegetarians or avoid red meets, exercise regularly in order to keep fit, and avoid harmful activities, such as, smoking and drinking. Concern for the environment and the planet is couple with genuine commitment to take care of ones' body and lead a long healthy life. To these teens, the idea of smoking cigarettes, drinking alcohol, or taking other drugs is decidedly uncool. They have learned to respect their bodies, such that introducing harmful substances to them has become an unacceptable behavior. For many of these teens, this choice of a health lifestyle is their way of asserting their independence.”

Intervention integrity. We adopted practices to ensure all parents carefully read the educational materials at least once. We told parents the research had two goals: (a) to help them discuss issues of heavy drinking with their son/daughter and (b) to obtain their feedback on the readability and interest value of the handbook. They were told the book had been written on the basis of scientific knowledge and that we needed their feedback. We asked them to write short statements summarizing each chapter and to complete several rating scales evaluating specific chapter sections. We used booster calls during the summer as a further check on the parents. Eighty-seven percent of the parents returned handbooks with written comments and completed rating scales. Thus, we believe parents did in fact read the materials.

Measures

Outcome Variables—Measures of alcohol use were based on items selected from the literature on drinking (e.g., Turrisi & Jaccard, 1992; Wechsler et al., 1994a).

Weekend drinking and heavy drinking: Weekend drinking was measured by asking each participant, “Given that it is a typical week, please write the number of drinks you probably would have each day (if none, then write in 0; If you are not exactly sure then write in your best estimate). A response scale is provided for each typical weekend drinking day (e.g., Thursday_____, Friday_____, Saturday_____). The items were summed for weekend drinking tendencies (alpha = .94).

Heavy drinking was measured with two items. The first item asks, "During the past 30 days, how many times have you gotten drunk, or very high from alcohol? (Please make your best estimate). The response scale for this item is a follows: Never, 1 to 2, 3 to 4, 5 to 6, 7 to 8, and 9 or more (Wechsler et al., 1994a, b). In previous research with adolescents and adults (e.g., Jaccard & Turrisi, 1987; Turrisi & Jaccard, 1991) non-significant correlations between these measures and indices of social desirability, reasonably high test-retest reliability estimates (e.g., r = 0.85 to 0.90), and good convergence between the indices of drinking quantity/frequency (e.g., r = 0.70 or greater) were observed. The measure asked individuals to report the number of times during the past two weeks that they had five or more drinks in a row on a single occasion (e.g., in the same evening). To accommodate gender differences, we also asked women this question focused on four or more drinks in a row. The items were standardized and averaged to derive an index of heavy drinking tendencies (r = .83).

Mediator Variables

Beliefs about alcohol: These beliefs were derived from findings in previous research (Brown, Goldman, Inn & Anderson, 1980; Christiansen, Smith, Roehling, & Goldman, 1989; Christiansen, Goldman & Inn, 1982; Turrisi, 1999; Turrisi, Jaccard, & McDonnell, 1997; Turrisi et al., 2000) that mapped onto sections of the parent handbook and consisted of the following constructs: alcohol can make positive transformations, alcohol can enhance social behavior, negative affect, normative approval, and Healthy lifestyle orientation (for individual items, see Table 1). Individuals responded to each of the items on a 5-point (strongly agree, moderately agree, neutral, moderately disagree, strongly disagree) Likert-type scale. We subjected the items to a principle-components factor analysis with oblique rotation (See Jaccard & Wan, 1996). Factor loadings for each of the constructs were greater than .79; eigenvalues were all greater than 1.0, and inter-item correlations were all greater than or equal to .50. A score on each multiple-item factor was defined by summing the multiple items that loaded on the factor (coefficient alphas on multiple item factors were all greater than .70). High scores on the negative affect and Healthy lifestyle orientation factors reflected less favorable views toward drinking alcohol (e.g., increased negative affect), whereas high scores on the positive transformations, enhance social behaviors, and normative approval factors reflected more positive views toward drinking (e.g., increased social behaviors).

Attitudes toward drinking activities: To assess the attitudes towards drinking activities, individuals were presented with the following scenario: "Suppose it was a Friday or Saturday and you were trying to decide what to do that evening. There are some possibilities that you might feel favorable about and some possibilities that you might feel unfavorable about." Individuals were then asked to indicate how favorable or unfavorable (e.g., strongly disagree, moderately disagree, neutral, moderately agree, strongly agree) they would feel toward each of the following drinking activities if they were going to go out: (1) going to a school sponsored sporting event to drink alcohol, (2) going to a bar to drink alcohol, (3) going to a bar to get drunk, (4) going to a party to drink alcohol, (5) going to a party to get drunk, and (6) going to a campus special event (e.g., concert) to drink alcohol. The content of these items was based on the work of Turrisi (1999).

Attitudes toward alternatives to drinking activities: To assess the attitudes toward alternatives to drinking activities, individuals were presented with a format similar to the assessment of attitudes toward drinking activities, "Suppose it was a Friday or Saturday and you were trying to decide what to do that evening. There are some possibilities that you might feel favorable about and some possibilities that you might feel unfavorable about." Individuals were asked to indicate how favorable or unfavorable they would feel toward each of the following alternatives if they were going to go out: (1) going to a school

sponsored sporting event and not drinking, (2) going to a coffee shop with live entertainment and not drinking, and (3) going to a campus special event (e.g., concert), but not drinking. Individuals responded to each of the items on a 5-point (unfavorable to favorable) Likert-type scale.

Test-retest reliability correlation for the attitudes toward drinking and non-drinking activity items have all been greater than .70, and they have been non-significantly related to measures of social desirability (Turrisi, 1999).

Statistical Analysis: The joint significance test of α and β was used to assess mediation based on the results of a Monte Carlo study in MacKinnon et al. (2002). In the study, they compared the joint significance test to thirteen other mediation techniques and found that the joint significance test had the most power and the most conservative Type I error rates relative to other approaches. Regression analyses are used to test the α and β paths testing the model shown in Figure 1 using AMOS 5.0 in SPSS. First the α path, the effect of the program on the hypothesized mediator, is assessed for statistical significance. Second, the β path, the effect of the mediator on the outcome, is assessed for significance while controlling for intervention program effects in the equation. If both the α and β paths jointly show significance at the .05 level there is evidence for a significant mediating relationship (e.g., being in the comparison/intervention group affects the outcome variable through changes in the mediating variables; MacKinnon, 1994). The mediated effect is the product of the α and β values (αβ) and provides an estimate of the relative strength between the mediated effects. When there is evidence for mediation, confidence intervals (95%) can be calculated to provide a range of estimates for the actual mediated effect value (Shrout & Bolger, 2002). Given that the regression coefficient provides an estimate for the actual mediated effect (αβ), if the confidence intervals around the regression coefficient do not contain the value of zero then this is considered further evidence the mediating effect is greater than zero or statistically significant and provides more precision of the actual mediated effect. We derived confidence intervals using a bootstrapping procedure in AMOS 5.0 in SPSS because of non-normality of the data on the outcome variables. For the analyses, intervention is coded as 0 and comparison is 1.

Results

The first focus of the analyses examined mean differences between the intervention and comparison groups on drinking outcomes and the mediational constructs. Examination of the F-ratios using ANOVA, means, and standard deviations in Table 2 revealed that the groups were significantly different on all the constructs in the anticipated directions. The results demonstrating the efficacy of the parent intervention examining the full study sample are consistent with the preliminary findings reported in Turrisi et al. (2001).

The second focus of the analyses was whether the theoretical attitudinal and cognitive constructs significantly mediated the relationship between the intervention and weekend drinking tendencies. All models were run examining individual mediators. Results of the mediation analyses are reported in Tables 3 & 4.

Program effects

Significant program effects ($p<.001$) were found in the anticipated directions on all of the predicted mediators (column α). For example, individuals in the intervention condition had more negative attitudes toward all weekend drinking activities than individuals in the comparison condition. Similarly, individuals in the intervention condition had more positive attitudes toward all alternative activities than individuals in the comparison condition. Individuals in the comparison condition thought that alcohol resulted greater perceived

benefits (positive transformations, enhanced social behavior, normative approval) and fewer consequences (less negative affect and worse healthy lifestyle orientation) relative to individuals in the intervention condition.

Mediator effects on weekend drinking

Examination of the β paths in Table 3 revealed significant relationships with all of the hypothesized mediators when controlling for intervention program effects in the anticipated directions. For example, as attitudes toward drinking activities increased, weekend consumption increased. Similarly, as attitudes toward alternative activities increased, weekend consumption decreased. Also, as the perceived benefits of alcohol increased (positive transformations, enhanced social behavior, normative approval) and the consequences decreased (less negative affect and worse healthy lifestyle orientation), weekend consumption increased. Finally, examination of the last two columns of Table 3 reveals that the confidence intervals around the regression coefficients do not contain the value of zero which provides additional evidence the mediating effects are greater than zero or statistically significant.

Mediated effects

Significant mediated effects (αβ) were observed for all of the constructs - attitudes toward drinking alternatives, attitudes toward alternative activities, perceived benefits of alcohol, and perceived consequences of alcohol. Thus, these findings are suggestive that the intervention changed the theoretical mediators, which in turn, changed weekend drinking as predicted.

The next focus of the analyses examined whether the theoretical attitudinal and cognitive constructs significantly mediated the relationship between the intervention and heavy drinking tendencies. Results of the mediation analyses are reported in Table 4. As observed with the weekend drinking, all of the program effects on the mediators and all of the mediators' effects on heavy drinking tendencies were significant (all ps < .001) and in the anticipated directions. Moreover, examination of the last two columns of Table 4 reveals the confidence intervals around the regression coefficients do not contain the value of zero which provides additional evidence the mediating effects are statistically significant. Thus, it would appear that the intervention had the desired result of changing theoretical mediators which, in turn, decreased heavy drinking tendencies as expected.

Discussion

Heavy drinking and alcohol-related problems represent a significant concern on our nation's college campuses (Perkins, 2002; Wechsler et al., 1998). For some students, alcohol consumption and negative consequences emerge after college matriculation, and a growing body of research has examined factors associated with the development of alcohol problems in college (Baer, 2002). Research also indicates that, for many students, excessive consumption in college represents a continuation or escalation of drinking patterns established earlier (Baer, Kivlahan, & Marlatt, 1995; O'Malley & Johnston, 2002). Such widespread prevalence of collegiate alcohol abuse has underscored the need for empirically supported interventions (Hingson et al., 2005; Marlatt et al., 1995). Moreover, the scope of college drinking requires that it be addressed across multiple domains, through the implementation of various empirically-validated approaches. The present study was an examination of an intervention strategy that utilizes parent communications to affect high risk college student drinking tendencies. While this intervention has been shown to be effective in reducing college student drinking in prior studies (Turrisi, 2003; Turrisi et al., 2001), the mediational processes were empirically undefined.

Our previous findings suggest college students are more likely to engage in a drinking activity when given several activities to choose from based on their attitudes toward drinking alternatives (Turrisi, 1999). The present study revealed some evidence to support the notion that when a nondrinking activity is made more favorable, perhaps as a result of new information or a change in belief patterns, college students tend to engage in the non-drinking activity more often. Our approach educated parents about how to convey new information or change beliefs about both drinking and nondrinking activities. We hypothesized that the parent intervention, , through communication between parents and teens, would affect cognitive and attitudinal variables related to drinking and non-drinking activities, which in turn, would influence subsequent drinking behaviors. It was our contention that individuals in the intervention group would develop (or reinforce existing) favorable attitudes toward non-drinking alternatives relative to the comparison group, thereby reducing their desire to engage in drinking activities and increasing their desire to engage in alternative activities. Results from a series of mediated analyses provide evidence to suggest the parent intervention potentially did in fact impinge on these constructs, which in turn, had an influence both weekend and heavy drinking outcomes.

Despite the potential implications for prevention suggested by the current study, there are several limitations that should be noted. First, the present study did not address different approaches to parenting or student orientations that might impact the effectiveness of the intervention. Future studies might benefit from the examination of communication styles (Turrisi et al., 2000), parental modeling or monitoring (Wood et al., 2000), behavioral tendencies (Guilamo-Ramos et al., 2004) and parental orientations toward underage consumption (Barnes, 1990) and how these constructs might moderate the relationships between the program effects and drinking tendencies. Relatedly, future research would benefit from identifying interventions that reduce heavy drinking in high risk populations such as members of the Greek society (Larimer, Irvine, Kilmer, & Marlatt, 1997; Larimer et al., 2001; Park, Sher, & Krull, 2006) and athletes (Turrisi, Mallett, Mastroleo, & Larimer, 2006). Second, there is the potential that the differences between the groups could be due to the fact that the intervention group teens were aware that they were in an intervention study whereas the comparison teens were not. Thus, teens in the intervention group may have underreported their true drinking in an effort to please the experimenters. We do not think this is operating in our data for several reasons. Students were informed that all of their responses would be confidential and the methods describing the procedures to insure their confidentiality was explained in detail prior to them giving consent to be in the study. Also, at no time did a respondent have to directly report an answer to a member of the research team which would have enhanced the possibility of socially desirable responding. Third, we observed no evidence of socially desirable responding when we examined statistical relationships between the measures in our present study and measures of social desirability (see Turrisi et al., 2001). Fourth, it is plausible that there are alternative explanations for the results we observed. For example, the conversations between parents and teens may have reinforced already existing values between parents and teens about underage drinking and drug use. Alternately, the conversations may have influenced and reinforced how much teens might want to please their parents when in college. Another alternative explanation of our findings is that our mediated effects could be byproducts of when assessments were made. We measured our mediators and outcomes at the same time and therefore have no way of assessing how long after the conversations between parents and teens it took to change teens' orientations toward drinking activities. Fifth, our sample was primarily Caucasian and this may limit the generalizability of our findings to other samples.

The final limitation of the present study is that the comparison group used in the present study was recruited using different procedures than the intervention group. This raises the possibility that parents in our treatment group interacted with their teens differently, perhaps

not because of the program, but because they were in a study. Although it is possible, it is unlikely. The findings we observed with respect to treatment group teens' attitudes toward alternative activities were more positive and drinking activities were more negative than the comparison group, who had no such parent-teen interactions. These findings were consistent with the theoretical model underlying the intervention.

Our shift away from our initial comparison group does raise several interesting questions about engaging parents and teens that might be the focus of future research efforts. First, does the intervention produce stronger effects above and beyond parents who were “cued” to talk, but not given the handbook? Second, in order to effectively reduce college students' alcohol consumption, do we merely need to cue parents to talk their sons and daughter prior to college matriculation? Both are interesting possibilities. Relatedly, future research might benefit from examining the dose-response relationship between parent communications and college student drinking behavior. Currently, we provide a handbook to parents and ask that they speak their sons and daughters prior to the start of college. However, there has been no research examining whether these conversations continue when the students are at college. Studies report students increase their consumption patterns throughout the first year in college (Sher & Rutledge, 2007). Thus, providing supplemental materials to parents during the first year of college to boost the dosage to help continue communications may help curb these patterns of consumption.

In conclusion, despite the limitations mentioned, the intervention examined shows good effects on weekend and heavy drinking tendencies through changes in attitudinal and cognitive constructs and is consistent with other reports that parents influence their sons and daughters even into college (Chassin & Handley, 2006; Fromme, 2006). The present study elucidated different constructs that parents could address with their teens to prevent heavy drinking tendencies. Parents who encourage their teens to adopt alternative activities, such as going to sporting events, coffee shops, and campus events, might be better off as opposed to simply warning them to avoid parties and bars. In addition, parents who convey that alcohol is not the only way to enhance their social interactions, make friends, and increase positive moods are likely to have teens that drink less. Finally, teens whose parents who can communicate the benefits of adopting a healthy lifestyle orientation tend to consume less alcohol and drink heavier less frequently.

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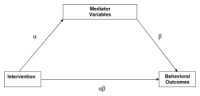

Figure 1.
Statistical mediational model

Table 1

Items Assessing Cognitive Mediators

Positive Transformations
• Having a few drinks is a nice way to celebrate
• Drinking makes me feel good
• Alcohol adds fun and excitement to an otherwise boring life
Enhance Social Behaviors
• A few drinks make it easier to talk to people
• I often feel sexier after I've had a few drinks
Normative Approval
• Most of my friends drink
• Everybody goes through the drinking phase
• It would be difficult for me not to drink alcohol because most of my friends do
Negative Affect:
• Drinking alcohol can result in negative changes in my personality and make me irritable
• Drinking alcohol can result in depression
• All things considered, I have a negative attitude toward drinking alcohol at this time in my life
Healthy Lifestyle Orientation
• I am committed to a healthy lifestyle
• Being physically healthy and physically fit is more important to me than most people

Table 2

Group Differences between Treatment and Comparison Groups of an Intervention

	Treatment		Comparisons			
	M	**SD**	**M**	**SD**	**F-Values**	**Partial η^2**
Outcomes						
Weekend Drinking	5.18	7.65	9.43	10.14	$32.92_{1,580}$***	.054
Heavy Drinking	3.34	3.29	4.70	3.94	$20.21_{1,580}$***	.034
Mediators						
Drinking Activities						
Going to a sporting event to drink	2.02	1.29	2.52	1.38	$19.43_{1,580}$***	.032
Going to a bar to drink	2.96	1.68	3.58	1.60	$19.21_{1,580}$***	.032
Going to a party to drink	2.98	1.68	3.59	1.57	$18.69_{1,580}$***	.031
Going to a bar to get drunk	2.45	1.52	3.13	1.60	$25.63_{1,580}$***	.042
Going to a party to get drunk	2.59	1.60	3.20	1.61	$19.40_{1,580}$***	.032
Alternative Activities						
Going to a sporting event	4.02	.96	3.71	.96	$14.47_{1,580}$***	.024
Going to a coffee shop	3.50	1.07	3.14	1.14	$14.28_{1,580}$***	.024
Going to a campus event	4.16	.77	3.85	.94	$19.61_{1,580}$***	.033
Cognitive Constructs						
Alcohol enhances social behavior	5.66	2.43	6.53	2.13	$19.69_{1,580}$***	.033
Alcohol creates positive transitions	8.20	3.57	9.99	3.38	$36.08_{1,580}$***	.059
Alcohol provides normative approval	7.96	3.12	9.71	3.12	$38.48_{1,580}$***	.062
Alcohol enhances negative affect	10.71	3.07	9.37	3.29	$24.85_{1,580}$***	.041
Healthy lifestyle orientation	7.85	1.88	7.25	1.99	$13.25_{1,580}$***	.022

*** $p < .001$ two-tailed

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Table 3

Program effects on Mediators, Mediator Effects on Weekend Drinking Tendencies, Mediated Effects, and Confidence Intervals

Mediator	(α) Program effect on mediator	(β) Mediator effect on outcome	(αβ) Mediated Effect	Lower C.I. of Mediated Effect	Upper C.I. of Mediated Effect
Drinking Activities					
Going to a sporting event to drink	.497*** (.130)	3.836*** (.221)	1.906	1.034	2.900
Going to a bar to drink	.615*** (.140)	3.246*** (.173)	1.996	1.112	2.937
Going to a party to drink	.604*** (.140)	3.310*** (.172)	1.999	1.092	2.900
Going to a bar to get drunk	.671*** (.132)	3.827*** (.169)	2.568	1.505	3.651
Going to a party to get drunk	.603*** (.137)	3.597*** (.167)	2.169	1.226	3.197
Alternative Activities					
Going to a sporting event	−.312*** (.082)	−1.492*** (.370)	.466	.184	.895
Going to a coffee shop	−.352*** (.093)	−3.044*** (.304)	1.071	.508	1.747
Going to a campus event	−.317*** (.450)	−2.617*** (.415)	.830	.369	1.467
Cognitive Constructs					
Alcohol enhances social behavior	.878*** (.198)	1.726*** (.138)	1.515	.879	2.200
Alcohol creates positive transitions	1.789*** (.289)	1.458*** (.084)	2.608	1.761	3.487
Alcohol provides normative approval	1.746*** (.281)	1.487*** (.090)	2.596	1.744	3.451
Alcohol enhances negative affect	−1.340*** (.269)	−1.380*** (.099)	1.849	1.111	2.576
Healthy lifestyle orientation	−.596*** (.164)	−1.110*** (.182)	.662	.269	1.178

*** $p < .001$ two-tailed

Table 4

Program effects on Mediators, Mediator Effects on Heavy Drinking Tendencies, Mediated Effects, and Confidence Intervals

Mediator	(α) Program effect on mediator	(β) Mediator effect on outcome	(αβ) Mediated Effect	Lower C.I. of Mediated Effect	Upper C.I. of Mediated Effect
Drinking Activities					
Going to a sporting event to drink	.497*** (.130)	1.559*** (.091)	.775	.411	1.169
Going to a bar to drink	615*** (.140)	1.345*** (.070)	.827	.455	1.221
Going to a party to drink	.671*** (.132)	1.581*** (.069)	1.061	.637	1.509
Going to a bar to get drunk	.604*** (.140)	1.364*** (.070)	.824	.456	1.201
Going to a party to get drunk	.603*** (.137)	1.505*** (.067)	.907	.510	1.334
Alternative Activities					
Going to a sporting event on a Friday or Saturday night	−.312*** (.082)	−1.140*** (.301)	.356	.091	.419
Going to a coffee shop on a Friday or Saturday night	−.352*** (.093)	−1.342*** (.123)	.472	.229	.754
Going to a campus event on a Friday or Saturday night	−.317*** (.450)	−1.175*** (.169)	.372	.163	.656
Cognitive Constructs					
Alcohol enhances social behavior	.878*** (.198)	.746*** (.056)	.655	.373	.944
Alcohol creates positive transitions	1.789*** (.289)	.618*** (.034)	1.106	.739	1.488
Alcohol provides normative approval	1.746*** (.281)	.623*** (.036)	1.088	.739	1.456
Alcohol enhances negative affect	−1.340*** (.269)	−.596*** (.099)	.799	.469	1.119
Healthy lifestyle orientation	−.596*** (.164)	−.468*** (.074)	.279	.117	.491

*** $p < .001$ two-tailed