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Alcohol expectancies, protective behavioral strategies, and alcohol-related outcomes: A moderated mediation study

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Aims: The influence of alcohol expectancies on alcohol consumption and the negative consequences of alcohol consumption among college students has been well documented. Protective behavioral strategies are associated with decreases in alcohol use and related consequences. This study examined the extent to which the use of protective behavioral strategies mediated the influence that alcohol expectancies had for alcohol consumption and negative alcohol-related consequences.
Methods: Measures of expectancies about alcohol consumption, protective behavioral strategies used when consuming alcohol, amount of alcohol consumed and negative consequences associated with alcohol use were completed by 679 traditional age undergraduate students via a secure website. A moderated mediation data analytic strategy was employed because of the gender differences that have been observed for alcohol expectancies, consumption, and consequences.
Findings: The use of protective behavioral strategies was found to mediate the associations that positive expectancies had with both the amount of alcohol consumed and the negative consequences of alcohol consumption only for women.
Conclusions: Education and harm reduction efforts for college student drinkers, including expectancy challenge initiatives, would benefit from including information about use of protective behavioral strategies.

INTRODUCTION

The abuse of alcohol among college students is a major public health concern on university campuses (U.S. Department of Health and Human Services, 2010).

Approximately 44% of college students have engaged in heavy episodic drinking, with 13% of students drinking 10 or more drinks in a row during the past two weeks and 5% of students drinking 15 or more drinks (Johnston, O'Malley, Bachman, & Schulenberg, 2011). Although rates of heavy drinking among college students have remained relatively stable four roughly 30 years, negative alcohol-related consequences continue to be a concern as alcohol-related problems have increased during that same time (Borden et al., 2011; Hingson, Zha, & Weitzman, 2009). Given the extent of this problem, there is a need to understand the factors that contribute to – and protect college students from – hazardous alcohol use. The two factors that will be examined in the present study are the expectancies associated with alcohol use and the protective behavioral strategies that individuals employ to minimize the negative impact of alcohol use.

Alcohol expectancies

The expected outcomes associated with alcohol consumption (i.e. alcohol expectancies) are strong predictors of problematic drinking behaviors (Thompson et al., 2009). Specifically, positive expectancies (e.g. increased sociability, enhanced sexuality) tend to be associated with an increased risk of problematic alcohol use (Labbe & Maisto, 2011) as well as greater acceptance of drinking behaviors such as pre-gaming (i.e. drinking alcohol prior to going to occasions like sporting events) or playing drinking games (Zamboanga, Schwartz, Ham, Borsari, & Van Tyne, 2010). Further, positive expectancies contribute to the maintenance of problematic alcohol use (Leeman, Toll, Taylor, & Volpicelli, 2009). In particular, positive alcohol expectancies may increase risky drinking behaviors by limiting one's attention to cues salient to the expectancy when drinking and reduce attention to

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contradictory cues (Labrie, Grant, & Hummer, 2011). Taken together, these results highlight the influence of positive expectancies on the development and maintenance of alcohol use behaviors (Scott-Sheldon, Terry, Carey, Garey, & Carey, 2012). At the same time, it has been suggested that negative expectancies predict lower levels of alcohol consumption (Jones, 2004; Leigh & Stacy, 2004). However, the influence of negative expectancies on drinking behavior appears to have less support than positive expectancies (Patel & Fromme, 2010). Given that the expectancies surrounding alcohol use have been shown to be associated with harmful drinking behaviors, it is important to identify those factors that may help to reduce the connection between alcohol expectancies and drinking behaviors. One of these possible factors would appear to be the use of protective behavioral strategies.

Protective behavioral strategies

Greater use of protective behavioral strategies is related to fewer alcohol-related negative consequences and reduced consumption among college drinkers (Araas & Adams, 2008; Benton et al., 2004; Borden et al., 2011; Martens et al., 2005; Ray, Turrisi, Abar, & Peters, 2009). Additionally, the use of protective behavioral strategies has been shown to partially mediate the associations that positive drinking motives (e.g. social, enhancement) have with alcohol consumption and negative consequences (Martens, 2007). Findings such as these are important for harm reduction efforts given that increased use of protective strategies has been shown to reduce the associations that these motives have with alcohol use behaviors. Further, it has been reported that many college students routinely engage in at least one protective behavioral strategy and that the use of more strategies appears to be better than the use of fewer strategies (Martens et al., 2004). However, individual characteristics – such as gender – have been shown to be associated with the use of protective behavioral strategies (Madson & Zeigler-Hill, in press) and may qualify the connection between protective behavioral strategies and alcohol-related outcomes. Additionally, the degree to which the use of protective strategies mediates the association between alcohol expectancies and drinking behaviors has not been investigated. Given that alcohol expectancies are robust predictors of alcohol use (Thompson et al., 2009), a better understanding of the role that protective strategies may have in this association may better inform prevention and intervention efforts.

The purpose of the present study was to examine the degree to which the use of protective behavioral strategies mediates the connections that alcohol expectancies have with alcohol consumption and alcohol-related negative consequences. Consistent with previous research, we expected positive expectancies to be associated with higher levels of alcohol consumption and more negative consequences. We also expected that this association would be mediated by protective

behavioral strategies such that the connection between positive expectancies and alcohol-related outcomes would largely be due to the failure of individuals to use protective behavioral strategies. Put more simply, we believe that individuals who expect to experience positive outcomes when they consume alcohol may be less likely to protect themselves from adverse experiences. This failure to engage in protective behavioral strategies may explain – at least in part – the reason that positive expectancies are connected with alcohol-related consequences. Due to the fact that gender differences exist for virtually every aspect of alcohol use, we also examined whether the strength of the hypothesized mediational effect would differ between men and women. We thought that protective behavioral strategies may play an especially important role in the connection between positive expectancies and alcohol-related outcomes for women. The rationale for this prediction was that women are more likely than men to use protective strategies under most conditions because they are more likely than men to suffer certain types of negative consequences (e.g. sexual assault) if they fail to protect themselves when they are drinking (e.g. Haines, Barker, & Rice, 2006). Our predictions were less certain for the role that protective behavioral strategies would play in the connection between negative expectancies and alcohol-related outcomes. Although we predicted that negative expectancies would be associated with the negative consequences of alcohol use, we were uncertain as to whether protective strategies would mediate this relationship.

METHOD

Participants and procedure

Participants were 679 undergraduates (136 men, 543 women) at a university in the southern region of the United States who were enrolled in psychology courses and participated in return for partial fulfillment of a research participation requirement. Participants completed measures concerning expectancies about alcohol consumption, protective behavioral strategies used when consuming alcohol, amount of alcohol consumed, and negative consequences associated with alcohol use via a secure website. The two criteria for participating in the present study were that the individuals had to be between the ages of 18 and 25 (the average age for our participants was 20.20 years [$SD = 1.78$]) and must have consumed alcohol within the past 30 days. The racial/ethnic composition was 61% White, 34% Black, and 5% Other. The demographic features of our sample are consistent with the demographic features of the university from which this sample was drawn.

Measures
Alcohol expectancies
The Comprehensive Effects of Alcohol (COEA) is a 38-item instrument that assesses expectations about the

Table I. Intercorrelations and descriptive statistics.

	1	2	3	4	5
1. Positive expectancy	–	0.58***	−0.28***	0.04	0.27***
2. Negative expectancy	0.64***	–	0.10*	0.00	0.21***
3. Protective behavioral strategies	−0.05	0.01	–	−0.29***	−0.51***
4. Amount of alcohol consumed	0.15	0.02	−0.29***	–	0.48***
5. Negative consequences of alcohol use	0.23**	0.13	−0.33***	0.37***	–
Mean for men	2.79	2.26	69.99	15.30	15.43
Standard deviation for men	0.57	0.54	15.19	15.90	12.46
Mean for women	2.68	2.31	78.90	8.10	11.13
Standard deviation for women	0.62	0.58	16.17	9.30	9.60

Notes: Correlations for the male participants are presented below the diagonal while correlations for the female participants are presented above the diagonal.
$*p < 0.05$; $**p < 0.01$; $***p < 0.001$.

effects of consuming alcohol (Fromme, Stroot, & Kaplan, 1993). This instrument contains four positive expectancy factors (i.e. increased sociability, tension reduction, enhanced sexuality, and 'liquid courage') and three negative expectancy factors (i.e. cognitive and behavioral impairment, risk and aggression and negative self-perception; Fromme et al., 1993). Participants were asked to respond to items based on how they believed they would behave after consuming alcohol (e.g. 'It would be easier to talk to people'). For each item, participants were asked to rate their level of agreement for the expected effect on a scale ranging from 1 (*disagree*) to 4 (*agree*). Expectancy scores were determined using the average score of the items for each factor. Positive and negative expectancies were calculated by summing each positive and negative factor (Walters & Baer, 2007). Evidence of reliability and validity for the COEA has been demonstrated (Fromme et al., 1993). In the present sample, the internal consistencies were 0.83 for positive expectancies and 0.76 for negative expectancies.

Protective behavioral strategies
The use of protective behavioral strategies was assessed by using the 15-item Protective Behavioral Strategies Scale that was developed by Martens et al. (2005). This instrument asks participants to 'indicate the degree to which you engage in the following behaviors to keep yourself safe when using alcohol or partying'. Participants responded to each item using a scale that ranged from 1 (*never*) to 6 (*always*) for behaviors such as using a designated driver or alternating between alcoholic and non-alcoholic drinks. Evidence for reliability and validity of the PBSS has been demonstrated by Martens et al. (2005) by finding expected negative correlations with alcohol consumption and negative consequences. The internal consistency of this measure was strong for the present sample ($\alpha = 0.89$).

Alcohol consumption
The amount of alcohol consumed by participants over the last 30 days was measured using a modified version of the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985). In order to accurately assess the level of consumption, this measure asked participants to estimate the number of standard drinks they consumed on each day of the typical week for the past month. Following the guidelines established by Collins et al. (1985) for classifying drinkers based on the Daily Drinking Questionnaire, participants were classified as infrequent drinkers (less than 3 drinks per week), moderate drinkers (4–11 drinks per week), and high volume drinkers (12 or more drinks per week). Collins et al. (1985) supported the validity of the DDQ by finding a moderate correlation with the Drinking Practices Questionnaire. As seen in Table I, correlations between the alcohol consumption as measured by the DDQ and negative consequences and protective behavioral strategies are consistent with previous research (e.g. Martens et al., 2005).

Negative consequences of alcohol use
The negative consequences of alcohol consumption were measured using the Young Adult Alcohol Problems Screening Test-Brief Version (Kahler et al., 2004) which is a 20-item instrument that assesses the frequency with which college students experienced negative alcohol-related consequences during the past year. Participants responded to items 1–6 using scales that ranged from 0 (*No, never*) to 9 (*Yes, 40 or more times in the past year*) and items 7–20 using scales that ranged from 0 (*No, never*) to 4 (*Yes, 3 or more times in the past year*). Total scores can range from 0 to 110 with higher scores indicating more frequent negative consequences during the past year. Reliability and validity for this measure has been well established (e.g. Devos-Comby & Lang, 2008). For this sample, the internal consistency was good ($\alpha = 0.80$).
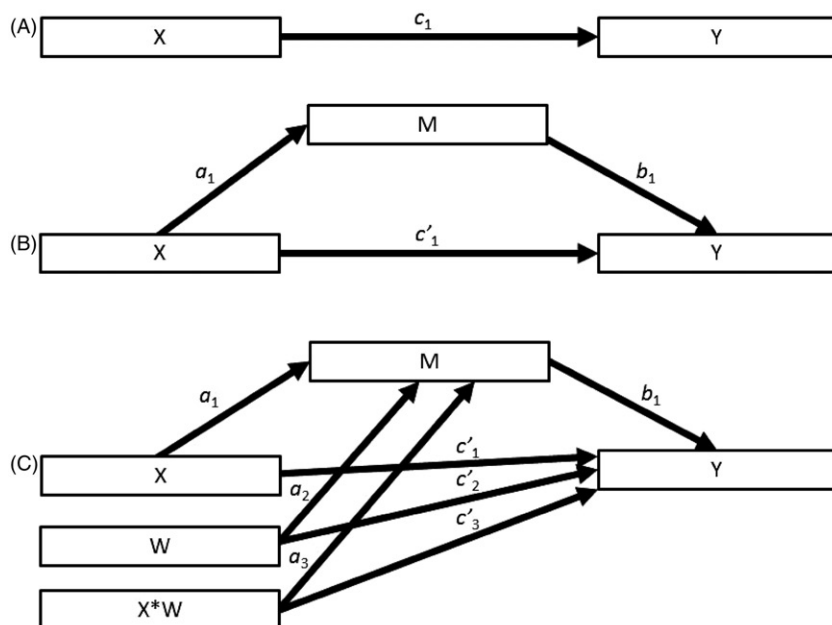
Figure 1. Panel A shows the unmediated model in which the predictor variable (X) is associated with the criterion variable (Y). Panel B shows the hypothesized simple mediation model in which the association between X and Y is mediated by another variable (M). Panel C shows the moderated mediation model in which the association between X and M is moderated by another variable (W). The designations for each path are also included in this figure (e.g. a_1 is the label for the path connecting X and M).

Data analytic approach

Our hypotheses were consistent with an indirect effects model such that the association between alcohol expectancies and alcohol-related outcomes was largely due to the use of protective behavioral strategies. Tests of mediational hypotheses such as this are often guided by the causal steps approach that was proposed by Baron and Kenny (1986). However, a number of potential problems associated with the causal steps approach have led to the development of other strategies for testing indirect effects such as a bootstrapping technique (e.g. Hayes, 2009; MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2004; Williams & MacKinnon, 2008). The bootstrapping technique creates an empirical representation of the sampling distribution of the indirect association by treating the empirical sample as a representation of the population and repeatedly resampling from the empirical sample during the analysis in order to mimic the original sampling process. This resampling process was repeated 5000 times for the current analysis and the path coefficients were recorded for each of these 5000 samples. The 5000 estimates of the indirect association were used to generate a 95% bias corrected confidence interval. The use of bootstrapped confidence intervals avoids some of the problems with power that are introduced by other techniques such as the Sobel test (MacKinnon et al., 2004). We tested our simple mediation hypotheses using an SPSS macro developed by Preacher and Hayes (2004) which facilitates estimation of the indirect effect using a bootstrap approach to obtain confidence intervals.

Our hypotheses concerning the moderating role of gender (coded as $1 = male$ and $0 = female$) led us to employ a moderated mediation approach (which is also known as a *conditional indirect effects model*; Preacher, Rucker, & Hayes, 2007). This approach combines moderation and mediation and allows researchers to determine if indirect effects are qualified by a moderator variable (Edwards & Lambert, 2007; Muller, Judd, & Yzerbyt, 2005; Preacher et al., 2007). This moderated mediation approach allows researchers to interpret conditional indirect effects at specific values of the moderator. This approach allowed us to determine whether the strength of the hypothesized indirect (mediation) effect differed for men and women. These moderated mediation analyses were conducted using an SPSS macro developed by Preacher et al. (2007). This approach facilitates the implementation of the bootstrapping methods that are recommended and provides a way to probe the significance of the conditional indirect effects at particular values of the moderator variable. The mediational models that we examined – as well as the labels assigned to the variables and path coefficients – are displayed in Figure 1.

RESULTS

The means, standard deviations, and intercorrelations for the measures employed in the present study are displayed in Table I. An inspection of the correlation matrix reveals that positive expectancies were negatively correlated with protective behavioral strategies

($r = -0.25$, $p < 0.001$) and positively correlated with both the amount of alcohol consumed ($r = 0.09$, $p < 0.05$) and the negative consequences of alcohol use ($r = 0.27$, $p < 0.001$). In contrast, negative expectancies were positively correlated with the negative consequences of alcohol use ($r = 0.18$, $p < 0.001$) but not with protective behavioral strategies ($r = -0.07$, ns) or the amount of alcohol consumed ($r = 0.00$, ns). It is important to note that gender differences emerged for the associations that positive and negative expectancies had with protective behavioral strategies such that significant associations emerged for women but not for men. The average reported number of standard drinks per week was 9.5 ($SD = 11.3$). Men reported drinking more alcoholic drinks per week than women ($M_{Men} = 15.30$ [$SD_{Men} = 15.90$], $M_{Women} = 8.10$ [$SD_{Women} = 9.30$], $t[677] = 6.82$, $p < 0.001$). The majority of participants were classified as either infrequent drinkers ($n = 224$ [32.9%]) or moderate drinkers ($n = 285$ [41.9%]) with 170 participants (25.2%) classified as heavy drinkers (Collins et al., 1985). Men and women did not differ with regard to their positive expectations about alcohol use ($t[677] = 1.82$, $p = 0.07$) or their negative expectations about alcohol use ($t[677] = -0.76$, $p = 0.45$). Men and women relied on similar protective behavioral strategies (e.g. knowing where your drink has been at all times, using a designated driver) but women were more likely to employ these strategies ($M_{Men} = 69.99$ [$SD_{Men} = 15.19$],

$M_{Women} = 78.90$ [$SD_{Women} = 16.17$], $t[677] = -5.80$, $p < 0.001$). Men were also more likely than women to report negative consequences stemming from their alcohol use ($M_{Men} = 15.43$ [$SD_{Men} = 12.46$], $M_{Women} = 11.13$ [$SD_{Women} = 9.60$], $t[677] = 4.37$, $p < 0.001$).

Positive expectancies and the amount of alcohol consumed

The first set of analyses examined whether protective behavioral strategies mediated the association between positive expectancies and the amount of alcohol consumed. The results of these analyses are presented in Panels A and B of Figure 2. This approach revealed that positive expectancies were associated with the amount of alcohol consumed ($c_1 = 0.09$, $p < 0.05$) such that individuals who expected good things to happen when they were drinking tended to drink more alcohol. Further, positive expectancies were associated with protective behavioral strategies ($a_1 = -0.25$, $p < 0.001$) such that those who had positive expectations about alcohol use were less likely to use protective behavioral strategies. In turn, protective behavioral strategies were associated with the amount of alcohol consumed ($b_1 = -0.32$, $p < 0.001$) such that those who utilized more protective strategies drank less than those who did not protect themselves. The association between positive expectancies and the amount of alcohol consumed failed to reach conventional levels of
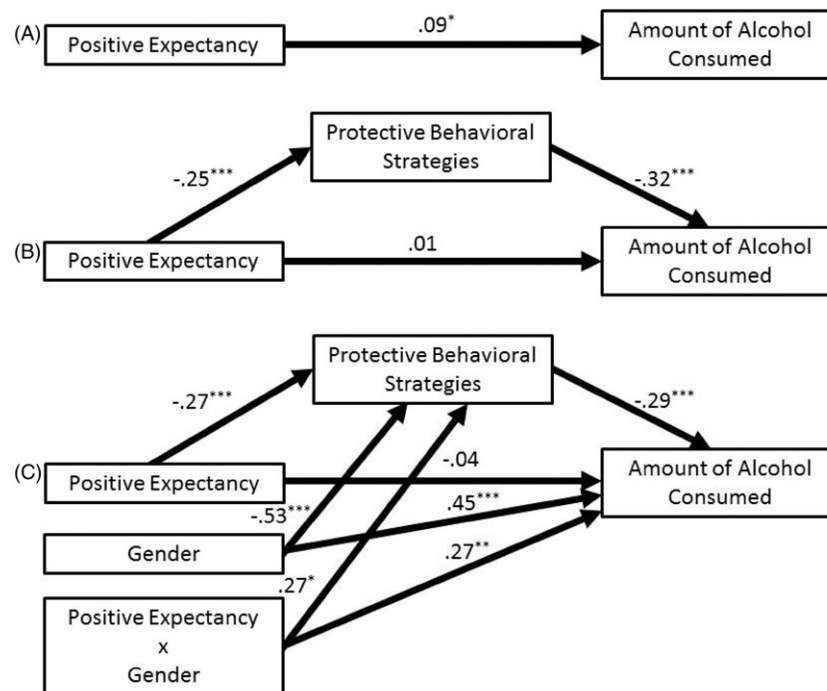

Figure 2. Panel A shows the unmediated model in which positive expectancies were associated with the amount of alcohol consumed. Panel B shows the simple mediation model in which the association between positive expectancies and the amount of alcohol consumed is mediated by protective behavioral strategies. Panel C shows the moderated mediation model in which the simple mediation is moderated by gender (coded as $1 = male$ and $0 = female$). The path coefficients are included for the direct and indirect effects. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

significance when protective behavioral strategies were included in the model ($c'_1 = 0.09$, ns). The bootstrap results suggest mediation as shown by a bootstrapped 95% CI around the indirect effect that does not contain zero ($CI_{Lower} = 0.07$, $CI_{Higher} = 0.15$). The Sobel test confirmed the bootstrap results by showing that the indirect effect was significant ($z = 5.86$, $p < 0.001$). These results suggest that protective behavioral strategies mediate the connection between positive expectancies about alcohol use and the amount of alcohol consumed (i.e. those with positive expectancies are less likely to utilize strategies to protect themselves which is associated with greater alcohol consumption).

We employed a moderated mediation analysis to determine whether the strength of the indirect (mediation) effect would differ for men and women. The results of this analysis are displayed in Panel C of Figure 2. These results showed that gender moderated the simple mediational association that was previously observed. That is, the association between positive expectancies and protective behavioral strategies was moderated by gender ($a_3 = 0.27$, $p < 0.05$). The simple slopes tests recommended by Aiken and West (1991) were used to describe the nature of this interaction. Simple slopes tests found that the slope of the line representing the association between positive expectancies and protective behavioral strategies was significant for women ($\beta = -0.28$, $p < 0.001$) but not for men ($\beta = -0.05$, ns). This is important because it suggests that positive expectancies are only associated with protective behavioral strategies for women. More specifically, women who have relatively few positive expectations about alcohol use tend to engage in protective behavioral strategies whereas women who expect good things to happen as a result of their drinking are less likely to protect themselves while drinking. In contrast, men are less likely to utilize protective behavioral strategies whether they have positive expectancies or not. With this in mind, it is not surprising that the strength of the indirect effect reached conventional levels of significance for women ($CI_{Lower} = 0.05$, $CI_{Higher} = 0.11$; $z = 5.00$, $p < 0.001$) but not for men ($CI_{Lower} = -0.06$, $CI_{Higher} = 0.08$; $z = 0.51$, ns). Taken together, these results show that protective behavioral strategies mediate the association between positive expectancies and alcohol consumption for women but not for men.

Negative expectancies and the amount of alcohol consumed

Negative expectancies were not associated with the amount of alcohol consumed ($c_1 = 0.00$, ns). It has been argued that it is unnecessary to demonstrate that the initial predictor variable is associated with the outcome in mediational analyses (Kenny et al., 1998; MacKinnon, Krull, & Lockwood, 2000; Shrout & Bolger, 2002), so we examined whether protective behavioral strategies served as a

mediator in this situation. However, our analyses revealed no evidence of mediation or moderated mediation.

Positive expectancies and the negative consequences of alcohol use

To examine whether protective behavioral strategies mediated the association between positive expectancies and the negative consequences of alcohol consumption, we followed the same basic approach as the earlier analyses with the exception that we also controlled for the amount of alcohol that participants reported consuming in these analyses. The first set of analyses examined whether protective behavioral strategies mediated the association between positive expectancies and the negative consequences of alcohol use. The results of this analysis are presented in Panels A and B of Figure 3. This approach revealed that positive expectancies were associated with the negative consequences of alcohol use ($c_1 = 0.23$, $p < 0.001$) such that individuals who expected good things to happen when they consumed alcohol tended to have more negative consequences. Further, positive expectancies were associated with protective behavioral strategies ($a_1 = -0.22$, $p < 0.001$) such that individuals who had positive expectations about alcohol use were less likely to protect themselves when drinking. Protective behavioral strategies were associated with the negative consequences of alcohol use ($b_1 = -0.33$, $p < 0.001$) such that those who failed to utilize strategies to protect themselves often experienced more negative consequences. The association between positive expectancies and the negative consequences of alcohol use remained significant when protective behavioral strategies were included in the model ($c'_1 = 0.15$, $p < 0.001$). The bootstrap results suggest that partial mediation occurred as shown by a bootstrapped 95% CI around the indirect effect that does not contain zero ($CI_{Lower} = 0.04$, $CI_{Higher} = 0.11$; $z = 5.86$, $p < 0.001$). These results suggest that protective behavioral strategies mediate the connection between positive expectancies about alcohol use and the negative consequences that individuals experience when they drink (i.e. those with positive expectancies are less likely to utilize strategies to protect themselves which is associated with more negative consequences).

We were also interested in whether the strength of the indirect (mediation) effect would differ for men and women so we employed a moderated mediation analysis. The results of this analysis are displayed in Panel C of Figure 3. These results were consistent with our prediction that gender would moderate the mediational association. As in the earlier analyses concerning the association between positive expectancies and the amount of alcohol consumed, the strength of the indirect effect reached conventional levels of significance for women ($CI_{Lower} = 0.06$, $CI_{Higher} = 0.13$;
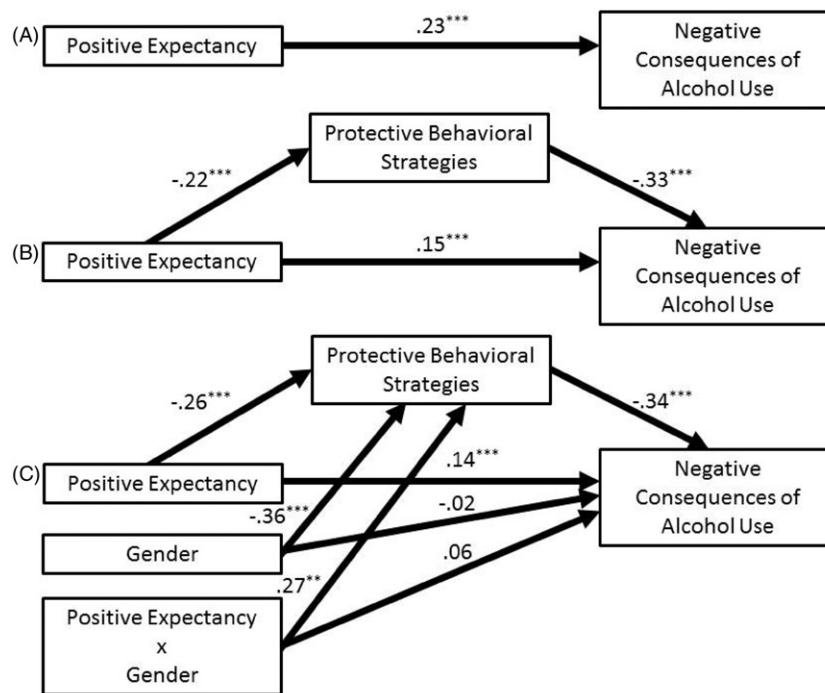
Figure 3. Panel A shows the unmediated model in which positive expectancies were associated with the negative consequences of alcohol use. Panel B shows the simple mediation model in which the association between positive expectancies and the negative consequences of alcohol use is mediated by protective behavioral strategies. Panel C shows the moderated mediation model in which the simple mediation is moderated by gender (coded as $1 = male$ and $0 = female$). The path coefficients are included for the direct and indirect effects.

$*p < 0.05; **p < 0.01; ***p < 0.001$.

$z = 5.55$, $p < 0.001$) but not for men ($CI_{Lower} = -0.10$, $CI_{Higher} = 0.07$; $z = -0.23$, *ns*). Taken together, these results show that protective behavioral strategies mediate the association between positive expectancies and the negative consequences of alcohol use for women but not for men.

Negative expectancies and the negative consequences of alcohol use

Similar analyses were conducted to examine whether protective behavioral strategies mediate the connection between negative expectancies and the negative consequences of alcohol use. Negative expectancies were associated with the negative consequences of alcohol use ($c_1 = 0.18$, $p < 0.001$). However, negative expectancies were not associated with protective behavioral strategies ($a_1 = -0.07$, *ns*) and no evidence for mediation was found since the bootstrapped 95% CI around the indirect effect contained zero ($CI_{Lower} = 0.00$, $CI_{Higher} = 0.06$; $z = 1.84$, *ns*). The moderated mediation analysis revealed that gender did not moderate the connection between negative expectancies and protective behavioral strategies ($a_3 = 0.11$, *ns*). These results suggest that individuals who have negative expectations about alcohol consumption report having more negative consequences as a result of their alcohol use but protective behavioral strategies do not mediate this association.

DISCUSSION

The purpose of this study was to evaluate the degree to which the use of protective behavioral strategies mediated the connections that alcohol expectancies had with alcohol consumption and negative consequences. We also sought to understand the degree to which the strength of the hypothesized mediational effect would differ between men and women. Our results add further support to the value of the use of protective behavioral strategies in reducing the negative consequences associated with drinking. First, we found that the use of protective behavioral strategies were generally associated with decreased alcohol consumption and fewer negative alcohol-related consequences. Second, we found that the use of protective behavioral strategies mediated the link that positive expectancies concerning alcohol use had with the amount of alcohol consumed and the negative consequences of alcohol use. More specifically, those who held positive alcohol expectancies were less likely to use protective behavioral strategies and, as a result, these individuals were more likely to consume greater amounts of alcohol and experience more negative alcohol-related negative consequences. This is an important finding because positive alcohol expectancies have been found to be a significant predictor of problematic drinking (Thompson et al., 2009).

Positive alcohol expectancies may also restrict one's attention to cues salient to the expectancy when drinking and reduce attention to contradictory cues which can increase risky drinking behavior (Labrie et al., 2011). Thus, prevention and intervention initiatives that focus specifically on increasing the use of protective behavioral strategies among those college students who hold positive expectancies about alcohol use have the potential to significantly impact the likelihood of problematic drinking and negative consequences for those students.

Our results also demonstrated that gender does play a role in the strength of the meditational effects of protective behavioral strategy use. Protective behavioral strategies mediated the association that positive expectancies had with alcohol consumption and negative consequences for female college students but not for male college students. More specifically, it appears that male college students are less likely to use protective behavioral strategies regardless of their alcohol expectancies. Multiple factors may explain this finding. It has been well documented that women tend to use more protective behavioral strategies than men (Benton et al., 2004; Delva & Smith, 2004; Walters, Roudsari, Vader, & Harris, 2007). This is consistent with the fact that women are more likely than men to have specific guidelines for safe drinking (e.g. partying in groups; Howard, Griffin, Boekeloo, Lake, & Bellows, 2007). Haines et al. (2006) found that women reported using more social strategies such as 'having a friend let you know when you had too much to drink' than men. Thus, the concern for safety when drinking appears to be far more prevalent among women than men. This may be related to the fact that men often view alcohol consumption as being intimately connected to their manhood (e.g. 'real men drink alcohol'). Differences in protective behavioral strategy use among men and women may be associated with male-gender socialization and that men may view the use of protective behavioral strategies as indicative of weakness or a lack of masculinity (Delva & Smith, 2004). In other words, drinking alcohol may be part of how some men define their masculine identity. The association between alcohol consumption and masculinity may facilitate the connection between beliefs concerning alcohol use and other activities associated with their masculine identities (e.g. aggression). Finally, gender differences in expectations about drinking outcomes may also influence protective behavioral strategy use. For instance, expectations concerning increased sociability (e.g. If I drink alcohol, I will be more talkative) tend to be associated with greater alcohol consumption among women, whereas expectations concerning tension reduction are more prominent for men. However, it remains unclear how these specific expectancies relate to the employment of protective behavioral strategies. Martens et al. (2004) found that the majority of student drinkers regularly use at least one protective strategy when drinking.

In contrast, the gender differences that we found suggest that the benefits observed for women in terms of their alcohol consumption and negative consequences may stem from their use of multiple protective behavioral strategies rather than simply relying on a single strategy.

The use of protective behavioral strategies did not mediate the associations that negative expectancies had with alcohol consumption and negative consequences. We found that negative expectancies had virtually no association with alcohol consumption. Even though negative expectancies were associated with higher levels of negative consequences, protective behavioral strategies did not mediate this association. Nonetheless, these findings are important for prevention and intervention efforts targeting alcohol expectancies. In particular, our results suggest that negative expectancies may not be as influential on drinking behaviors as positive expectancies for college drinkers, which is consistent with the conclusions of previous researchers (e.g. Patel & Fromme, 2010). This suggests that focusing on positive alcohol expectancies may be especially important in future research and intervention efforts.

Our findings have important implications for prevention and intervention efforts with college students. First, our results lend further support to the need for gender specific prevention and intervention efforts targeting alcohol expectancies and protective behavioral strategies (Thompson et al., 2009). Current broad-based prevention efforts may not address issues that differentially influence the drinking behaviors of men and women. For instance, Musher-Eizenman and Kulick (2003) reaffirmed that the expectancy-challenge protocol was ineffective for women and concluded that this result was likely because different types of expectancies are more prominent for men than women. Second, traditional expectancy challenge approaches focus on increasing negative expectancies and reducing positive expectancies (Labbe & Maisto, 2011). Scott-Sheldon et al. (2012) found that expectancy challenges did reduce positive expectancies but noted that the long term effects of these interventions have not been demonstrated. Thus, the researchers suggested that expectancy challenge interventions should be refined to improve long term outcomes. Following this suggestion, expectancy challenge initiatives may be enhanced by helping students understand how these expectancies are associated with protective behavioral strategies and alcohol-related outcomes. For example, the risks associated with positive expectancies can be discussed such as individuals failing to adequately protect themselves. Harm reduction efforts can also emphasize strategies for remaining safe while drinking alcohol as is the case for the Brief Alcohol Screening and Intervention for College Students program (BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999) which has been shown to reduce the negative consequences associated with alcohol

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consumption (Carey, Scott-Sheldon, Carey, & DeMartini, 2007). The role that alcohol expectancies play in drinking behaviors – including the use of protective behavioral strategies – could be discussed including how expectancies may influence one's use of protective strategies. Next, students could engage in developing a plan that facilitates safe drinking. These types of discussion could occur in individual or group settings to maximize resources and promote safe drinking behaviors.

Although our results provide valuable information, these findings should be interpreted in light of the limitations of the study. One limitation of the present work is that our sample was a convenience sample drawn from a single university in the southern region of the United States. This is a potentially important limitation because the southern United States tends to have lower rates of alcohol consumption than other regions of the country (Johnson, O'Malley, Bachman, & Schulenberg, 2009). This suggests that the participants in the present study may represent lower rates of drinking and higher rates of protective strategy use than would have been obtained in a broader sample that included multiple regions of the country. As a result, it is an open empirical question as to whether our results would replicate in other areas of the United States. Similarly, while hazardous drinking may also be high among university students in other countries (Heather et al., 2011; Pegg, Patterson, & Axelsen, 2011) our results may not generalize because of cultural and contextual differences such as the legal drinking age and involvement in sororities and fraternities (Huchting, Lac, Hummer, & LaBrie, 2011; Wechsler & Nelson, 2010). Future studies should attempt to address this limitation through replication with international samples of university students.

A second limitation was that data were collected using self-report measures and may be susceptible to recall errors or social desirability. However, efforts were followed to ensure data accuracy as is standard practice (Scott-Sheldon et al., 2012). A third limitation of the present study is that we had far more female participants than male participants (i.e. 543 women but only 136 men). This gender ratio is less than ideal, but it is not unusual for samples from this particular university and it is representative of the gender composition of this university. It is important to note that even though we had far more female participants, the number of male participants in our study was still relatively large and should have provided adequate power to detect a mediational effect if such an effect existed. A fourth limitation is that our data was correlational in nature. As a result, it is impossible to determine whether alcohol-related expectancies actually lead to the adoption of protective behavioral strategies as suggested by our underlying process model. For example, it is possible that the direction of this effect may be reversed such that the use of protective behavioral strategies influences the expectancies that individuals adopt toward their use of alcohol. Additional research will be necessary to clearly determine the causal links between these variables.

Our results also pointed to several areas that deserve further investigation. One direction for future research may be to examine the degree to which protective strategies mediate the link between specific expectancies concerning alcohol use (e.g. tension reduction, enhanced sexuality) and alcohol-related consequences including specific types of consequences (e.g. unwanted sexual experiences). Additionally, we do not yet have an adequate understanding of the role that specific protective behavioral strategies (i.e. serious harm reduction, limiting/stopping drinking, manner of drinking) play in the associations between alcohol expectancies, consumption, and negative consequences. Another area for future research concerns the connection between gender and protective behavioral strategies (e.g. the role of gender socialization in the employment of protective strategies). For example, we know very little about how the differences in negative consequences experienced by men and women may influence their use of protective behavioral strategies. Finally, research should examine other attitudinal models and social cognitive models that may be related to protective behavioral strategies such as self-determination theory or the theory of planned behavior in order to gain a better understanding of the conditions under which individuals will consume alcohol in a relatively safe manner.

The use of protective behavioral strategies among college students is important for reducing the harm associated with increased consumption during this period of life. Our study contributes additional support for the value of protective behavioral strategies for those who hold positive expectations toward alcohol use. Our results also add support for the importance of harm reduction approaches that are gender specific.

REFERENCES

Aiken, L.S., & West, S.G. (1991). *Multiple regression: Testing and interpreting interactions*. London: Sage.

Araas, T.E., & Adams, T.B. (2008). Protective behavioral strategies and negative alcohol-related consequences in college students. *Journal of Drug Education, 38*, 211–224.

Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.

Benton, S.L., Schmidt, J.L., Newton, F.B., Shin, K., Benton, S.A., & Newton, D.W. (2004). College student

protective strategies and drinking consequences. *Journal of Studies on Alcohol, 65*, 115–121.

Borden, L.A., Martens, M.P., McBride, M.A., Sheline, K.T., Bloch, K.K., & Dude, K. (2011). The role of college students' use of protective behavioral strategies in the relation between binge drinking and alcohol-related problems. *Psychology of Addictive Behaviors, 25*, 346–351.

Carey, K.B., Scott-Sheldon, L.A.J., Carey, M.O., & DeMartini, K.S. (2007). Individual-level interventions to reduce college student drinking: A meta-analytic review. *Addictive Behaviors, 32*, 2469–2494.

Collins, R.L., Parks, G.A., & Marlatt, G.A. (1985). Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology, 53*, 189–200.

Delva, J., & Smith, M. (2004). A study of the relationship between protective behaviors and drinking consequences among undergraduate college students. *Journal of American College Health, 53*, 19–27.

Devos-Comby, L., & Lange, J.E. (2008). Standardized measures of alcohol-related problems: A review of their use among college students. *Psychology of Addictive Behaviors, 22*, 349–361.

Dimeff, L.A., Baer, J.S., Kivlahan, D.R., & Marlatt, G.A. (1999). *Brief Alcohol Screening and Intervention for College Students (BASICS): A harm reduction approach*. New York, NY: Guildford Press.

Edwards, J.R., & Lambert, L.S. (2007). Methods for integrating moderation and mediation: A general analytical framework using moderated path analysis. *Psychological Methods, 12*(1), 1–22.

Fromme, K., Stroot, E., & Kaplan, D. (1993). Comprehensive effects of alcohol: Development and psychometric assessment of a new expectancy questionnaire. *Psychological Assessment, 5*, 19–26.

Haines, M.P., Barker, G., & Rice, R.M. (2006). The personal protective behaviors of college student drinkers: Evidence of indigenous protective norms. *Journal of American College Health, 55*, 69–76.

Hayes, A.F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*, 408–420.

Heather, N., Partington, S., Partington, E., Longstaff, F., Allsop, S., & Jankowski, M. (2011). Alcohol use disorders and hazardous drinking among undergraduates at English universities. *Alcohol and Alcoholism, 46*, 270–277.

Hingson, R., Zha, W., & Weitzman, E. (2009). Magnitude of and trends in alcohol-related mortality and morbidity among US college students ages 18–24, 1998–2005. *Journal of Studies on Alcohol and Drugs, 16*, 12–20.

Howard, D.E., Griffin, M., Boekeloo, B., Lake, K., & Bellows, D. (2007). Staying safe while consuming alcohol: A qualitative study of protective strategies and informational needs of college freshmen. *Journal of American College Health, 56*, 247–254.

Huchting, K.K., Lac, A., Hummer, J.F., & LaBrie, J.W. (2011). Comparing Greek-Affiliated students and student athletes: An examination of the behavior-intention link, reasons for drinking, and alcohol-related consequences. *Journal of Alcohol and Drug Education, 55*, 61–81.

Johnston, L.D., O'Malley, P.M., Bachman, J.G., & Schulenberg, J.E. (2009). *Monitoring the Future national survey results on drug use, 1975–2008. Volume II: College students and adults ages 19–45 (NIH Publication No. 09-7402)*. Bethesda, MD: National Institute on Drug Abuse.

Johnston, L.D., O'Malley, P.M., Bachman, J.G., & Schulenberg, J.E. (2011). *Monitoring the Future national survey results on drug use, 1975–2010. Volume II: College students and adults ages 19–50*. Ann Arbor, MI: Institute for Social Research, The University of Michigan.

Jones, B.T. (2004). Changing alcohol expectancies: Techniques for altering motivations for drinking. In W.M. Cox & E. Klinger (Eds.), *Handbook of motivation counseling: Concepts, approaches, and assessment* pp. 121–138). New York, NY: John Wiley & Sons Ltd.

Kahler, C.W., Strong, D.R., Read, J.P., Palfai, T.P., & Wood, M.D. (2004). Mapping the continuum of alcohol problems in college students: A Rasch model analysis. *Psychology of Addictive Behaviors, 18*, 322–333.

Kenny, D.A., Kashy, D.A., & Bolger, N. (1998). Data analysis in social psychology. In D.T. Gilbert, S.T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (4th ed., pp. 233–265). New York, NY: McGraw-Hill.

Labbe, A.K., & Maisto, S.A. (2011). Alcohol expectancy challenges for college students: A narrative review. *Clinical Psychology Review, 31*, 673–683.

Labrie, J.W., Grant, S., & Hummer, J.F. (2011). 'This would be better drunk': Alcohol expectancies become more positive while drinking in the college social environment. *Addictive Behaviors, 36*, 890–893.

Leeman, R.F., Toll, B.A., Taylor, L.A., & Volpicelli, J.R. (2009). Alcohol-induced disinhibition expectancies and impaired control as prospective predictors of problem drinking in undergraduates. *Psychology of Addictive Behaviors, 23*, 553–563.

Leigh, B.C., & Stacy, A.W. (2004). Alcohol expectancies and drinking in different age groups. *Addiction, 99*, 215–227.

MacKinnon, D.P., Krull, J.L., & Lockwood, C.M. (2000). Equivalence of the mediation, confounding and suppression effect. *Prevention Science, 1*, 173–181.

MacKinnon, D.P., Lockwood, C.M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research, 39*, 99–128.

Madson, M.B., & Zeigler-Hill, V. (in press). Race and gender as moderators in protective strategy use by college drinkers. Manuscript submitted for publication to *Journal of Ethnicity in Substance Abuse*.

Martens, M.P. (2007). Do protective behavioral strategies mediate the relationship between drinking motives and alcohol use in college students? *Journal of Study on Alcohol and Drugs, 68*, 106–115.

Martens, M.P., Ferrier, A.G., Sheehy, M.J., Corbett, K., Anderson, D.A., & Simmons, A. (2005). Development of the protective behavioral strategies survey. *Journal of Studies on Alcohol, 66*, 698–705.

Martens, M.P., Taylor, K.K., Damann, K.M., Page, J.C., Mowry, E.S., & Cimini, M.D. (2004). Protective behavioral strategies when drinking alcohol and their relationship to negative alcohol-related consequences in college students. *Psychology of Addictive Behaviors, 18*, 390–393.

Muller, D., Judd, C.M., & Yzerbyt, V.Y. (2005). When moderation is mediated and mediation is moderated. *Journal of Personality and Social Psychology, 89*, 852–863.

Musher-Eizenman, D.R., & Kulick, A.D. (2003). An alcohol expectancy-challenge prevention program for at risk

college women. *Psychology of Addictive Behaviors, 17*, 163–166.

Patel, A.B., & Fromme, K. (2010). Explicit outcome expectancies and substance use: Current research and future directions. In P. Scheier & P. Scheier (Eds.), *Handbook of drug use etiology: Theory, methods, and empirical findings* pp. 147–164). Washington, DC: American Psychological Association.

Pegg, S., Patterson, I., & Axelsen, M. (2011). Sporting events and the use of alcohol by university students: Managing the risks. *Event Management, 15*, 63–75.

Preacher, K.J., & Hayes, A.F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*, 717–731.

Preacher, K.J., Rucker, D.D., & Hayes, A.F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research, 42*, 185–227.

Ray, A.E., Turrisi, R., Abar, B., & Peters, K.E. (2009). Social–cognitive correlates of protective drinking behaviors and alcohol-related consequences in college students. *Addictive Behaviors, 34*, 911–917.

Scott-Sheldon, L.A.J., Terry, D.L., Carey, K.B., Garey, L., & Carey, M.P. (2012). Efficacy of expectancy challenge interventions to reduce college student drinking: A meta-analytic review. *Psychology of Addictive Behaviors, 26*, 393–405.

Shrout, P.E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7*, 422–445.

Thompson, M.P., Spitler, H., McCoy, T.P., Marra, L., Sutfin, E.L., Rhodes, S.D., & Brown, C. (2009). The moderating role of gender in the prospective associations between expectancies and alcohol-related negative consequences among college students. *Substance Use & Misuse, 44*, 934–942.

U.S. Department of Health and Human Services. (2010). *Health People 2020*. Office of Disease Prevention and Health Promotion. Washington, DC. Retrieved from http://www.healthypeople.gov/2020/default.aspx

Walters, S.T., & Baer, J.S. (2007). *Talking with college students about alcohol: Motivational strategies for reducing abuse*. New York, NY: Guilford Press.

Walters, S.T., Roudsari, B.S., Vader, A.M., & Harris, T.R. (2007). Correlates of protective behavior utilization among heavy-drinking college students. *Addictive Behaviors, 32*, 2633–2644.

Wechsler, H., & Nelson, T.F. (2010). Will increasing alcohol availability by lowering the minimum legal drinking age decrease drinking and related consequences among youths? *American Journal of Public Health, 100*, 986–992.

Williams, J., & MacKinnon, D.P. (2008). Resampling and distribution of the product methods for testing indirect effects in complex models. *Structural Equation Modeling, 15*, 23–51.

Zamboanga, B.L., Schwartz, S.J., Ham, L.S., Borsari, B., & Van Tyne, K. (2010). Alcohol expectancies, pregaming, drinking games, and hazardous alcohol use in a multiethnic sample of college students. *Cognitive Therapy and Research, 34*, 124–133.