High- and Low-Dose Expectancies as Mediators of Personality Dimensions and Alcohol Involvement*

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ABSTRACT. Objective: The present study examined the influences of personality dimensions (extraversion, neuroticism) on college alcohol involvement both (1) directly and (2) mediated by positive and negative alcohol expectancies across two imagined (high and low) alcohol doses. Method: Participants (N = 339; 176 women) were regularly drinking college students who completed a questionnaire battery on demographic characteristics, personality, expectancies, and alcohol use and problems. Results: Structural equation modeling analysis of low- and high-dose models revealed partial support for the Social Learning Theory conceptualization of expectancies as mediators of more distal (personality) influences. Interestingly, patterns of association differed by dose. At high-expectancy doses, positive alcohol expectancies fully mediated the extraversion-use association. At low doses, positive expectancies did not play a critical role. Two distinct pathways from neuroticism to alcohol use were observed: a direct pathway, whereby neuroticism is a protective factor for alcohol use, and an indirect pathway, through positive expectancies, whereby neuroticism is a risk factor. The protective pathway was evident regardless of expectancy doses, whereas the risk pathway was evident only at high doses. Negative expectancies partially mediated the association between neuroticism and alcohol problems at both high- and low-expectancy doses. Conclusions: These data underscore the unique role of both positive and negative expectancies in the association between personality and drinking behavior and point to the importance of considering alcohol dose when assessing expectancies. Findings suggest that it may be beliefs about the effects resulting from heavy (rather than moderate) drinking that may be the active mechanism underlying drinking behavior. (J Stud Alcohol 67: 204-214, 2006)

HEAVY DRINKING IN COLLEGE IS associated with numerous consequences (e.g., Abbey, 2002; Donovan and McEwan, 1995; Perkins, 2002; Scott et al., 1999) and is a significant problem on U.S. college campuses. Examinations of factors that may influence drinking outcomes will help to elucidate mechanisms of action underlying drinking in this population and may inform preventive interventions.

Personality dimensions and alcohol involvement

Myriad influences have been implicated in the etiology of problem drinking. Among the most prominent of these is personality (e.g., Cloninger et al., 1988; Pihl and Peterson, 1995; Sher and Trull, 1994; Sher et al., 1999, 2000). Personality may be particularly important during early adulthood, and it has been suggested that investigation of personality during this developmental period may facilitate understanding of “the larger social-developmental context” (Sher et al., 1999, p. 91) of young adults.

Affect regulation is a central motivation for alcohol use (Cox and Klinger, 1988; Lang et al., 1999). Thus, it is not surprising that dimensions of personality pertaining to emotionality have been linked to heavy drinking in college students (Martsh and Miller, 1997; O’Connor and Colder, 2005) and other populations (Cloninger et al., 1988; see Pihl and Peterson, 1995; Sher and Trull, 1994, for reviews). For individuals high on negative emotionality, alcohol may serve as a negative reinforcement to the extent that it relieves (or is believed to relieve) negative affect. For those high on positive emotionality, alcohol may be positively reinforcing, providing stimulation or new sensations and evoking or enhancing a positive mood. In college students, positive emotionality has been shown to be a risk factor for drinking (Colder and O’Connor, 2002; Finn et al., 2000; Henderson et al., 1994; Martsh and Miller, 1997; Read et al., 2003). In addition to direct influences, personality also may affect drinking indirectly, via more proximal influences (e.g., alcohol-relevant cognitions; Goldman et al., 1999; Maisto et al., 1981).

Cognitive factors

According to cognitive and social learning theories, cognitions about alcohol and its effects (i.e., alcohol expectancies) have a direct influence on drinking behavior (see Christiansen et al., 1982; Connors et al., 1986; Leigh, 1989) and, in particular, are strong predictors of college drinking behavior (Brown, 1985; Fromme and Dunn, 1992; Sher et al., 1996). Positive alcohol expectancies pertain to the
beneficial effects of drinking. There has been a tendency in the expectancy literature to focus on positive expectancies (see Leigh and Stacy, 1993), possibly because anticipated positive outcomes from drinking may be more temporally immediate and thus more salient in guiding behaviors (e.g., Leigh and Stacy, 1998; Stacy et al., 1990). Yet, at least some data point to the potential etiological importance of negative expectancies (beliefs about negative outcomes from drinking; Lee et al., 1999; Leigh and Stacy, 1993, 1994; McCarthy et al., 2001).

Alcohol expectancies have also been shown to vary according to dose of alcohol (Earleywine and Martin, 1993; Guarna and Rosenberg, 2000; Wiers et al., 1997). Previous research shows, for example, greater expectations for the effects (both positive and negative) of alcohol at higher doses than at lower doses (Earleywine and Martin, 1993; Guarna and Rosenberg, 2000). It may be that these dose-related expectations exert more of an influence on drinking. To date, this has not been tested empirically.

**Hypothesized pathways to alcohol use and problems: Cognitive mediation**

Cognitive and Social Learning theories posit a mediated pathway, through which more distal factors may influence drinking by way of more proximal cognitive factors. In the case of personality influences, a dispositional inclination toward either negative or positive emotionality may lead to the development and nurturance of particular belief systems about alcohol that are consistent with that personality style, and the cognitive beliefs subsequently lead to drinking behavior. An individual higher on extraversion and prone to positive emotionality, for example, would be more likely to develop and nurture beliefs about alcohol’s ability to stimulate or enhance positive emotion, leading to more drinking. Those whose personality tends more toward neuroticism/negative emotionality, conversely, would theoretically be more likely to hold beliefs that alcohol will reduce or inhibit negative affect and would be more likely to drink for this reason.

Some empirical evidence offers support for theorized associations among emotionality personality dimensions, positive expectancies, and drinking. Studies by Henderson et al. (1994) and Finn et al. (2000) found positive expectancies to partially mediate associations between positive emotionality and drinking in young adult samples. In two studies, McCarthy and colleagues (2001) examined mediation by positive expectancies of the personality-drinking association in undergraduate samples and found expectancies to mediate the association between neurotic extraversion (conceptualized as disinhibition) and drinking for men but not for women.

Examination of negative expectancies in the context of personality may help shed light on their association with drinking behavior, as certain individuals may be predisposed to be more or less affected by anticipation of negative drinking outcomes. The relation between negative expectancies and alcohol involvement only very seldom has been examined in this context (e.g., Galen et al., 1997), and to our knowledge no studies have examined the mediating role of negative expectancies.

Although a fairly extensive literature has examined associations between personality and drinking, and between expectancies and drinking, a number of issues remain unresolved. Few studies have examined both positive and negative emotionality personality dimensions within a single model, for example. Moreover, the mediating effects of positive and negative expectancies, and the ways these expectancy types may be uniquely linked to personality dimensions, have not been examined. Only a handful of studies have examined dose differences in alcohol expectancies (e.g., Earleywine and Martin, 1993; Fromme et al., 1993; Guarna and Rosenberg, 2000; Wall et al., 2000; Wiers et al., 1997, 2000). No studies have examined how associations among personality and cognitive factors and alcohol involvement may differ according to perceived dose of alcohol. The purpose of the present study was, therefore, to examine the influences of personality dimensions on alcohol use and problems, both directly and mediated by positive and negative expectancies across two imagined doses of alcohol. Further, as some empirical and theoretical literature suggests a negative affectivity pathway to problem drinking (e.g., Cooper et al., 1995; Lang et al., 1999), we also sought to test the direct association between neuroticism and alcohol problems as well as the indirect association through negative expectancies, controlling for alcohol use.

**Method**

**Participants**

Participants were students enrolled in introductory psychology classes at a midsized university in the northeast United States. Those with a substantial amount of missing data on variables of interest were not retained for the analyses, leaving a total of 339 subjects (176 women). The majority of participants (285; 84%) were white. Just over half (195; 58%) were freshmen, and the average (SD) age was 19 (1.4). To be eligible for the study, participants had to be regular drinkers (having consumed alcohol at least once weekly for the past 3 months).

**Procedure**

Participants were screened via a mass-testing procedure that took place in the first week of the semester. The vast majority of university introductory-psychology students participated in this screening, which included questions about
the frequency of alcohol consumption. Those who met criteria for “regular drinking” were then contacted by email and invited to participate in the study. Experimental sessions were conducted in groups of 10-20 mixed-gender participants. Informed consent was obtained at the beginning of each session. Participants received academic credit for their participation.

Measures

Demographic information. Demographic data gathered in this assessment battery were gender, age, ethnicity, year in school, work and residential status, grade-point average, and affiliation with a fraternity or sorority.

Alcohol consumption. A range of alcohol-use behaviors was assessed. As substantial variability in college-drinking patterns (even over the course of a single academic year) has been noted (e.g., Del Boca et al., 2004; Greenbaum et al., 2005), both past-90-day and past-30-day averages were assessed, to form more reliable indices of drinking. These measured typical quantity and frequency of alcohol consumption, average frequency of heavy drinking, average weekly frequency of drinking to light-headedness, and average weekly frequency of drunkenness. Responses to the quantity and frequency items were multiplied separately for 90- and 30-day contexts, forming a single composite measure of use during the past 90 days and the past 30 days. Averaging across 30- and 90-day reports, mean (SD) responses to the composite quantity by frequency, and frequency of heavy drinking, average weekly frequency of drinking to light-headedness, and average weekly frequency of drunkenness were calculated for each scale. For the current sample, mean extraversion and neuroticism scores were 3.57 (0.98), 4.35 (1.06), and 4.51 (1.07), respectively, for men. Values of 4 on the latter three measures indicate engagement in that behavior “1-2 times a week”; thus, the data suggest that this is a sample that drinks regularly, if not heavily.

Prior to questionnaire administration, the term “standard drink” was operationalized (1 oz of distilled spirits, 6 oz of wine, 12 oz of beer) and specific examples were given (e.g., how a mixed-drink, a “party” tumbler of beer, or a “shooter” would be categorized). Participants were asked to think of their drinking in the measurement terms described, as they completed the questionnaire battery. They also were instructed to ask research assistants any questions they had pertaining to quantification of alcohol consumption.

Alcohol consequences: Young Adult Alcohol Consequences Questionnaire (YAAQ). The YAAQ is a 67-item, self-report measure of alcohol-associated consequences (Kahler et al., 2005; Read et al., 2006). Items assess the following domains of consequences that occurred in the past year: interpersonal consequences, academic/occupational consequences, risky behavior, impaired control, poor self-care, diminished self-perception, blackout drinking, and physiological dependence. Response options were rated dichotomously (yes/no; see Kahler et al., 2004). Coefficient α for this measure was .90 in this sample.

Alcohol expectancies. The expectancy measure was designed to assess a broad range of positive and negative beliefs about alcohol. Participants were given a list of 132 expectancy words, derived from previous work by Goldman and colleagues (see Dunn and Goldman, 1996; Goldman and Darkes, 2004; Rather et al., 1992). Each word was preceded by the stem phrase orienting the participant to lighter and heavier imagined doses of alcohol. Questionnaires for men and women differed on these expected doses; women’s questionnaires asked about “two” and “four or more” drinks, men’s asked about “three” and “six or more” drinks. Thus, each participant completed the following stem sentences for all 132 expectancy words: “Drinking 2/3 drinks makes me __,” and “Drinking 4/6 or more drinks makes me __.” Each item was rated on a 7-point scale with response options ranging from “never” to “always.”

Personality dimensions. The 44-item, self-report Big Five Inventory (BFI) was developed by John et al. (1991) and was used in this study to assess personality dimensions of interest. Items consist of short phrases based on trait adjectives that assess prototypical features of each personality dimension. In the present study, the extraversion (eight items; e.g., “I see myself as someone who … is talkative”) and neuroticism (8 items; e.g., “I see myself as someone who … can be tense”) scales were used. Response options ranged from 1 (disagree strongly) to 5 (agree strongly). Mean scores were calculated for each scale. For the current sample, mean extraversion and neuroticism scores were 3.57 (0.69) and 2.55 (0.73), respectively, for men; and 3.90 (0.65) and 2.97 (0.71), respectively, for women. Alphas for the extraversion and neuroticism scales were .84 and .81, respectively, in this sample.

Data analytic overview

There were two primary stages of the analyses: (1) measurement model identification, and (2) pathanalytic hypotheses testing. As our personality measures were derived from a well-validated and reliable questionnaire, and the measure of alcohol problems was adapted from two psychometrically established questionnaires, manifest variables for neuroticism, extraversion, and alcohol-use problems were included in all models. Latent factors represented multiple dimensions of use and positive and negative expectancies at high and low doses—crucial given the absence of established measures of these dimensions by dose.

Measurement model. The first step was identification of the factor structure of positive and negative alcohol expectancy items at high and low dose. To this end, an exploratory
factor analysis (EFA) was conducted. In an effort to identify unambiguous factors, only those items with factor loadings $> .32$ (substantial loading; Comrey and Lee, 1992; Tabachnick and Fidell, 2001) at both high and low doses were included in further analyses. The 30 items (15 positive and 15 negative) that had high loadings across doses and could be supported conceptually as indicators of the identified positive and negative factors were included in the final model. Nested covariance models were conducted to confirm the comparability of the models across doses.

The second step was the identification of the measurement model. Three latent factors were of interest: Alcohol Use, and Positive and Negative Expectancies. Use and expectancy items were parcelled to prevent artifactual decrement in model fit (Kline, 1998). Alcohol-use items (quantity-frequency composite, heavy use, drunkenness, light-headedness) were parcelled across mean 90- and 30-day assessments. The 15 positive and 15 negative expectancy items resulting from the EFA also were parcelled into two sets of five randomly grouped, 3-item parcels, consistent across high and low dose. The three latent factors and three manifest variables (alcohol problems, neuroticism, extraversion) were included in a fully saturated covariance (measurement) model that was tested once each with high- and low-dose expectancy factors.

Prior to our path analyses, we tested a series of three nested-measurement models that included high- and low-dose expectancies, as well as personality variables and alcohol outcomes, to compare the magnitude of relations between high- and low-dose expectancies with antecedent and outcome variables.

**Path analyses**. Following evaluation of the measurement models (Anderson and Gerbing, 1988) and examination of covariance structures to compare expectancy factors across doses, two mediational models were tested at high and low imagined alcohol doses. Each included two exogenous, manifest personality variables (extraversion, neuroticism), putative latent mediators (positive and negative expectancies), and one latent (alcohol use) and one manifest (alcohol problems) endogenous variable. We modeled the influences of extraversion and neuroticism on use directly and indirectly, and on alcohol problems directly (for neuroticism) and indirectly (via expectancies and use). Given our interest in the link between neuroticism and problems, direct paths were estimated from neuroticism to problems and from negative expectancies to problems. No direct extraversion-problems path was estimated.

**Gender invariance**. The relationship between alcohol expectancies and drinking has been shown to differ for men and women (e.g., Rather et al., 1992, Read et al., 2004). Thus, we examined gender invariance (i.e., differences in model fit across gender) of our mediated models in a sequential, four-step process, with additional parameters constrained to be equal across gender at each step (Kline, 1998). Consistent with Bollen and Bollen (1989), the model form across gender was tested first, followed by tests of invariance of factor loadings, path coefficients, factor covariances and variances, and, last, error variances.

**Model specification and fit evaluation.** All models were estimated from covariance matrices using a maximum-likelihood estimation procedure. Model fit for each of the structural equation models (SEM) was evaluated with multiple criteria (Byrne, 2001; Kline, 1998) using omnibus chi-square tests, Goodness of Fit Index (GFI), Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). Based on Hu and Bentler’s (1999) criteria, the CFI should be greater than .95 and the RMSEA less than .06. Kline (1998) and Hu and Bentler (1995) suggest that the GFI should be greater than .90. A $\chi^2$/df ratio of 3.0 is considered to be good (Kline, 1998).

Measurement and hybrid models were run with SAS software Version 9.0 (SAS Institute Inc., Cary, NC). Multigroup analyses of gender invariance were conducted with Mplus Version 3.01 (Muthén and Muthén, 2004).

**Results**

**Measurement model**

**EFA of expectancies.** The Kaiser-Guttman Rule (Tabachnick and Fidell, 2001) suggested a two- or three-factor solution. Examination of standardized loadings for both the two- and three-factor models (promax rotation) at high and low doses suggested that the three-factor solution provided a better fit to the data. The three distinct factors revealed were interpreted as a Positive Arousal Expectancy factor, a Negative Arousal Expectancy factor, and a Sedation Expectancy factor. Items loading on this Sedation factor were positively and negatively valenced sedation items (e.g., “drowsy,” “giddy,” “irresponsible,” “woozy,” and “stumble”). This factor was not included in structural model testing for several reasons. First, this factor is consistent with the “Sedating/Sleepy” factor that Goldman and Darkest (2001) identified using multidimensional scaling with the 132 expectancy words employed in the current study. These authors found their “Sleepy” factor to be a nonsignificant prospective predictor of drinking. In addition, subsequent examination of this factor indicated that this construct was not equivalent across doses, as the items loading on it were quite different from one another at high and low doses, unlike the positive- and negative-arousal items (see below).

Last, we viewed the Positive and Negative Arousal Expectancy factors yielded from our factor analysis to be most conceptually relevant to the personality constructs of interest in this study. Therefore, we retained only the positive- and negative-arousal expectancies in model testing. These constructs are referred to henceforth as “positive and negative expectancies.”
First, to identify unambiguous factors, only those items that loaded substantially on the two chosen factors at both high and low dose were maintained. Next, only those 15 items that loaded highly and could be supported conceptually as indicators of the respective positive and negative factors, at both doses, were identified (see Table 1 for items and loadings). The correlation between high and low positive expectancies was .48, and between high and low negative expectancies .75 (p’s < .001). The positive-negative expectancies correlation was .32 at high dose and .30 at low dose (p’s < .001).

Factor structure across doses. To confirm the similarity of the factor structure of the model across doses, we tested two covariance models that included personality variables, high- and low-dose expectancies, and alcohol outcomes. The first covariance model was a fully unconstrained model, with all covariances estimated freely. The second model constrained factor loadings to be equal across doses. The factor structure of the expectancies factors was essentially the same, with all item parcels loading strongly and significantly on their latent expectancy factors at .77 or higher (all p’s < .01). A χ2 difference test (Δχ2 = 22.54, 8 df, p < .01) revealed slight differences in the magnitude of factor loadings for the Negative Expectancies factor such that the third item parcel, which consisted of the expectancy words “aggressive,” “mad,” and “nasty,” loaded more strongly on the high-dose factor than they did on the low-dose factor. When this item parcel loading was allowed to vary across doses, models were fully equivalent.

Full measurement model. Tests of the measurement models supported the underlying factor structure of our models. Both the high-dose (χ2 = 274.26, 107 df, p < .001) and the low-dose (χ2 = 281.72, 107 df, p < .001) measurement models showed good fit to the observed data, with CFI indices above .95, GFI indices above .90, RMSEA less than .07, and χ2/df ratio less than 3.0. Furthermore, good fit of both measurement models was supported by standardized factor loadings that were all greater than .60.

Examination of covariance structures for low- and high-dose expectancies

To compare the magnitude of associations between high- and low-dose expectancies with antecedent and outcome variables, we tested a series of three nested-measurement models for high- and low-dose expectancies, personality variables, and alcohol outcomes.

In the first model, covariances between expectancy and personality variables, and expectancy and alcohol outcomes were freely estimated (χ2 = 597.79, 289 df). In the second model, the covariances between high-dose expectancies and alcohol outcomes were constrained to be equal to the covariances between low-dose expectancies and alcohol outcomes. Covariances between expectancies and personality variables were freely estimated. The nested chi-square test of this model (Δχ2 = 55.33, 4 df, p < .05) suggested that covariances differed significantly across expectancy doses. Alcohol use was more strongly associated with positive (r = .37) and negative (r = .13) expectancies at higher doses than at lower doses (r’s = .06 and .01, respectively). This pattern was similar for the expectancies-problems association (r’s for positive and negative expectancies at high doses = .22 and .34, and at low doses = .02 and .17, respectively).

Next we constrained covariances between personality and high- and low-dose expectancies to be equal. The nested chi-square difference test (Δχ2 = 9.1, 4 df) revealed the covariances for high- and low-dose expectancies to be similar. Overall, these results suggest that expectancy dose affects how expectancies relate to alcohol outcomes but not how personality variables relate to expectancies.

With the relative contribution of high- and low-dose expectancies to alcohol outcomes established within a nested-model framework, the next step was to test our mediational hypotheses. Given the complexity of these models, mediation at high and low doses was tested separately, as described below.
Mediated Model 1: High-dose expectancies

High-dose overall model fit. Overall fit of this model was good ($\chi^2 = 283.08, 110$ df, $p < .001$), with a CFI of .96, GFI of .91, RMSEA less than .07, and $\chi^2$/df ratio = 2.57. Extraversion was positively and significantly associated with positive expectancies ($\beta = .21, p < .001$), which were, in turn, associated with use ($\beta = .35, p < .001$), which was associated with problems ($\beta = .49, p < .001$). Neuroticism showed a similar pathway to use and problems (see Figure 1) through positive expectancies (neuroticism-positive expectancies; $\beta = .12, p < .05$). Although neuroticism was significantly and positively related to negative expectancies ($\beta = .25, p < .001$), the negative expectancies-use path was not significant. It is interesting to note that neuroticism was associated with alcohol problems both directly ($\beta = .14, p < .01$) and indirectly, via negative expectancies ($\beta = .24, p < .001$) and use. In addition, neuroticism was negatively related to use ($\beta = -.18, p < .01$). In this model, 17% of the variance in alcohol use and 34% in alcohol problems was explained.

High-dose model mediational analyses. Mediational analyses were conducted using Sobel’s method (1988), which allows for testing the significance of indirect effects. In the high-dose model we found evidence for full mediation of the relationship between extraversion and alcohol use by positive expectancies, as the indirect path from extraversion to alcohol use is significantly different from zero ($z = 3.25, p < .01$), whereas the direct path from extraversion to use is not significantly different from zero. The indirect path accounts for 56.95% of the shared variability between extraversion and use. The results support partial mediation by positive expectancies of the neuroticism-use association (accounting for 18.21% of shared variability), as both the direct neuroticism-use path, and the indirect path through positive expectancies ($z = 2.03, p < .05$) differed significantly from zero. The association between neuroticism and alcohol-related problems was also of interest. As the direct effect of neuroticism on problems was significant, we tested partial mediation. Two mediated paths were supported, one through negative expectancies only ($z = 3.32, p < .01$), and one through alcohol use only ($z = -2.94, p < .01$). The former pathway accounted for 19.11% of the shared variance between neuroticism and problems, whereas the latter pathway, via use, accounted for 27.93%. The data also suggested that an indirect path via both positive expectancies and alcohol use was important, although the significance of this path cannot be assumed, as there is no analytical technique to test for two mediators simultaneously. This indirect pathway did, however, account for 6.73% of the shared variance between neuroticism and problems.

Mediated Model 2: Low-dose expectancies

Low-dose overall model fit. The overall fit of the low-dose model was good ($\chi^2 = 294.22, 110$ df, $p < .001$). The CFI was .96, the GFI was .90, and the RMSEA was .07. The $\chi^2$/df value was 2.67. As depicted in Figure 2, extraversion was positively and significantly associated with positive expectancies ($\beta = .15, p < .01$). Positive expectancies were not significantly associated with use in this model, however. In this model, extraversion showed a significant and positive direct association with alcohol use ($\beta = .13,$

![Figure 1](image-url)
and alcohol use was significantly and positively associated with alcohol problems ($\beta = .54, p < .001$). Findings for neuroticism were similar, with a significant positive association with both positive ($\beta = .16, p < .01$) and negative ($\beta = .25, p < .001$) expectancies, but neither expectancy type demonstrating significant associations with alcohol use. As in the high-dose model, neuroticism was associated with alcohol problems both directly ($\beta = .17, p < .001$) and indirectly, through negative expectancies ($\beta = .13, p < .01$) and alcohol use. Again, the neuroticism-alcohol use association was negative ($\beta = -.13, p < .05$). Four percent of the variance in alcohol use and 31% of the variance in alcohol problems was explained.

**Low-dose model mediational analyses.** As neither positive nor negative expectancies demonstrated significant associations with alcohol use, there was no mediated pathway between extraversion and neuroticism to alcohol use. Support was found for partial mediation by both negative alcohol expectancies only ($z = 2.27, p < .05$) and alcohol use only ($z = -2.08, p < .05$) in the association between neuroticism and problems. The indirect path via negative expectancies accounts for 12.03% of the shared variability between neuroticism and problems, whereas the path via use accounts for 24.74% of the shared variability.

**Gender invariance**

At high and low doses, the form of the model appeared to adequately fit the data for both men and women, as indicated by CFIs of .94 or greater, RMSEAs all less than .08, and $\chi^2$/df ratios all below 2.1. There was not a significant decrement in model fit when factor loadings were constrained to be equal, compared with the fully unconstrained model (high: $\chi^2_{\text{diff}} = 5.31, 11 \text{ df};$ low: $\chi^2_{\text{diff}} = 4.43, 11 \text{ df};$ $p$’s > .10). The addition of path coefficients constrained to be equal across gender (high: $\chi^2_{\text{diff}} = 14.39, 10 \text{ df};$ low: $\chi^2_{\text{diff}} = 13.89, 10 \text{ df}$), and the further addition of constrained factor variances and covariances (high: $\chi^2_{\text{diff}} = 5.22, 7 \text{ df};$ low: $\chi^2_{\text{diff}} = 7.96, 7 \text{ df}$), did not show significant decrements in fit (all $p$’s > .10). This evidences gender invariance across factor loadings, path coefficients, and factor variances and covariances. The addition of constrained error variances did result, however, in a significant decrement in model fit (high: $\chi^2_{\text{diff}} = 36.70, 14 \text{ df};$ low: $\chi^2_{\text{diff}} = 32.35, 14 \text{ df};$ $p$’s < .01), suggesting error variability to be variant across gender.

**Discussion**

The purpose of this study was to examine specific mediational processes in associations between personality and expectancy factors, and alcohol involvement, across two perceived doses of alcohol. Alcohol expectancies, in particular, have been posited to serve as a mediational pathway, through which more distal psychosocial factors exert their influence (Cox and Klinger, 1988; Goldman et al., 1999; Maisto et al., 1981, 1999). Our data offer at least partial support for this conceptualization.

Extraversion was a risk factor for alcohol involvement. It is interesting to note that positive expectancies fully accounted for the influence of extraversion on alcohol involvement at high doses but did not play a crucial role at
low doses. This suggests a process by which individuals higher on extraversion may attend to or view as salient the positive effects of high doses of alcohol, thus leading to increased alcohol involvement.

The findings regarding the link between neuroticism and alcohol involvement are more complex. There appear to be two distinct pathways from neuroticism to use. One is a direct pathway, in which neuroticism serves as a protective factor and is evident regardless of expectancy dose. The other pathway is indirect, via positive expectancies, with neuroticism as a risk factor. This was evidenced in the high-dose model, in which we found partial mediation by positive expectancies of the neuroticism-use association.

We also observed both direct and indirect pathways between neuroticism and problems. The significant, direct path from neuroticism to problems in these models suggests that individuals higher on neuroticism are at greater risk for alcohol problems, regardless of levels of use. Another possible interpretation of this finding is that individuals high on neuroticism may be particularly attentive to, and thus more likely to report, negative experiences resulting from alcohol. Of the three observed indirect pathways from neuroticism to problems, two suggest that neuroticism is associated with greater risk for problems. First, at high dose only, we found that those who are higher on neuroticism may have greater positive expectations for alcohol’s effects, and this in turn leads to heavier use and, thus, increased consequences. A second pathway, supported at both high and low doses, is through negative expectancies. Here, individuals high on neuroticism identify the negative impact of alcohol consumption, which in turn is related to increased problems. Use is not a mediating factor in this pathway. As with the direct pathway, this pathway via negative expectancies may be a result of these individuals’ overvaluation of, and attention to, the negative expectations of alcohol’s effects, co-occurring with the tendency to attend more to negative outcomes. The third indirect pathway from neuroticism to problems is protective, with greater neuroticism leading to less use and thus to fewer problems.

In addition to supporting the importance of positive expectancies as proximal predictor of alcohol use, these data also shed light on the influence of negative expectancies. Consistent with past findings (Lee et al., 1999; Leigh and Stacy, 1993; McCarthy et al., 2001), we found negative expectancies to be a weaker predictor of alcohol use than positive expectancies. By distinguishing between problems and use, however, we were able to elucidate the role of negative expectancies, which, at both high and low imagined doses, partially mediated the path between neuroticism and problems. We found relations between negative expectancies and problems but not use. This is in contrast to McCarthy et al. (2001), who found a significant association between negative expectancy and use but not problems. This discrepancy may be accounted for by measurement; our Negative Expectancies factor consisted of negative arousal expectancies, whereas McCarthy et al. assessed a range of negative expectancies. Another possibility is that associations among these variables look different in the context of a multivariate model.

Findings from both our covariance and path-analytic models suggested patterns of association differed for high- and low-dose expectancies. This difference was most evident in the mediational role played by alcohol expectancies. In the high-dose model, positive expectancies played a prominent mediating role, through which both extraversion and neuroticism influenced alcohol use. This was not the case in the low-dose model. This suggests that it is beliefs about the effects resulting from heavy (rather than moderate) drinking that may be the active mechanism underlying drinking behavior. For interventions that seek to modify drinking behavior by altering drinking beliefs (e.g., Corbin et al., 2001, Darke and Goldman, 1993, 1998) it may be most appropriate, therefore, to target positive expectations for heavy drinking, rather than for drinking in general.

In both high- and low-dose models, neuroticism was negatively associated with use but positively associated with problems. This was unexpected, as it seemed likely that individuals high on neuroticism would be more attentive to, and thus would endorse, higher levels of negative expectancies, leading them to drink less and to experience fewer alcohol consequences. In both models, neuroticism was indeed linked to higher negative alcohol expectancies as well as to less use (though not mediated through expectancies). Yet the positive relation between both neuroticism and negative expectancies and problems is perplexing. One explanation may be the previously noted attentional bias to negative alcohol outcomes by those higher on neuroticism. This finding may also be viewed in the context of literature suggesting that social factors figure prominently in alcohol use in college students (Neighbors et al., 1999; Read et al., 2003; Stewart, et al., 1996), whereas problems may be more likely to center on psychological adjustment factors. Another possible explanation is the direction of association among expectancy and drinking variables. Previous data show bidirectional associations between expectancies and drinking outcomes. As these data are cross-sectional, the positive association we observed in our model between negative expectancies and alcohol problems may reflect what students who have experienced alcohol consequences have learned about drinking (e.g., that it makes them feel belligerent, aggressive, reckless, etc.).

We found no evidence of gender invariance in either high- or low-dose models. This suggests that the observed direct and mediated associations were consistent across male and female students in this sample. McCarthy et al. (2001) reported positive expectancies to mediate the association between disinhibition and drinking for men but not for
women. Differences in the measurement of personality constructs of interest may account for discordant findings regarding gender. Conceptualizations of extraversion and similar constructs (e.g., behavioral undercontrol, sensation-seeking, impulsivity) vary widely in the substance use and other literatures. In their study, McCarthy et al. examined a construct that subsumed both positive (sociability, activity, optimism) and negative (emotional reactivity) emotionality dimensions and was viewed by these authors as representing behavioral undercontrol. This is in contrast to our study, in which extraversion was operationalized and measured as originally described by John and Srivastava (1999), encompassing a dispositionally based inclination toward positive emotionality and sociability. The divergence of findings between the present study and those of McCarthy et al. may, among other things, underscore the fact that different conceptualizations of positive emotionality dimensions of temperament show different associations with both mechanistic (i.e., mediating) and outcome variables.

Conclusions from this study should be considered in the context of its limitations. Among the most significant of these is that models were tested with cross-sectional data. Although pathways tested here (whereby personality dimensions precede the development of alcohol expectancies, which in turn influence drinking behaviors) certainly are plausible, other temporal ordering and dynamic associations also are possible. Indeed, as noted, rather than expectancies influencing drinking in a linear fashion, the expectancy-drinking relation may be better described as reciprocal (Sher et al., 1996; Smith et al., 1995). The cross-sectional nature of our data precludes testing such reciprocal pathways, and makes the determination of any type of temporal ordering among variables impossible to test empirically.

In this study, expectancy factors were initially identified with an EFA, the results of which did not support a positive sedation/stress-reduction factor. The literature regarding the extent to which young adults drink to alleviate stress reveals mixed findings (Bradizza et al., 1999; Kassel et al., 2000; MacLean et al., 1999; Read et al., 2003; Stewart et al., 1996). Our EFA adds to this equivocal literature, and suggests that expectancies for stress reduction from drinking were not central for this sample. Still, the absence of a tension reduction expectancy factor in our models leaves questions unanswered about how such expectancies may mediate personality risk for alcohol involvement.

The two expectancy factors supported by the EFA were then defined by those items that loaded strongly at high as well as low doses, as this approach allowed us to examine the same beliefs in two different imagined drinking contexts. Factor-structure comparison across doses suggested that expectancy items loaded according to the same pattern and, with one exception, at the same magnitude, across doses. A limitation of this approach is that it precludes exploration of how different expectancy types may be more or less relevant at different doses. A direction for future research may be to construct expectancy factors based solely on the highest-loading expectancies at each dose and to examine associations among these different dose factors.

Despite these limitations, this study provides an empirical test of theorized associations among personality and expectancy influences and drinking behavior. Further, the examination of these pathways at different imagined doses of alcohol adds information about the perceived effects of alcohol, based on amount consumed, that has not previously been examined in the literature. Findings also may be used in tailoring preventive interventions. A focus on expectations for heavy, rather than moderate, drinking may more effectively alter drinking behaviors.

Acknowledgments

The authors gratefully acknowledge Melissa Beattie, Shannon Leffler, Tim Olewniczak, Jason Oliver, Preetaal Karecha, Brenda Thapa, and Emily Watts for their help with data collection; Craig Colder for statistical consultation; and Danielle Sirianni Molnar for her contributions to early work on this article.

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