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Alcohol expectancies, conduct disorder and early-onset alcoholism: negative alcohol expectancies are associated with less drinking in non-impulsive versus impulsive subjects

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Abstract

Aims—Research suggests that positive alcohol expectancies promote excessive alcohol use while negative alcohol expectancies discourage excessive alcohol use. Evidence suggests that disinhibitory characteristics, such as conduct disorder and impulsivity, are associated with a general neglect of long-term negative outcomes. This study assessed whether negative expectancies would be associated more strongly with lower levels of alcohol use for low- compared with high-impulsive individuals.

Design—Positive and negative alcohol expectancies, alcohol use and impulsivity were assessed in a sample of 99 young adults with alcohol dependence (AD) and conduct disorder (CD), 77 with AD and no CD and 124 controls.

Findings—AD/CD subjects had higher proximal (same day) and distal (next day) negative alcohol expectancies, even though they drank more alcohol, compared with AD-alone and control subjects. Distal negative expectancies were associated more strongly with lower levels of drinking for low-impulsive compared with high-impulsive subjects. Proximal negative expectancies were associated more strongly with higher alcohol consumption for high- versus low-impulsive subjects.

Conclusions—Impulsivity and conduct disorder may be important factors in determining how much distal negative alcohol expectancies may discourage excessive alcohol consumption.

Keywords

Alcohol; alcoholism; expectancies; impulsivity

INTRODUCTION

People's expectations about how alcohol will affect them are associated with how much they drink and the number of alcohol-related problems they have experienced (Brown, Goldman & Christiansen 1985; Mann *et al.* 1987; Stacy, Widaman & Marlatt 1990; McMahon & Jones 1993; Wood, Sher & Strathman 1996; Finn *et al.* 2000). The expectations that drinking alcohol will result in desirable outcomes, called positive alcohol expectancies, are thought to promote increased alcohol use (Brown *et al.* 1980; Brown *et al.* 1985). Higher positive alcohol expectancies have been associated with higher levels of current drinking (Brown *et al.* 1985; Mann *et al.* 1987; Sher *et al.* 1991; Webb *et al.* 1993; Henderson *et al.* 1994; Finn *et al.* 2000), higher levels of future alcohol involvement in prospective studies (Bauman *et al.* 1985; Christiansen *et al.* 1989; Stacy *et al.* 1990; Smith *et al.* 1995; Sher *et al.* 1996) and a

greater likelihood of relapse for post-treatment problem drinkers (Connors, O'Farrell & Pelcovits 1988).

The expectations that alcohol consumption will result in undesirable outcomes, called negative alcohol expectancies, are thought to discourage alcohol consumption (Ludwig 1985; Leigh 1987; Sharkansky & Finn 1998). Negative expectancies have been associated with lower levels of alcohol use (Kilbey, Downey & Breslau 1998; Leigh 1989; Weirs *et al.* 1997; Sharkansky & Finn 1998), a lower likelihood for relapse after treatment (Eastman & Norris 1982; Jones & McMahon 1994), and reasons to stop excessive drinking in remitted problem drinkers (Ludwig 1985; Amodeo & Kurtz 1990). However, in other studies, high negative expectancies have been associated with heavy drinking (e.g. Mann *et al.* 1987; McMahon, Jones & O'Donnell 1994). Still other studies report no association between negative expectancies and alcohol use (Southwick *et al.* 1981; Fromme *et al.* 1993).

The precise reasons for the inconsistencies in the association between negative expectancies and levels of alcohol use are not clear. Some suggest that the association between negative expectancies and drinking may vary by population (e.g. problem versus non-problem drinkers, treatment versus non-treatment samples, etc.), by dose and by time-course, such as proximal (same-day) and distal (next day) consequences (McMahon *et al.* 1994; Weirs *et al.* 1997). McMahon *et al.* (1994) proposed that high negative expectancies are associated mainly with problem drinking, because problem drinkers accumulate many negative experiences, while negative expectancies are either absent or inoperative for light drinkers. However, McMahon *et al.* (1994) also note that in treatment samples or in heavy drinkers considering change, negative expectancies are more likely to be associated with abstinence or reductions in drinking. McMahon and colleagues (McMahon & Jones 1993; McMahon *et al.* 1994) note the importance of distinguishing the roles of proximal negative expectancies (i.e. the effects experienced the day of drinking) from distal negative expectancies (i.e. the effects experienced the next day). These researchers propose that proximal negative expectancies are less likely to influence drinking restraint (McMahon *et al.* 1994) and distal expectancies more likely to influence restraint.

We propose that the association between negative expectancies and drinking is moderated by poor inhibitory control associated with impulsivity. Other research suggests that personality may moderate the association between positive expectancies and alcohol outcomes. McCarthy, Kroll & Smith (2001) found that neurotic extraversion, a construct thought to be associated with increased reward-seeking, moderated the association between positive expectancies and drinking problems, but not drinking behavior. Fischer *et al.* (2003) found that positive expectancies were associated more strongly drinking level for those high in extroversion compared with those low in extraversion. The central idea in McCarthy *et al.* (2001) and Fischer *et al.* (2003) is that increased reward-seeking moderates the association between positive expectancies and drinking. The key idea in the current study is that the poor inhibitory control associated with impulsivity moderates the association between negative expectancies and drinking. Negative expectancies should be less likely to inhibit or discourage drinking in heavy drinkers with high levels of impulsivity, because impulsivity is associated with weak behavioral inhibition when faced with the prospect of adverse outcomes (Finn 2002; Finn *et al.* 2002).

The first hypothesis tested in this study is that alcoholics with conduct disorder, who have high levels of impulsivity, weak behavioral inhibition and severe symptoms of dependence (Finn *et al.* 2002), have high proximal negative alcohol expectancies even though they drink excessively. Based on McMahon *et al.*'s (1994) ideas, these subjects should accumulate more negative experiences as a result of excessive drinking and have higher proximal, and perhaps distal, negative alcohol expectancies compared with alcoholics without conduct disorder and

controls. In other words, these subjects have many alcohol-related problems, recognize the possibility that bad things may happen when they are drunk and know that they are likely to have a hangover the next day, yet they still drink to excess on a regular basis. Research suggests that alcoholics with conduct disorder are less inhibited by the prospect of negative outcomes than controls and alcoholics without conduct disorder (Mazas, Finn & Steinmetz 2000; Finn *et al.* 2002) and may continue to drink excessively even though they expect negative consequences. Because alcohol problems and high levels of drinking covary strongly with high positive alcohol expectancies (Mann *et al.* 1987; Sher *et al.* 1991; Henderson *et al.* 1994; Finn *et al.* 2000), we also expected that both alcoholic groups would have higher positive alcohol expectancies compared with controls.

The second and third hypotheses tested in this study were related to our proposal that impulsivity moderates the association between negative expectancies and drinking. The second hypothesis was that for high-impulsive individuals, higher proximal negative expectancies are associated more strongly with more drinking than for low-impulsive individuals. Consistent with McMahon *et al.*'s (McMahon & Jones 1993; McMahon *et al.* 1994) work, we expected a positive correlation between drinking and proximal negative expectancies, because proximal negative expectancies are thought to be less likely to influence drinking restraint in a non-treatment sample of young adult alcoholics in the early stages of alcohol dependence. Furthermore, we expected impulsivity to moderate this relationship such that proximal negative expectancies will be associated more strongly with higher levels of drinking for impulsive subjects. Although we expect that the same is true for alcoholics with conduct disorder, our model (Finn 2002) posits that the key moderating process is associated with the personality trait of impulsivity, rather than diagnostic category. The third hypothesis was that for low-impulsive individuals, higher distal (next day) negative expectancies would be associated more strongly with lower levels of drinking compared with high-impulsive subjects. In other words, the expectation of experiencing negative consequences the day after heavy drinking should be more likely to discourage heavy drinking in low- versus high-impulsive individuals.

METHODS

Participants

The sample consisted of 300 young adult subjects (222 white, 34 black, 10 Hispanic, 10 Asian, five Native Americans and 19 other) with a mean age of 20.6 ± 1.8 years (range 18–25 years), 92% ($n = 277$) of whom were college students; 99 with diagnoses of alcohol dependence (AD) and a history of childhood conduct disorder (the AD/CD group), 77 with AD without childhood CD (AD-alone group) and 124 controls with neither AD, childhood CD or any history of other substance abuse. The onset of alcoholism was ≤ 21 years of age for all subjects with AD. Of the non-college students, there were 20 white, one Native American, one Hispanic and one other ethnicity. Table 1 displays the group characteristics on demographic and self-report measures.

Recruitment—The subjects were recruited from the community using advertisements placed in local newspapers and around the local community. Advertisements were designed using Widom's (1977) approach to attract responses from individuals varying in terms of the level of impulsive, disinhibited traits. Highly disinhibited subjects were targeted with advertisements asking for responses from 'adventurous, carefree individuals, who have led exciting and impulsive lives', or 'daring, rebellious, defiant individuals', or 'individuals on probation or who have been in trouble with the law'. Subjects with average or low levels of disinhibited traits were targeted with advertisements asking for 'persons interested in psychological research', or 'quiet, reflective and introspective persons'. Subjects were excluded if they were not between 18 and 25 years of age, were taking any psychotropic or antihistamine medications,

had never consumed alcohol, had a history of heart disease or psychosis, were not able to speak or read English or had less than a grade 6 education level. Prior to testing, subjects were administered a breath-alcohol test using an AlcoSensor-III (Intoximeters, Inc., St Louis, MO, USA) to ensure that their breath-alcohol level (BAL) was 0.00%. Subjects read and signed an informed consent to participate, were free to refuse any procedure and were paid \$10.00 per hour. The study was approved by the Institutional Review Board at Indiana University.

Measures

Psychiatric diagnoses were ascertained by the first author, a clinical psychologist, from responses on the Semi-Structured Interview for the Genetics of Alcoholism (SSAGA: Bucholz *et al.* 1994) using criteria from the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV, American Psychiatric Association 1994). The SSAGA assesses the onset of each symptom and was used to determine the onset of alcohol abuse or dependence. The number of symptoms of alcohol abuse or dependence was quantified as the total number of symptoms endorsed by the subject on the SSAGA interview. A history of conduct disorder was ascertained from responses to the antisocial personality section of the Diagnostic Interview Schedule (Robins *et al.* 1985) using DSM-IV criteria.

Alcohol use was assessed as frequency, quantity and density measures of alcohol consumption for the past 6 months. Frequency of consumption was defined as the total number of occasions alcohol was consumed in a typical week. The alcohol quantity measure was defined as the average amount of alcohol consumed (in standard drinks) per occasion in a typical week. A standard drink was defined as one beer or wine cooler, one glass of wine, one shot of liquor or one 1.5-oz (45-ml) mixed drink. The density measure was the greatest number of drinks consumed on any one occasion in the preceding 6 months. The alcohol measures were square-root transformed and used as indicator measures for an alcohol-use latent variable for structured equation modeling analyses. The alcohol variables were not transformed for the ANOVAs.

Negative alcohol expectancies were assessed using the proximal (same day) and distal (next day) scales from an adapted version of the Negative Alcohol Expectancy Questionnaire (NAEQ: McMahon & Jones 1993). The NAEQ was originally designed to assess the expectations of alcoholics in treatment about what negative events might happen if they had a drink (i.e. relapsed). The scales list a series of negative events/outcomes that follow the question, 'If I went for a drink now, then ...' for the proximal scale and 'If I went for a drink now, then tomorrow ...' for the distal next-day scale. The proximal scales assesses expectations for events such as having a car accident, going to jail, wetting the bed, losing your driver's license, becoming depressed, anxious, sleepless, boastful, argumentative, aggressive or losing control. The distal scale assesses expectations for physical (sweats, shakes, ill, sick, unable to eat), emotional (depressed, anxious, guilty, afraid, restless, shy) and other hangover/withdrawal symptoms (sleepless, low self-esteem, craving, missing work). Because we were interested in examining negative expectancies for heavy drinking in a non-treatment sample, rather than expectancies for relapse in a treatment sample, we adapted the NAEQ by changing the wording of the questions preceding the list of negative events. The proximal subscale was changed to 'if I were to go out and drink heavily this weekend, then ...'. The distal subscale was changed to 'if I were to go out and drink heavily this weekend, then the next day ...'. High scores on each scale reflect greater negative expectancies.

We assessed negative expectancies for heavy drinking (i.e. 'what would happen if you were to drink heavily this weekend?'), because it is less likely that any negative events will follow light drinking. Because research suggests that the association between negative expectancies and drinking varies by dose (Weirs *et al.* 1997), we wanted to include some common benchmark to use for all subjects. Positive expectancies were assessed as proximal expectancies only, because it is hard to think of how drinking might be associated with positive next-day outcomes.

Positive alcohol expectancies were assessed on five of the six subscales of the Alcohol Expectancy Questionnaire (AEQ: Brown, Christiansen & Goldman 1987); global positive change (Scale 1), sexual enhancement (Scale 2), physical/social pleasure (Scale 3), social assertion (Scale 4) and tension reduction (Scale 5). Scale 6, aggression, was not included because it is not a positive expectancy. The AEQ, which is probably the most widely used measure of alcohol expectancies, has been shown to be predictive of drinking patterns (Leigh 1989).

Impulsivity was assessed with the Eysenck Impulsivity–Venturesomeness scale (EIV: Eysenck & Eysenck 1978). High scores on this scale reflect lower self-control, greater spontaneity, increased recklessness and a lack of planning and reduced foresight (Luengo, Carrillo de la Pena & Otero 1991; Finn *et al.* 2002).

Data analyses

ANOVAs were used to test the first set of hypotheses that AD/CD subjects would have higher negative expectancies than AD-alone and control subjects even though they drink more alcohol and that both AD groups would have higher positive expectancies than controls.

Multiple-groups structured equation models (SEM) were used to test the hypotheses that the association between negative expectancies and drinking would differ between high- and low-impulsive subjects. We hypothesized that for high-impulsive individuals drinking would be positively associated more strongly with proximal negative expectancies, and that for low-impulsive subjects drinking would be associated more strongly with lower distal negative expectancies. AMOS 3.61 (Arbuckle 1997) was used to fit the SEM to the covariance matrices of the measures of negative expectancies (proximal and distal), total positive expectancies, impulsivity and alcohol use, which was assessed as a latent variable. In the model (see Fig. 1) measures of expectancies and impulsivity served as independent variables and the latent variable of alcohol use was the dependent measure. We obtained a maximum likelihood solution for the entire sample to estimate the associations (i.e. covariance structure) among measures. The sample was then divided into high- and low-impulsive subjects using a median split and a multiple groups SEM was conducted to test the hypothesis concerning differences between high- and low-impulsive subjects on the paths from negative expectancies to alcohol use. The multiple-groups SEM compared the relative fit of a fully constrained model, where all paths were constrained to be equal for high- and low-impulsive subjects, with a partially constrained model that allowed the paths from proximal and distal negative expectancies to alcohol use to vary freely between high- and low-impulsive groups, but kept the paths from positive expectancies and impulsivity to alcohol use constrained to be equal across groups. Multiple-groups SEMs were used rather than multiple regression, because the SEM approach allows greater control for testing specific hypotheses by constraining or unconstraining specific paths.

RESULTS

Group differences in expectancies

A two-factor (group $\times$ gender) ANOVA was used to test our hypotheses about group differences on each of the three expectancy measures. As hypothesized, the AD/CD group had higher proximal ($F = 17.9$, 2/294 df, $P < 0.0001$) and distal ($F = 6.3$, 2/294 df, $P < 0.01$) negative expectancies than both controls and the AD-alone group, even though they drank more alcohol per week than both groups ($F = 43.5$, 2/294 df, $P < 0.0001$). Table 1 presents these data. The AD-alone group had significantly higher proximal negative expectancies than controls, but did not differ from controls on distal negative expectancies. Both the AD/CD and the AD-alone group also had higher positive alcohol expectancies than controls ($F = 27.8$, 2/294 df, $P <$

0.0001). There were no significant main effects of gender or gender $\times$ group interactions for any of the expectancy measures.

Group differences in alcohol measures and impulsivity

As illustrated in Table 1, there were significant group differences in alcohol consumption levels ($F_s = 34.2\text{--}43.5$, 2/294 df, all $P_s < 0.0001$), symptoms of abuse and dependence ($F = 227.6$, 2/294 df, $P < 0.0001$) and impulsivity ($F = 48.2$, 2/294 df, $P < 0.0001$). A main effect of gender on each measure revealed that men had higher levels of drinking than women ($F_s = 4.0\text{--}25.8$, 1/294 df, $P_s < 0.05\text{--}0.0001$). There was a significant group $\times$ gender interaction only on the alcohol density measure ($F = 5.5$, 2/294 df, $P < 0.01$). In the two alcoholic groups, men had higher density measures than women, but men did not differ from women in the control group. Table 1 displays the specific pattern of group differences on each of these measures.

Impulsivity and the association between expectancies and drinking

Full sample analysis—The SEM for the full sample (Fig. 1: top panel) fitted the data well [$\chi^2(8\text{ df}, n = 300) = 5.4$, $P = 0.71$, GFI = 0.99, RMSEA = 0.0001] and accounted for 40% in the variation in alcohol use. All path coefficients are significant in this model. As can be seen from Fig. 1, higher scores on measures of positive expectancies, proximal negative expectancies and impulsivity were significantly associated ($P_s < 0.0005$) with more alcohol use, while higher scores on the distal (next day) negative alcohol expectancies were associated with less alcohol use. Table 2 displays the Pearson product–moment correlations among the observed variables in the model. It is worth noting that the zero-order correlations between distal negative expectancies and alcohol use measures are not statistically significant. However, when the influence of proximal negative expectancies is partialled out, the first-order partial correlations between distal negative expectancies and the alcohol use measures are significant ($r = -0.35$, -0.31 and -0.38 , $P_s < 0.001$, for quantity, frequency and density measures of drinking, respectively). When the joint influence of proximal negative expectancies, positive expectancies and impulsivity are partialled out, the correlations are still significant but somewhat lower. Table 3 displays the partial correlations between the predictor variables and the three alcohol use measures.

Impulsivity group differences—As described above, the sample was divided into high- and low-impulsive groups based on a median split. Multiple-groups SEM was then conducted comparing the fit of a fully constrained model and a partially constrained model to assess impulsivity group differences in the strength of the paths from negative expectancies to alcohol use. In the low-impulsivity group there were 96 controls, 33 AD-alone, and 17 AD/CD subjects. In the high-impulsivity group there were 28 controls, 44 AD-alone and 82 AD/CD subjects. Table 4 displays the means for the alcohol and expectancy measures for low- and high-impulsive subjects. On the multiple groups SEM, the unconstrained model fitted the data well [$\chi^2(18\text{ df}, n = 300) = 23.5$, $P = 0.173$, GFI = 0.98, RMSEA = 0.03] and provided a better fit than the constrained model [$\chi^2(20\text{ df}, n = 300) = 31.5$, $P = 0.049$, GFI = 0.97, RMSEA = 0.04, difference $\chi^2(2\text{ df}, n = 300) = 8.0$, $P < 0.05$] indicating that the association of proximal and distal negative expectancies with alcohol use differed between high- and low-impulsive individuals. The moderation effect of impulsivity is also evident using a multiple regression approach to analysis, where both the impulsivity $\times$ proximal and impulsivity $\times$ distal expectancies interactions were significant for quantity [$t(1) = 2.1$ and 2.2 ; $P_s < 0.05$] and density measures [$t(1) = 2.3$ and 2.9 ; $P_s < 0.05$], but not the frequency measure [$t(1) = 0.48$ and 1.4], and the impulsivity $\times$ positive expectancies interaction was not significant for any of the alcohol measures [$t_s(1) = 0.1$, 0.36 and 0.97]. Figure 1 (middle and bottom panels) display the associations between expectancies and alcohol use for high- and low-impulsive subjects. Consistent with our hypotheses, high proximal negative expectancies were associated more strongly with alcohol use for high-impulsive subjects ($\beta = 0.49$, $P < 0.00001$ versus $\beta = 0.38$,

$P < 0.001$ for low-impulsives), and higher distal negative expectancies were associated with less drinking for low-impulsive subjects ($\beta = -0.60$, $P < 0.00001$ versus $\beta = -0.38$, $P < 0.005$ for high-impulsives). The third-order partial correlations between the predictor variables and the alcohol use measures for high- and low-impulsive subjects are displayed in Table 5.

To ensure that each of these two paths were significantly different between impulsive groups, the multiple group SEM was repeated using a partially constrained model that allowed only proximal negative expectancies to vary freely between groups and, again, using a partially constrained model that allowed only distal negative expectancies to freely vary between groups. When group differences on proximal negative expectancies were isolated and tested, the multiple groups SEM remained significant [difference χ^2 (1 df, $n = 300$) = 5.9, $P < 0.05$] indicating that the association between high proximal negative expectancies and high drinking levels was stronger for high impulsive subjects. Similarly, when group differences on distal negative expectancies were isolated and tested, the multiple groups SEM remained significant [difference χ^2 (1 df, $n = 300$) = 7.9, $P < 0.01$] indicating that the association between high distal negative expectancies and lower drinking was stronger for low impulsive subjects.

DISCUSSION

The results of this study are consistent with our overarching theory that negative alcohol expectancies do not discourage drinking as much in people with high levels of impulsivity. In a non-treatment sample, alcoholics with a history of conduct disorder (AD/CD) had higher levels of both proximal and distal negative expectancies compared with alcoholics without conduct disorder (AD-alone) and controls, even though AD/CD subjects drank more than both AD-alone and control subjects. Consistent with our hypotheses, higher proximal negative expectancies were associated more strongly with higher levels of alcohol consumption for high-impulsive compared with low-impulsive subjects, and higher distal negative expectancies were associated more strongly with lower levels of alcohol consumption in low-impulsive compared with high-impulsive subjects. Consistent with McMahon *et al.*'s (1994) findings that proximal negative expectancies are less likely to influence drinking restraint and distal expectancies more likely to influence restraint, we found that proximal negative expectancies were positively correlated with alcohol use while negative expectancies were negatively correlated with alcohol use.

The fact that AD/CD subjects had both higher negative alcohol expectancies and more symptoms of alcohol abuse and dependence compared with AD-alone and control subjects, suggests that their reports of negative alcohol expectancies accurately reflect the negative outcomes that typically occur when they drink heavily. These results are consistent with the findings of Mann *et al.* (1987) and McMahon *et al.* (1994) and lend credence to the McMahon and colleagues' idea that heavy drinkers accumulate many experiences of the negative consequences of heavy drinking and, as a result, develop stronger negative alcohol expectancies (McMahon & Jones 1993; McMahon *et al.* 1994). However, even though AD/CD subjects expect more negative outcomes after drinking, they also expect significantly more positive drinking outcomes than controls. As expected, both alcoholic groups had significantly higher positive expectancies compared with controls, although it is difficult to assess whether they actually experience many positive outcomes after drinking. These results are consistent with studies showing that positive alcohol expectancies are associated with heavy drinking (e.g. Sher *et al.* 1991; Webb *et al.* 1993; Henderson *et al.* 1994; Rather & Goldman 1994; Smith *et al.* 1995; Finn *et al.* 2000). Our results (Table 5) suggest that positive alcohol expectancies influence drinking more than negative expectancies for young adults with high levels of impulsivity.

Consistent with the idea that negative expectancies may be less likely to inhibit or discourage drinking in heavy drinkers with high levels of disinhibitory characteristics (Finn 2002), we found that proximal negative expectancies were associated more strongly with higher levels of drinking and distal negative expectancies were less strongly associated with lower levels of drinking in high-impulsive compared with low-impulsive subjects. This suggests that, rather than playing a role in discouraging drinking, proximal negative expectancies appear to be relatively accurate reflections of the range of adverse consequences that high-impulsive subjects experience as a result of heavy drinking. The results also suggest that distal negative expectancies may influence restraint more in low- than in high-impulsive subjects. While these results are generally consistent with a disinhibitory model of impulsivity, negative expectancies and alcohol use, two aspects of the results were unexpected. First, although the association was weaker, high proximal negative expectancies were still significantly associated with more drinking in low impulsive subjects. Thus, proximal negative expectancies in low-impulsive college students also appear to reflect the actual negative consequences of excessive drinking and do not appear to influence restraint. Secondly, after partialling out the influence of proximal negative expectancies, distal negative expectancies were negatively correlated with drinking in high-impulsive subjects, suggesting that expecting adverse events the next day may still influence some restraint in high-impulsive subjects.

This study had a few limitations that should be considered when interpreting the results. First, our community-based sample was recruited in a fashion that was non-random (i.e. responses to advertisements) and therefore it is not clear how representative it is of the general population of young adult alcoholics who are not in treatment. Although recruiting from the community should result in a sample that is more representative of the population of alcoholics than a sample of alcoholics in treatment, this approach suffers from some self-selection biases (e.g. requires someone to see and respond to an advertisement) and is more likely to attract participants who are college students and who are not employed on a full-time basis. Secondly, we did not assess positive alcohol expectancies in the same fashion as negative expectancies. We assessed negative expectancies for what would happen if the subject drank heavily. For the assessment of positive expectancies we used the AEQ (Brown *et al.* 1987), which assesses expectancies for the general effects of alcohol without specifying a specific dose or level of alcohol consumption. The AEQ was included initially in a test battery for a large study of disinhibitory processes in early-onset alcoholism, and we had not considered this particular study when deciding to include this measure. There might be a different association between positive expectancies and drinking if we had assessed positive expectancies for the effects of heavy drinking. It seems likely that low-impulsive, or non-alcoholic, subjects would expect fewer positive effects of heavy drinking than high-impulsive individuals. Finally, these data are cross-section in nature and no conclusions can be made about the directionality of the observed effects. Negative and positive alcohol expectancies can influence alcohol consumption and can develop as a result of alcohol consumption.

In summary, consistent with a disinhibitory model of alcohol use, alcoholics with a history of conduct disorder had higher levels of both proximal and distal negative expectancies even though they drank more alcohol compared with alcoholics without conduct disorder and controls. The results also revealed that for low-impulsive subjects, distal (next day) negative expectancies were more strongly associated with lower levels of alcohol consumption compared with high-impulsive subjects, suggesting that distal negative expectancies might be more likely to influence drinking restraint in low-impulsive compared with high-impulsive subjects. Proximal (same day) negative alcohol expectancies were positively correlated with alcohol consumption for both high- and low-impulsive subjects; however, the association was stronger for high-impulsive subjects. Consistent with the findings of McMahon *et al.* (1993) these results suggest that proximal negative alcohol expectancies do not influence restraint in young adult subjects and may simply reflect an accurate report of the typical negative

consequences of heavy drinking. This study clearly underlines the importance of studying individual differences in how alcohol expectancies are associated with alcohol consumption.

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Figure 1.

Structural equation models (SEMs) of the regression of alcohol use [latent variable indicated by quantity (q), frequency (f) and density (d) of alcohol consumption] on negative alcohol expectancies (proximal and distal), positive alcohol expectancies and impulsivity for the full sample (top panel; $n = 300$), low impulsive subjects (middle panel, $n = 146$) and for high-impulsive subjects (bottom panel; $n = 154$). Multiple groups SEMs that compared the models for the low- and high-impulsive subjects determined that the paths from negative expectancies to alcohol use differed between low- and high-impulsive subjects. The path coefficients are standardized regression weights. **** $P < 0.0001$; *** $P < 0.001$; ** $P < 0.005$.

Table 1

Sample characteristics.

	Controls		AD-alone		AD + CD	
	Men	Women	Men	Women	Men	Women
<i>n</i>	35	89	31	46	63	36
Age	20.6 ± 1.9	20.3 ± 1.6	20.8 ± 1.8	20.3 ± 1.8	20.9 ± 2.0	20.7 ± 2.0
Education (years)	14.2 ± 1.5	14.1 ± 1.5	14.3 ± 1.6	14.2 ± 1.6	13.7 ± 1.7	13.7 ± 2.0
Alcohol use						
Total drinks/week	8.8 ± 10.8 ^c	6.3 ± 6.5 ^c	28.0 ± 17.8 ^b	17.3 ± 12.2 ^b	34.5 ± 26.7 ^a	23.1 ± 16.6 ^d
Frequency	2.2 ± 2.3 ^c	2.0 ± 1.6 ^c	4.5 ± 2.2 ^b	3.4 ± 2.2 ^b	5.0 ± 3.0 ^a	4.6 ± 2.6 ^a
Quantity	2.8 ± 2.7 ^b	2.4 ± 2.2 ^b	6.6 ± 3.0 ^a	4.7 ± 2.6 ^a	6.5 ± 3.4 ^a	4.5 ± 2.4 ^a
Density	6.8 ± 5.5 ^b	6.0 ± 4.3 ^b	14.7 ± 5.0 ^a	11.0 ± 5.2 ^a	16.2 ± 8.8 ^a	9.7 ± 4.5 ^a
Symptoms of abuse/dependence	3.7 ± 3.1 ^c	3.3 ± 2.8 ^c	14.9 ± 4.3 ^b	15.3 ± 5.1 ^b	21.1 ± 8.5 ^a	21.7 ± 9.3 ^a
Negative alcohol expectancies						
Proximal	19.1 ± 12.7 ^c	19.0 ± 17.1 ^c	23.6 ± 9.9 ^b	3.8 ± 10.6 ^b	31.4 ± 11.9 ^a	29.9 ± 12.7 ^a
Distal	15.8 ± 13.7 ^b	18.0 ± 17.0 ^b	15.4 ± 11.2 ^b	18.1 ± 10.1 ^b	21.6 ± 13.6 ^a	25.1 ± 14.9 ^a
Positive alcohol expectancies	87.7 ± 15.7 ^b	86.7 ± 18.6 ^b	101.9 ± 11.4 ^a	99.1 ± 11.4 ^a	99.8 ± 11.6 ^a	102.2 ± 10.7 ^a
Impulsivity	6.9 ± 4.4 ^c	6.2 ± 4.0 ^c	9.0 ± 4.0 ^b	10.3 ± 4.4 ^b	12.5 ± 3.7 ^a	12.0 ± 3.4 ^a

CD = a history of DSM-IV conduct disorder; AD = alcohol dependence. Alcohol use: frequency = average number of occasions per week over the past 6 months when alcohol consumed; quantity = average quantity per drinking occasion; density = maximum number of drinks consumed on any one occasion over the past 6 months. Negative alcohol expectancies: proximal = expectations for negative events while drinking (same day); distal = expectations for negative events the day after drinking (next day).

a,b,c Significant group differences between means: *a* > *b* > *c* (Newman-Keuls procedure).

Table 2

Zero-order correlations among the observed model variables (full sample).

	1	2	3	4	5	6	7
(1) Proximal negative expectancy	1.0						
(2) Distal negative expectancy	0.79	1.0					
(3) Positive expectancy	0.24	0.06	1.0				
(4) Impulsivity	0.24	0.06	0.22	1.0			
(5) Alcohol use: quantity	0.21	-0.05	0.48	0.34	1.0		
(6) Alcohol use: frequency	0.14	-0.09	0.41	0.28	0.67	1.0	
(7) Alcohol use: density	0.18	-0.10	0.47	0.31	0.83	0.73	1.0

Alcohol use: quantity = average amount of alcohol consumed per occasion in a typical week; alcohol use: frequency = total number of occasions alcohol was consumed in a typical week; alcohol use: density = maximum number of drinks on one occasion.

Table 3
Partial correlations between predictor variables and alcohol use measures (full sample).

<i>Alcohol use measures</i>		
<i>Predictor variable</i>	<i>Quantity</i>	<i>Frequency</i>
Proximal negative expectancy	0.20	0.17
Distal negative expectancy	-0.22	-0.21
Positive expectancy	0.35	0.31
Impulsivity	0.18	0.15

Partial correlations reflect the correlation between the alcohol use measure and the predictor variable from which the linear relation, or influence, of the other three predictor variables have been removed. Quantity = alcohol quantity consumed per occasion; frequency = alcohol consumption frequency; density = maximum number of drinks on one occasion.

Table 4

Group means (standard deviation) on alcohol and expectancy measures.

	Low-impulsivity (n = 146)	High-impulsivity (n = 154)
Alcohol use		
Frequency (/week)		4.1 ± 2.7 ^a
Quantity (no. of drinks)	2.8 ± 2.4 ^b	5.4 ± 3.2 ^a
Density (maximum no.)	3.3 ± 2.9 ^b	12.5 ± 7.6 ^a
Symptoms of abuse/dependence	8.0 ± 5.6 ^b	12.6 ± 8.0 ^a
Negative alcohol expectancies	5.4 ± 5.1 ^b	
Proximal (while drinking)		27.5 ± 14.4 ^a
Distal (next day)	20.6 ± 13.4 ^b	20.3 ± 14.4
Positive alcohol expectancies	17.8 ± 14.4	98.1 ± 15.8 ^a
	91.6 ± 15.1 ^b	

Alcohol use: frequency = average number of occasions per week over the past 6 months when alcohol consumed; quantity = average quantity per drinking occasion; density = maximum number of drinks consumed on any one occasion over the past 6 months.

^{a,b} Significant difference between means where a > b (Newman-Keuls procedure).

Table 5

Partial correlations between predictor variables and alcohol use measures for high- and low-impulsive subjects.

<i>Predictor variable</i>	<i>Alcohol use measures</i>		
	<i>Quantity</i>	<i>Frequency</i>	<i>Density</i>
High-impulsive group			
Proximal negative expectancy	0.26	0.11	0.25
Distal negative expectancy	−0.21	−0.13	−0.20
Positive expectancy	0.36	0.42	0.38
Impulsivity	−0.01	−0.02	−0.06
Low-impulsive group			
Proximal negative expectancy	0.16	0.22	0.22
Distal negative expectancy	−0.36	−0.30	−0.36
Positive expectancy	0.32	0.28	0.26
Impulsivity	0.15	0.16	0.18

Partial correlations reflect the correlation between the alcohol use measure and the predictor variable after the linear relations of the other three predictor variables have been removed. Quantity = alcohol quantity consumed per occasion; frequency = alcohol consumption frequency; density = maximum number of drinks on one occasion.