The association between earlier age of first drink, disinhibited personality, and externalizing psychopathology in young adults

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ABSTRACT

Earlier age of first drink (AFD) of alcohol is associated with higher rates of alcohol abuse and dependence as well as a range of other externalizing problems. This study tested the hypotheses that in young adults earlier AFD is associated with [1] the common variance among externalizing problems (lifetime alcohol, marijuana, other drug, childhood conduct, and adult antisocial behavior problems) rather than being uniquely associated with alcohol problems, and [2] the disinhibited personality traits of social deviance and impulsivity, and that the association between earlier AFD and externalizing problems is partly accounted for by disinhibited personality. The sample (N = 502) included 299 young adults with a history of alcohol dependence (AD) and 203 subjects with no history of AD. Analyses showed that [1] earlier AFD was associated with the covariance among the different domains of externalizing problems and was not unique to any one externalizing problem, [2] earlier AFD was associated with social deviance and impulsivity, and [3] social deviance and impulsivity accounted for part of the association between earlier AFD and externalizing problems. The results suggest that earlier AFD is associated with a vulnerability to disinhibitory disorders and is not specifically associated with alcohol problems.

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1. Introduction

Earlier age of first drink (AFD) of alcohol is associated with a range of problems across the life span, such as higher rates of alcohol abuse and dependence (Dawson, Goldstein, Chou, Ruan & Grant, 2008; Grant & Dawson, 1997; Hingson, 2006), other substance abuse (Kuperman et al., 2001), delinquency and criminal behavior (Brens, Johnson, Neal, & Freeman, 2004), behavioral problems (King & Chassin, 2007; McGue, Iacono, Legrand, & Elkins, 2001; McGue, Iacono, Legrand, Malone, & Elkins, 2001; Sartor, Lysnkey, Heath, Jacob, & True, 2006) and generally poor psychosocial adjustment (Prescott & Kendler, 1999; York, 1999). Evidence suggests that an earlier AFD reflects an underlying vulnerability to externalizing problems in general (McGue, Iacono, Legrand, & Elkins, 2001; McGue, Iacono, Legrand, Malone, et al., 2001), and is not uniquely associated with the development of alcohol problems (King & Chassin, 2007; Sartor et al., 2006), although some data suggest a unique effect of AFD on alcohol dependence (Dawson et al., 2008). Furthermore, there is increasing evidence for the existence of a single dimension of externalizing psychopathology (Krueger & Markon, 2006; Krueger et al., 2002; Krueger, Markon, Patrick, & Iacono, 2005) that represents that covariance among problems with alcohol, other drugs, childhood conduct, and adult antisocial behavior. Recent research suggests that this dimension is highly heritable and genetically distinct from internalizing disorders, such as major depression (Kendler, Prescott, Myers, & Neale, 2003; Krueger et al., 2002) and is associated with a broader disinhibitory disorder dimension (Bogg & Finn, in press). The initial goal of this study was to replicate the association between earlier AFD and externalizing psychopathology and to extend these findings by testing the hypothesis that earlier AFD would be associated with the covariance among the externalizing disorders, and not specifically with alcohol problems.

McGue, Iacono, Legrand, and Elkins (2001), McGue, Iacono, Legrand, Malone, et al., 2001, suggest that early AFD reflects a general vulnerability to externalizing, disinhibitory disorders, such as childhood conduct disorder, adult antisocial personality/behavior, and substance abuse and dependence. This is consistent with the strong inter-relationships among earlier AFD and behavioral/conduct problems and different kinds of substance use problems. Externalizing disorders, such as childhood conduct disorder, adult antisocial personality, and substance abuse/dependence, are also labeled as disinhibitory disorders, because the evidence suggests that the processes that contribute to poor inhibitory control reflect a vulnerability that is common to externalizing disorders (Finn, 2002, Finn, Mazas, Justus, & Steinmetz, 2002; Gorenstein & Newman, 1980; McGue, Iacono, Legrand, Malone, et al., 2001). The personality traits of social deviance and impulsivity, which are strongly predictive of different externalizing disorders (Finn, 2002), also are associated with...
poor inhibitory control and are considered to be dispositional phenotypes for the disinhibitory vulnerability that is associated with disinhibitory (externalizing) disorders (Finn, 2002; Finn et al., 2002). Thus, social deviance and impulsivity can be considered as an intermediate phenotypes between a basic disinhibitory vulnerability and disinhibitory, externalizing, disorders (Finn, 2002). The second goal of this study was to test the hypothesis that earlier AFD also would be associated with the personality traits of social deviance and impulsivity. Alcohol use disorders and antisocial psychopathology are associated with higher levels of social deviance and impulsivity (Finn, 2002; Finn, Sharkansky, Brandt, & Turcotte, 2000; Finn, Mazas, Justus, & Steinmetz, 2002; Hathaway & McKinley, 1989), which are key personality domains associated with a predisposition to disinhibitory disorders (Bogg & Finn, in press; Finn, 2002). Although early AFD has been associated with elevated levels of symptoms of different disinhibitory disorders, studies have not examined the association between AFD and dimensions of disinhibitory personality. This study also was designed to extend the literature on the correlates of AFD by assessing the association between AFD and impulsivity and social deviance. The third goal of this study was to examine the associations among AFD, disinhibited personality, and externalizing problems and to test the hypothesis that the association between earlier AFD and externalizing problems would be partly accounted for by disinhibited personality (i.e., impulsivity and social deviance). In other words, we propose that earlier AFD is associated with a general disinhibitory vulnerability to externalizing disorders that is manifested, in part, by increased impulsivity and social deviance.

2. Methods

2.1. Participants

2.1.1. Recruitment and inclusion/exclusion criteria

A detailed description of participant recruitment and the study criteria can be found in Cantrell, Finn, Rickert, and Lucas (2008). Our recruitment strategy was designed to ensure sufficient variation and range in severity of lifetime problems with alcohol, marijuana, other drugs, childhood conduct disorder, and adult antisocial behavior, all of which comprised the externalizing factor. Participants were recruited using advertisements in local and student newspapers and with flyers posted around the community. Advertisements and flyers were designed using Widom’s (1977) approach to elicit responses from individuals varying in levels of impulsive and disinhibited traits and levels of alcohol use and problems. They included requests for responses from “heavy drinkers wanted for psychological research”, “daring, rebellious, defiant individuals”, “impulsive individuals”, and “social drinkers wanted for psychological research.” Respondents were screened by telephone interview to determine if they met study inclusion criteria, which were being between ages 18 and 30, reading and speaking English, having at least a 6th grade education level, not reporting any severe head injuries, having no history of psychosis, and having consumed alcohol on at least one occasion in their life. A cutoff age of 30 years was chosen because the study focused on disinhibitory processes in young adults and we wanted to avoid potential confounds associated with the consequences of chronic alcoholism.

2.1.2. Sample characteristics

The sample consisted of 502 young adults (245 men and 257 women) with a mean age of 22.01 ± 2.9 years and mean educational level of 13.7 ± 2.1 years. Approximately 95% of the sample (n=299; 143 men and 156 women) had a lifetime DSM-IV diagnosis of alcohol dependence. Approximately 78% were Caucasian, 14% were African-American, 5% Asian, 2% Hispanic, and 1% Pacific Islander.

2.2. Assessment

2.2.1. Age of first drink

To determine age of first drink (AFD), participants were asked at what age they consumed an “entire” drink of alcohol (at least one beer, mixed drink, or glass of wine) rather than just tasting or having a “sip” of alcohol. The reason for distinguishing between an entire drink versus a sip is that a simple “sip” of an alcoholic beverage does not constitute having a drink. Having a drink involves intentionally consuming a significant amount of alcohol. On the other hand, having a sip of alcohol does not result in the consumption of significant amount of alcohol and does not really imply “drinking alcohol” per se. It suggests sampling alcohol for its taste or some other purpose rather than intentionally consuming alcohol. Finally, this is a standard requirement in studies of AFD (e.g., McGue, Iacono, Legrand, Malone, et al., 2001). The mean AFD for the sample was 14.31 ± 2.9 years.

2.2.2. Lifetime externalizing problems

Participants were administered the Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA; Bucholz et al., 1994) which is based on criteria from the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV; American Psychiatric Association, 1994). Total lifetime problems with alcohol, marijuana, other drugs, childhood conduct, and adult antisocial behavior were determined by summing the number of positive responses to subsets of questions in relevant sections of the SSAGA. Using symptom or problem counts to assess problems associated with specific diagnoses is a common practice to assess the dimensional nature of the severity of problems in different diagnostic domains (e.g., Krueger et al., 2004, 2005, 2007; van den Oord et al., 2000). Such problem counts have good psychometric properties (Krueger et al., 2004; 2007), but the total scores must be Blom-transformed to correct their skewed distributions (Krueger et al., 2002; van den Oord et al., 2000).

2.3. Personality

2.3.1. Social deviance

Social deviance was measured as a latent variable using the Psychopathic Deviate (Pd) scale of the Minnesota Multiphasic Personality Inventory-2 (MMPI-2; Hathaway & McKinley, 1989) and the Socialization (So) scale of the California Psychological Inventory (Gough, 1969) as indicators. The Pd and So scale are well established measures of social deviance used in a range of studies (e.g., Finn, 2002; Finn & Hall, 2004). High scores on the Pd scale and low scores on the So scale are associated with disruptive, antisocial, and rule-breaking behavior (Finn, 2002; Finn & Hall, 2004; Gough, 1969), which are exemplars of socially deviant behavior. The sample means were 22.05 ± 6.2 on the Pd scale and 28.52 ± 8.0 on the So scale.

2.3.2. Impulsivity

Impulsivity was measured as a latent variable using the impulsivity subscale from the Eysenck Impulsivity-Venturesomeness scale (E-IV: Eysenck & Eysenck, 1978) and the control scale of the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982) as indicators. Sample means were 10.35 ± 4.6 on the impulsivity scale and 11.33 ± 5.9 on the control scale. High scores on the E-IV scale and low scores on the MPQ control scale are associated with poor self control and higher levels of externalizing behaviors in general (Bogg & Finn, in press; Finn, 2002; Finn et al., 2002).

2.4. Procedure

Informed written consent was obtained from each participant before testing began. Participants were given a breath alcohol test using an AlcoSensor IV (Intoximeters Inc., St. Louis, MO) and asked about their alcohol and drug use over the past 24 h. Participants were
rescheduled if their breath alcohol level was greater than 0.0%, if they reported consuming any drug within the past 12 h, if they reported feeling hung-over, or if they behaved impaired, high, overly sleepy, or were unable to attend to questions. Participants were paid $10.00 per hour for their time. The testing session lasted about 2 h.

2.5. Data analysis

First, a structural equation model (SEM) was used to assess the relationship between AFD and a latent externalizing (EXT) factor. As in Cantrell et al. (2008), the EXT factor was indicated by measures of lifetime problems with alcohol (alc), marijuana (mar), other drugs (drg), childhood conduct (ccd), and adult antisocial behavior (aab).

Because of their skewed distribution, all of the indicator measures of lifetime problems were Blom-transformed for the SEM analyses. Blom-transformation is considered to be the optimal approach to handling psychiatric symptom counts in multivariate modeling analyses (Krueger et al., 2002; van den Oord et al., 2000). Finally, the residuals for the three substance problem indicators of EXT (alc, mar, and drg) were allowed to freely co-vary in the models because these residuals are likely to reflect common variance associated with substance use problems that are not associated with the covariance among substance use problems and antisocial problems. The residuals for the two antisocial problem EXT indicators (ccd and aab) also were allowed to freely co-vary because they are assumed to reflect common variance in antisocial problems that are not associated with their covariance with substance use problems.

After the initial SEM analysis, modification indices were examined to determine whether adding paths from AFD to any individual predictor variable would significantly improve model fit. The purpose of examining modification indices for these paths was to determine whether AFD was uniquely associated with any domain of lifetime problems beyond its covariance with other domains of externalizing problems. A modification index greater than 4.0 for a particular path indicates that that path is significant.

The second stage of SEM involved assessing the association between AFD and the personality traits of impulsivity and social deviance, assessed as latent variables. The residuals for social deviance and impulsivity were allowed to freely co-vary. The final stage of SEM involved assessing the association between AFD and the EXT factor, while controlling for social deviance and impulsivity. This model assessed whether social deviance and impulsivity partly accounted for the association between AFD and EXT.

The Bentler and Bonett (1980) normed-fit index (NFI) and the root mean square error of approximation (RMSEA: Browne & Cudek, 1993) were used to assess goodness-of-fit for all SEMs. An acceptable model approximation to the data should yield an NFI > 0.94 and an RMSEA ≤ 0.08. Table 1 displays the intercorrelations among all variables used in the SEMs.

3. Results

3.1. Age of first drink and externalizing problems

Table 1 illustrates that earlier AFD was strongly correlated with more lifetime problems in all domains. The first SEM was used to test the hypothesis that earlier AFD would be associated with the covariance among the externalizing disorders, and not specifically with alcohol problems. Furthermore, the first SEM, which fit the data well, χ²(5, N = 502) = 9.35, p = .096, NFI = .995, RMSEA = .042, indicated that earlier AFD was associated with higher scores on the EXT latent factor. Fig. 1 displays this model. The path from AFD to the EXT factor was highly significant, β = −.601, p < .00001. AFD predicted 36.2% of the variance in EXT.

3.2. Age of first drink and disinhibited personality

The second SEM was employed to test the hypothesis that earlier AFD would be associated with the personality traits of social deviance and impulsivity. This model also fit the data exceptionally well, χ²(3, N = 502) = 2.70, p = .424, NFI = .998, RMSEA = .001. AFD accounted for 21.7% of the variance in the social deviance factor

![Table 1](Image 315x628 to 540x738)

**Table 1**

<table>
<thead>
<tr>
<th>Lifetime problem counts</th>
<th>Personality</th>
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<tbody>
<tr>
<td></td>
<td>a b c d e f g h i</td>
</tr>
<tr>
<td>AFD -0.49 -0.43 -0.45 -0.51 -0.48 -0.36 -0.44 -0.25 0.26</td>
<td></td>
</tr>
<tr>
<td>a. ALC 1 0.65 0.60 0.66 0.68 0.53 0.57 0.49 0.25 0.45</td>
<td></td>
</tr>
<tr>
<td>b. MAR 1 0.68 0.59 0.60 0.41 0.52 0.36 0.32</td>
<td></td>
</tr>
<tr>
<td>c. DRG 1 0.57 0.60 0.46 0.55 0.37 0.31</td>
<td></td>
</tr>
<tr>
<td>d. CCD 1 0.50 -0.26 0.30 -0.11 -0.18 0.34 0.45 0.39</td>
<td></td>
</tr>
<tr>
<td>e. AAB 1 0.61 -0.65 -0.50 -0.40</td>
<td></td>
</tr>
<tr>
<td>f. PD 1 -0.74 0.46 0.21 0.46 0.39</td>
<td></td>
</tr>
<tr>
<td>g. SO 1 0.55 0.46 0.61 0.74 0.21 0.46 0.39</td>
<td></td>
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<tr>
<td>h. EIMP 1 0.61 0.55 0.40 0.21 0.46 0.39</td>
<td></td>
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<tr>
<td>i. CON 1 0.61 0.55 0.40 0.21 0.46 0.39</td>
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</tr>
</tbody>
</table>

AFD = age of first drink; ALC = alcohol lifetime problems; MAR = marijuana lifetime problems; DRG = other drug lifetime problems; CCD = childhood conduct disorder lifetime problems; AAB = adult antisocial behavior lifetime problems; PD = Psychopathic Deviate scale of Minnesota Multiphasic Personality Inventory; SO = Socialization scale of California Psychological Inventory; EIMP = Impulsivity scale of Eysenck Impulsivity-Venturesomeness Scale; CON = Control scale of the Multidimensional Personality Questionnaire. All measures of lifetime problems are Blom-transformed. All correlations are significant at p < .0001.

![Fig. 1](Image 334x115 to 521x245)

**Fig. 1.** Structural equation model (SEM) showing the path between age of first drink (AFD) and the latent externalizing problems factor. Indicators for the externalizing problems factor are Blom-transformed lifetime problems with alcohol (alc), marijuana (mar), other drugs (drg), childhood conduct disorder (ccd), and adult antisocial behavior (aab).

The Bentler and Bonett (1980) normed-fit index (NFI) and the root mean square error of approximation (RMSEA: Browne & Cudek, 1993) were used to assess goodness-of-fit for all SEMs. An acceptable model approximation to the data should yield an NFI > 0.94 and an RMSEA ≤ 0.08. Table 1 displays the intercorrelations among all variables used in the SEMs.
and 8% of the variance in impulsivity. The paths from AFD to both social deviance and impulsivity were significant, $t(new) = -47$ and $-28$, $p < .001$ and $.01$, respectively. Fig. 2 displays this model.

The third SEM was used to test the hypothesis that the association between earlier AFD and externalizing problems is partly accounted for by disinhibited personality (i.e., impulsivity and social deviance). The SEM also fit the data well, $\chi^2(26, N=502) = 59.06, p = .001$, NFI = .982, RMSEA = .05 and accounted for 75% of the variance in the EXT factor. Examination of modification indices indicated that the addition of a direct path from AFD to adult antisocial behavior would improve the model fit (modification index = 5.57). The model was computed again after this path was added. This final model fit the data well, $\chi^2(25, N=502) = 47.98, p = .004$, NFI = .986, RMSEA = .043 and accounted for 76% of the variance in the EXT factor. This model is illustrated in Fig. 3. The path from AFD to the EXT factor was significant, $t = -305, p < .001$, although the path was weaker than in the first model. In fact, examination of the direct and indirect effects indicated that the direct effect of AFD on EXT accounted for only 7% of the variance in the EXT factor in this model, while the indirect effect of AFD on EXT (via the personality measures) accounted for 29% of the variance in the EXT factor. This model indicated that the personality measures partly accounted for the association between AFD and externalizing problems.

4. Discussion

There were three main goals of this study: [1] to replicate the association between earlier age of first drink (AFD) and externalizing (EXT) problems and to extend these findings by testing the hypothesis that earlier AFD is associated with the covariance among these problems, rather than uniquely associated with alcohol problems, [2] to extend the literature on the correlates of AFD by including items that assess behavioral problems per se. Studies indicate that these domains of personality reflect a vulnerability to disinhibitory disorders in general (Bogg & Finn, in press; Finn, 2002). It is likely that there is a reciprocal association between AFD and disinhibitory personality. This is further substantiated by the association between earlier AFD and disinhibitory personality. The analyses indicated that AFD was associated with higher levels of the disinhibitory personality traits of social deviance and impulsivity. The measures of social deviance and impulsivity do not include items that assess behavioral problems per se. Studies indicate that these domains of personality reflect a vulnerability to disinhibitory disorders in general (Bogg & Finn, in press; Finn, 2002). It is likely that there is a reciprocal association between AFD and disinhibitory personality. These traits may lead to earlier experimentation with alcohol, and earlier exposure to alcohol may promote the development of these traits as well. In any event, the results are consistent with the idea proposed by McGuire and colleagues (McGuire, Iacono, Legrand, & Elkins, 2001; McGuire, Iacono, Legrand, Malone, et al., 2001) that AFD is associated with an underlying vulnerability to disinhibitory disorders in general, and is not uniquely associated with the development of alcohol problems.

The results of the current study should be interpreted in light of the limitations of the study design. First, AFD was assessed using retrospective reports, which are subject to recall biases and are less reliable than reports obtained within a longitudinal study design. Second, the cross-sectional nature of the study design precludes inferences about the direction of effects. One cannot assume that causal or development processes are reflected in the paths depicted in the SEM models. Third, this study used a non-random sample of substance abusers who responded to various advertisements, and thus may not be representative of all individuals with externalizing problems. Also, we asked participants to refrain from alcohol and illicit drug use for twelve hours prior to testing. Thus, the sample may have been biased to exclude those who did not wish to refrain, or could not refrain, from substance use prior to the study. Finally, the sample was comprised of predominantly white, young adults.
Therefore, the findings may not generalize to other racial ethnic groups, younger or older adults, or non-students. Past research indicates that AFD is not as strongly associated with alcoholism among black compared to non-black Americans (Grant & Dawson, 1997).

In summary, the results suggest that earlier AFD is associated with processes common to a range of externalizing problems. Earlier AFD was associated with the covariance among a number of types of externalizing problems and was not unique to any one type of externalizing problem. Earlier AFD also was associated with higher levels of adult impulsivity and social deviance, which partly accounted for the association between earlier AFD and externalizing problems.

The results are consistent with the idea that earlier AFD is associated with a general vulnerability to disinhibitory disorders in general and is not specifically associated with risk for alcoholism.

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Funding for this study was provided by NIAAA Grant R01-AA123456. NIAAA had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

Contributors
The study was designed (and protocol written) by Zernicke and Finn. Cantrell and Lucas conducted literature searches. The statistical analyses were conducted by Finn and Cantrell. Zernicke wrote the first draft. Finn rewrote the entire paper. Editing was conducted by all authors. Lucas tested subjects and organized the databases.

Conflict of Interest
All authors declare that they had no conflict of interest associated with the research conducted and reported in this paper.

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References