



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 (Brems, Johnson, Neal, & Freemon, 2004), behavioral problems (King & Chassin, 2007; McGue, Iacono, Legrand, & Elkins, 2001; McGue, Iacono, Legrand, Malone, & Elkins, 2001; Sartor, Lynskey, 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

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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 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 59% 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.

Table 1
Correlations among AFD, lifetime problems and personality measures.

	Lifetime problem counts					Personality			
	a	b	c	d	e	f	g	h	i
AFD	-.49	-.43	-.45	-.51	-.48	-.36	.44	-.25	.26
a. ALC	1	.65	.60	.66	.68	.53	-.57	.49	-.45
b. MAR		1	.68	.59	.60	.41	-.52	.36	-.32
c. DRG			1	.57	.60	.46	-.55	.37	-.31
d. CCD				1	.50	-.26	-.30	-.11	-.18
e. AAB					1	.61	-.65	.50	-.40
f. PD						1	-.74	.46	-.39
g. SO							1	-.55	.46
h. EIMP								1	-.74
i. CON									1

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 $p < .0001$.

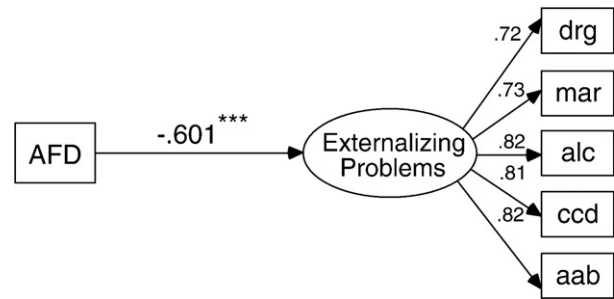


Fig. 1. Structural equation model (SEM) showing the path between age of first drink (AFD) and the latent externalizing problems factor. Indicators for the externalizing problems factor are Blom-transformed lifetime problems with alcohol (alc), marijuana (mar), other drugs (drg), childhood conduct disorder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

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, $\chi^2(5, N = 502) = 9.35, p = .096, NFI = .995, RMSEA = .042$, 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, $\beta = -.601, p < .00001$. 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, $\chi^2(3, N = 502) = 2.70, p = .424, NFI = .998, RMSEA = .0001$. AFD accounted for 21.7% of the variance in the social deviance factor

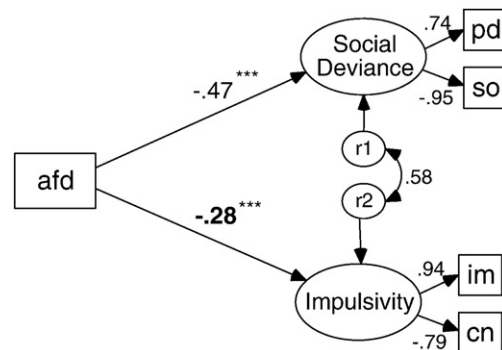


Fig. 2. SEM showing paths between age of first drink (AFD) and the personality dimensions of Social Deviance and Impulsivity. The indicator measures for Social Deviance are the psychopathic deviate (Pd) scale of the Minnesota Multiphasic Personality Inventory-2 and the socialization (So) scale of the California Psychological Inventory. Indicators for the Impulsivity factor are the impulsivity (im) of the Eysenck Impulsivity - Venturesome scale and the control (cn) scale of the Multidimensional Personality Inventory-2.

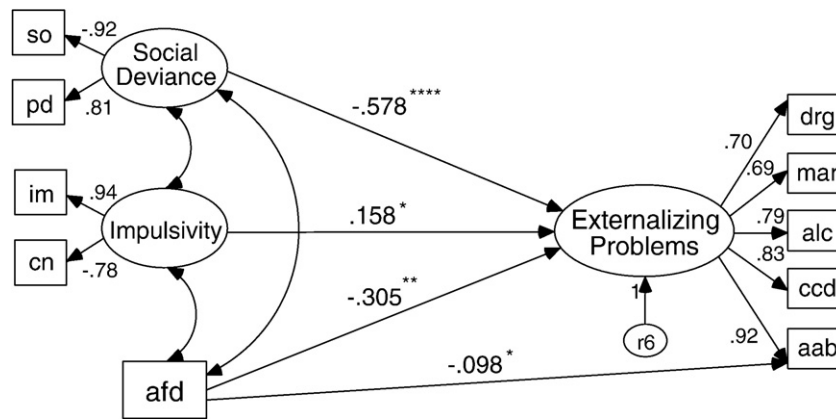


Fig. 3. SEM showing paths from the exogenous predictor variables of social deviance, impulsivity, and age of first drink (AFD) to the externalizing problem factors. In this SEM, AFD also is associated with adult antisocial problems independent of its covariance with other externalizing problem indicators.

and 8% of the variance in impulsivity. The paths from AFD to both social deviance and impulsivity were significant, $\beta_s = -.47$ and $-.28$, $p_s < .0001$ and $.001$, 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, $\beta = -.305$, $p < .001$, 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 by 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 assessing the association between AFD, social deviance, and impulsivity, and [3] to test the hypothesis that the association between earlier AFD and externalizing problems is partly accounted for by social deviance and impulsivity.

The results were consistent with our hypotheses. An earlier AFD is associated with higher levels of EXT problems in general and was not uniquely associated with alcohol problems. The first SEM showed that AFD was negatively related with the covariance among the different EXT problem domains and was not uniquely associated with any one problem domain beyond its covariance with the other EXT problem domains. In addition, earlier AFD was associated with higher levels of both social deviance and impulsivity, which suggests that earlier AFD is associated with personality traits that reflect a vulnerability to disinhibitory disorders (Finn, 2002). The final SEM revealed that the

association between earlier AFD and EXT disorders was partly accounted for by social deviance and impulsivity.

Our results are consistent with previous studies in that earlier AFD was associated with more alcohol, marijuana, and drug problems in early adulthood and more antisocial behavior in childhood and early adulthood (e.g., Brems et al., 2004; Grant & Dawson, 1997; Hingson, 2006; Kuperman et al., 2001; McGue, Iacono, Legrand, & Elkins, 2001; McGue, Iacono, Legrand, Malone, et al., 2001; Prescott & Kendler, 1999). Our analyses also suggested that earlier AFD is associated with processes that are common to substance use problems and antisocial behavior. This was demonstrated by the finding that AFD was associated with the covariation among the different domains of EXT problems. This result suggests that earlier AFD may not be uniquely associated with the development of alcohol problems. Rather, an earlier AFD appears to be associated with risk for the development of a range of disinhibitory, externalizing disorders. 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 McGue and colleagues (McGue, Iacono, Legrand, & Elkins, 2001; McGue, 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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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 conflicts of interest associated with the research conducted and reported in this paper.

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References

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders*, 4th ed. Washington, DC: American Psychiatric Association.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88, 588–606.
- Bogg, T., & Finn, P.R. (in press). A self-regulatory model of behavioral disinhibition in late adolescence: Integrating personality traits, externalizing psychopathology, and cognitive capacity. *Journal of Personality*.
- Brems, C., Johnson, M. E., Neal, D., & Freemon, M. (2004). Childhood abuse history and substance use among men and women receiving detoxification services. *American Journal on Drug and Alcohol Abuse*, 30, 799–821.
- Browne, M. W., & Cudek, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & K. J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.
- Bucholz, K., Cadoret, R., Cloninger, C. R., Dinwiddie, S., Hesselbrock, V., Nuberger, J., Reich, T., Schmit, I., & Schuckit, M. (1994). A new, semistructured psychiatric interview for use in genetic linkage studies: A report of the reliability of the SSAGA. *Journal of Studies on Alcohol*, 55, 149–158.
- Cantrell, H., Finn, P. R., Rickert, M. E., & Lucas, J. (2008). Decision making in alcohol dependence: Insensitivity to future consequences and comorbid disinhibitory psychopathology. *Alcoholism: Clinical & Experimental Research*, 32, 1398–1407.
- Dawson, D. A., Goldstein, R. B., Chou, P., Ruan, W. J., & Grant, B. F. (2008). Age of first drink and the first incidence of adult-onset DSM-IV alcohol use disorders. *Alcoholism: Clinical and Experimental Research*, 31, 2149–2160.
- Eysenck, S. B. G., & Eysenck, H. J. (1978). Impulsiveness and venturesomeness: Their position in a dimensional system of personality description. *Psychological Reports*, 43, 1247–1255.
- Finn, P. R., & Hall, J. (2004). Cognitive ability and risk for alcoholism: Short-term memory capacity and intelligence moderate personality risk for alcohol problems. *Journal of Abnormal Psychology*, 113, 569–581.
- Finn, P. R. (2002). Motivation, working memory and decision making: A cognitive-motivational theory of personality vulnerability to alcoholism. *Behavioral and Cognitive Neuroscience Review*, 1, 183–205.
- Finn, P. R., Mazas, C. A., Justus, A. N., & Steinmetz, J. (2002). Early-onset alcoholism with conduct disorder: Go/no go learning deficits, working memory capacity, and personality. *Alcoholism: Clinical & Experimental Research*, 26, 186–206.
- Finn, P. R., Sharkansky, E. J., Brandt, K. M., & Turcotte, N. (2000). The effects of familial-risk, personality, and expectancies on alcohol use and abuse. *Journal of Abnormal Psychology*, 109, 122–133.
- Gorenstein, E. E., & Newman, J. P. (1980). Disinhibitory psychopathology: A new perspective and a model for research. *Psychological Review*, 87, 301–315.
- Gough, H. G. P. D. (1969). *Manual for the California Psychological Inventory*. Palo Alto, CA: Consulting Psychological Press.
- Grant, B. F., & Dawson, D. A. (1997). Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal on Substance Abuse*, 9, 103–110.
- Hathaway, S. R., & McKinley, J. C. (1989). *MMPI 2: Minnesota Multiphasic Personality Inventory 2*. Minneapolis, MN: The University of Minnesota Press.
- Hingson, R. W. (2006). Age at drinking onset and alcohol dependence: Age at onset, duration, and severity. *Archives of Pediatric Adolescent Medicine*, 160, 739–746.
- Kendler, K. S., Prescott, C. A., Myers, J., & Neale, M. C. (2003). The structure of genetic and environmental risk factors for common psychiatric and substance use disorders in men and women. *Archives of General Psychiatry*, 60, 929–937.
- King, K. M., & Chassin, L. (2007). A prospective study of the effects of age of initiation of alcohol and drug use on adult substance dependence. *Journal of Studies on Alcohol and Drugs*, 68, 256–265.
- Krueger, R. F., Hicks, B. M., Patrick, P. J., Carlson, S. R., Iacono, W. G., & McGue, M. (2002). Etiologic connections among substance dependence, antisocial behavior, and personality: Modeling the externalizing spectrum. *Journal Abnormal Psychology*, 111, 411–424.
- Krueger, R. F., Nichol, P. E., Hicks, B. M., Markon, K. E., Patrick, P. J., Iacono, W. G., & McGue, M. (2004). Using latent trait modeling to conceptualize an alcohol problems continuum. *Psychological Assessment*, 16, 107–119.
- Krueger, R. F., Markon, K. E., Patrick, P. J., & Iacono, W. G. (2005). Externalizing psychopathology in adulthood: A developmental-spectrum conceptualization and its implications for DSM-V. *Journal Abnormal Psychology*, 114, 537–550.
- Krueger, R. F., Markon, K. E., Patrick, P. J., Benning, S. D., & Kramer, M. D. (2007). Linking antisocial behavior, substance abuse, and personality: An integrative quantitative model of adult externalizing spectrum. *Journal Abnormal Psychology*, 116, 645–666.
- Krueger, R. F., & Markon, K. E. (2006). Reinterpreting comorbidity: A model-based approach to understanding and classifying psychopathology. *Annual Review Clinical Psychology*, 2, 11–133.
- Kuperman, S., Schlosser, S. S., Kramer, J. R., Bucholz, K., Hesselbrock, V., Reich, T., & Reich, W. (2001). Developmental sequence from disruptive behavior diagnosis to adolescent alcohol dependence. *American Journal Psychiatry*, 158, 2022–2026.
- McGue, M., Iacono, W. G., Legrand, L. N., & Elkins, I. (2001). Origins and consequences of age of first drink II: Familial risk and heritability. *Alcoholism: Clinical Experimental Research*, 25, 1166–1173.
- McGue, M., Iacono, W. G., Legrand, L. N., Malone, S., & Elkins, I. (2001). Origins and consequences of age of first drink I: Associations with substance-use disorders, disinhibitory behavior and psychopathology, and P3 amplitude. *Alcoholism: Clinical and Experimental Research*, 25, 1156–1165.
- Prescott, C. A., & Kendler, K. S. (1999). Age at first drink and risk for alcoholism: A noncausal association. *Alcoholism: Clinical and Experimental Research*, 23, 101–107.
- Sartor, C. E., Lynskey, M. T., Heath, A. C., Jacob, T., & True, W. (2006). The role of childhood risk factors in initiation of alcohol use and progression to alcohol dependence. *Addiction*, 102, 216–225.
- Tellegen, A. (1982). *Brief Manual of the Multi-dimensional Personality Questionnaire*. University of Minnesota: Unpublished manuscript.
- van den Oord, E. J. C. G., Simonoff, E., Eaves, L. J., Pickles, A., Silberg, J., & Maes, H. (2000). An evaluation of different approaches for behavior genetic analyses with psychiatric symptom scores. *Behavior Genetics*, 30, 1–18.
- Widom, C. S. (1977). A method for studying noninstitutionalized psychopaths. *Journal of Consulting and Clinical Psychology*, 44, 614–623.
- York, J. L. (1999). Clinical significance of alcohol intake parameters at initiation of drinking. *Alcohol*, 19, 97–99.