

Early Risk Factors for Alcohol Use Across High School and Its Covariation With Deviant Friends

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ABSTRACT. Objective: Past research has associated childhood characteristics and experiences with alcohol use at single time points in adolescence. Other work has focused on drinking trajectories across adolescence but with risk factors typically no earlier than middle or high school. Similarly, although the connection between underage drinking and affiliation with deviant friends is well established, early risk factors for their covariation across adolescence are uncertain. The present study examines the influence of early individual and contextual factors on (a) trajectories across high school of per-occasion alcohol use and (b) the covariation of alcohol use and deviant friends over time. **Method:** In a longitudinal community sample ($n = 374$; 51% female), temperamental disinhibition, authoritarian and authoritative parenting, and parental alcohol use were assessed during childhood, and adolescents reported

on alcohol use and affiliation with deviant friends in the spring of Grades 9, 10, 11, and 12. **Results:** Early parental alcohol use predicted the intercept of adolescent drinking. Subsequent patterns of adolescent alcohol use were predicted by sex and interactions of sex and childhood disinhibition with early authoritarian parenting. Additionally, childhood disinhibition interacted with parental alcohol use to moderate the covariation of drinking and deviant friends. **Conclusions:** These findings highlight early individual and contextual risk factors for alcohol use across high school, extending previous work and underscoring the importance of developmental approaches and longitudinal techniques for understanding patterns of growth in underage drinking. (*J. Stud. Alcohol Drugs*, 74, 746–756, 2013)

UNDERAGE ALCOHOL USE IS COMMON in the United States (Johnston et al., 2012; Swendsen et al., 2012) and can have serious immediate and longer term consequences, including increased risk of mental health problems, alcohol misuse in adulthood, injury, and death (Committee on Substance Abuse, 2010; Masten et al., 2008; Pitkänen et al., 2008). Previous research has associated negative health outcomes with adolescent alcohol use trajectories (Danielsson et al., 2010; Hill et al., 2000), but more work is needed to examine individual and family risk factors in childhood—and their interactions—as predictors of growth in alcohol consumption across adolescence. Furthermore, given the well-established association between drinking and deviant, alcohol-using friends during adolescence (Cruz et al., 2012; Martino et al., 2009), examination of early risk factors influencing this association over time is needed to understand these important risk processes.

Past research has identified a number of early childhood characteristics and experiences that influence underage

drinking. Individual characteristics like childhood temperamental disinhibition, undercontrol, and novelty seeking are associated with greater alcohol consumption in adolescence and early adulthood (Caspi et al., 1996; Kirisci et al., 2007; Mâsse and Tremblay, 1997). Parental factors such as alcohol use or misuse and parenting style have also been associated with adolescent drinking (Alati et al., 2010; Guo et al., 2001; Hussong et al., 2008; Ryan et al., 2010; Wong et al., 2006). Although warm, engaged, authoritative parenting is generally considered the most protective style (Baumrind, 1991; Becoña et al., 2012), more punitive, authoritarian parenting may sometimes also result in beneficial outcomes when considering adolescent alcohol consumption (Alati et al., 2010; Becoña et al., 2012; Luyckx et al., 2011; van den Eijnden et al., 2011).

Given the complex relationship between individual and environmental factors, identifying who is most at risk for developing alcohol problems may be best addressed by examining individual-by-context interactions. Rather than high-

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lighting a single parenting style as universally ideal, research suggests that the effectiveness of a given style may depend on child temperament. For example, although authoritative-like parenting has predicted positive outcomes in inhibited children (Kochanska, 1991), authoritarian-like parenting has been associated with positive outcomes in disinhibited children (Bates et al., 1998; Cornell and Frick, 2007). Whereas these studies considered temperament-by-parenting effects on childhood outcomes, it is likely that the influence of early parenting may also extend to adolescence. Crucially, parents socialize young children to internalize norms and values that may extend to issues and situations later in life (Kochanska, 1991), such as alcohol consumption in adolescence. Thus, early parenting styles, especially in interaction with temperamental characteristics like disinhibition (Gallagher, 2002), may predict adolescent alcohol consumption. In addition, although the evidence is mixed (Schulte et al., 2009; Zucker et al., 2011), sex differences in some early risk factors for adolescent alcohol use have been found, suggesting that exploring such differences may be fruitful.

Although prior research serves as an important launching point, many studies have been limited by examining concurrent associations and/or considering adolescent alcohol use at only one time point, providing a limited depiction of the course of underage drinking and restricting our understanding of how early predictors may relate to the progression of alcohol consumption across adolescence. Studies that have assessed longitudinal patterns of underage alcohol use have examined time frames as short as 1 or 2 years (e.g., D'Amico et al., 2001; van den Eijnden et al., 2011; van der Vorst et al., 2006, 2009) up to several years (e.g., Barnes et al., 2006; Danielsson et al., 2010; Duan et al., 2009; Hussong et al., 2008; Kelly et al., 2011; King et al., 2011; Martino et al., 2009; White et al., 2011). For example, this work has found that middle-schoolers' problems with self-control predict high levels of alcohol use from Grade 8 to 11 (King et al., 2011), and low parental monitoring and high peer deviance in adolescence may be associated with higher initial levels and steeper increases of alcohol use across time (Barnes et al., 2006). Despite growing attention to the processes during adolescence that can influence longitudinal patterns of alcohol consumption, with only occasional exceptions (e.g., Luyckx et al., 2011) have studies considered early risk factors for underage drinking trajectories, with most work assessing factors no earlier than high school or middle school. What is missing are studies that consider individual and contextual risk factors from earlier periods and that examine interactions that may be most informative for understanding early influences on underage alcohol use across adolescence.

Among the more well-studied proximal risks for adolescent drinking behaviors are affiliation with deviant peers (Duncan et al., 2006; Trucco et al., 2011) and having friends and peers who drink (Ali and Dwyer, 2010). A few studies

have considered the influence of peer deviance on adolescent alcohol use trajectories, with peer effects measured at either single (Cruz et al., 2012; Feldman et al., 2009; van der Vorst et al., 2009) or co-occurring longitudinal assessments (Martino et al., 2009; Wiesner et al., 2008). For example, one study found that, compared with stable low affiliation with peers who drink, a pattern of steadily increasing affiliation predicted greater likelihood of higher-risk drinking trajectories, and stable high affiliation with drinking peers was strongly associated with stable heavy drinking from age 14 to 19 years (Martino et al., 2009). Research has not yet examined the effects of childhood risk factors on the association between adolescent drinking and affiliation with deviant friends, limiting our understanding of how early influences moderate the dynamic interplay between these factors across adolescence. In other areas of research, this general type of question has been addressed with multilevel models of intraindividual coupling (Essex et al., 2011; Ruttle et al., 2011; Sliwinski et al., 2006; Vickery et al., 2009), which simultaneously consider change in the main variable of interest that can be accounted for by variables that covary or change along with it, as well as potential moderators of this association. Here, such models can examine which early risk factors may be associated with the covariation of alcohol consumption and peer deviance in adolescence. Importantly, both here and in the prediction of adolescent alcohol use trajectories, identification of early factors is essential for appropriately targeting prevention programs at individuals most at risk for later problematic alcohol consumption (Spath et al., 2008).

The present study extends prior research by identifying individual and contextual factors from childhood that may influence (a) trajectories of per-occasion adolescent alcohol consumption and (b) the covariation across high school of drinking and affiliation with deviant friends. The dearth of longitudinal studies predicting growth in underage drinking from multiple early risk factors makes formal hypothesis testing inappropriate. Nevertheless, existing research leads us to expect that individuals with greater disinhibition and more exposure to parental drinking early in life will have higher alcohol use levels in Grade 9. Based on contemporary developmental approaches (Masten et al., 2008), we anticipate that early temperament will interact with parenting to influence alcohol consumption across adolescence. We also expect alcohol use and involvement with deviant friends to be associated across adolescence and—given limited prior research—explore which early factors may influence their covariation. We also explore sex differences in early risk factors for both major research questions. Finally, although we do not have parallel measures of parenting styles in both childhood and adolescence, we conduct secondary analyses that include available parenting measures in early adolescence to consider whether early parenting effects may be mediated by later parenting.

Method

Participants

Participants were drawn from the longitudinal Wisconsin Study of Families and Work. A total of 570 women and their partners were recruited through medical clinics in and around Milwaukee (80%) and Madison (20%), WI, during the second trimester of pregnancy and met initial inclusion criteria. Expectant parents were required to be older than age 18 years, cohabiting, and—because of the original focus on pre- and postnatal work and family experiences—employed or a full-time homemaker. Ten families were subsequently excluded because of miscarriages, yielding an original sample of 560 (Hyde et al., 1995). Current analyses focused on 374 adolescents (191 girls, 183 boys) who reported on alcohol use at least twice (i.e., in Grades 9 and/or 10, and Grades 11 and/or 12). Racial/ethnic background of the sample was 89% European American, 5% African American, 3% Native American, 2% Asian/Pacific Islander, and 1% Hispanic. Initially (1990–1991), mothers were 20–41 years old ($M = 30$), fathers were 20–55 years old ($M = 32$), and 96% of couples were married. Mothers included 2% with less than a high school degree, 42% high school graduates, 37% college graduates, and 19% with postbaccalaureate education; fathers' education levels were similar. Annual family income (in U.S. dollars) ranged from \$9,000 to more than \$200,000 ($Mdn = \$47,000$). Participants did not differ from nonparticipants on the above family demographic variables, with one exception: participating mothers were, on average, slightly older at recruitment than the remainder (29.6 vs. 28.9 years), $t(568) = -2.02, p = .043$. Similarly, participants did not differ from nonparticipants on early risk factors (see below), with one exception: participating parents scored slightly higher, on average, for alcohol use (.90 vs. .65), $t(477) = -2.94, p = .003$. Parents gave informed consent at each assessment, and child assent was obtained after age 12 years. All procedures were approved by the University of Wisconsin Institutional Review Board.

Childhood and adolescent risk factors

Disinhibition. Mothers completed a version of the Children's Behavior Questionnaire (Rothbart et al., 2001) at child ages 3.5 and 4.5 years, rating items from 1 (*extremely untrue of your child*) to 7 (*extremely true of your child*). Disinhibition scores represent the mean of activity level (eight items; e.g., "Tends to run rather than walk from room to room") and approach (seven items; e.g., "Gets so worked up before an exciting event that s/he has trouble sitting still"). High scores characterize a bold child who approaches novelty and vigorously engages with the environment. Subscale α 's at ages 3.5 and 4.5, respectively, were .70 and .73 for activity level and .64 and .73 for approach. Scores were correlated

over time ($r = .75, p < .001$) and averaged for the summary measure.

Parenting styles. The Child-Rearing Practices Report (Block, 1965) was administered to mothers and fathers at child age 4.5 and in Grade 3, and only to mothers in Grades 7 and 9, as Likert-formatted items scored from 1 (*extremely untrue*) to 7 (*extremely true*). Authoritarian parenting (seven items) is characterized by control (e.g., "I do not allow my child to question my decisions"), criticism (e.g., "I believe that scolding and criticism makes my child improve"), and punishment (e.g., "I teach my child that in one way or another punishment will find him/her when he/she is bad"). In contrast, authoritative parenting (seven items) taps parents' efforts to foster openness (e.g., "I encourage my child to talk about his/her troubles"), support exploration (e.g., "I encourage my child to be curious, to explore and question things"), and respond nonpunitively (e.g., "I talk it over and reason with my child when he/she misbehaves"). Alpha coefficients ranged from .55 to .66 for authoritarian parenting and .68 to .78 for authoritative parenting. Scores from childhood were correlated over time ($r = .60$ and $.66$ for mothers and fathers, respectively, for authoritarian and $.58$ and $.45$ for authoritative, $ps < .001$). Therefore, for each parent separately, the age 4.5 years and Grade 3 scores were averaged. For each early parenting style, the higher of the mean mother and mean father scores was used in analyses because maximum scores increased variance and better represented high levels; fathers contributed 67% of early authoritarian parenting scores, whereas mothers provided 67% of early authoritative parenting scores. In adolescence, mother's scores for each style were correlated across Grades 7 and 9 ($r = .71$ and $.64$ for authoritarian and authoritative parenting, respectively, $ps < .001$) and were averaged to create two mean mother-report scores, one each for authoritarian and authoritative parenting. The parenting-style scores from childhood and adolescence were correlated at $r = .42$ and $.51$ ($ps < .01$) for authoritarian and authoritative parenting, respectively.

Parental alcohol use. Mothers reported on parental alcohol use at child age 4.5 years and in Grade 3 on three items for each parent: whether they drank regularly and had experienced objections to their drinking (0 = *no*, 1 = *yes*) and the number of drinks consumed daily. Using guidelines that recommend limiting intake to no more than one drink per day for women and two drinks per day for men (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010), parental alcohol consumption was scored as 0 (*none*), 1 (*up to one drink for women, two for men*), 2 (*two drinks for women, three for men*), 3 (*three drinks for women, four for men*), or 4 (*four drinks for women, five for men*), with higher daily levels reported only for men and scored as 5 (*six drinks*), 6 (*seven drinks*), or 7 (*eight drinks*). For each parent separately, the three item scores were summed at each

assessment; these were then averaged over time and across parents to yield mean parental alcohol use ($M = 0.90$, $SD = 0.76$, range: 0–4).

Adolescent deviant friends

In the spring of Grades 9, 10, 11, and 12, adolescents completed an adaptation of the Self-Report of Close Friends (O'Donnell et al., 1995), rating items from 1 (*not at all*) to 4 (*very much*) or answering yes or no. Alpha coefficients were .60 or greater for friends' substance use (e.g., "Have these people tried beer, wine, or liquor when their parents didn't know about it?"), friends' conduct problems (e.g., "Have these people done anything that could have gotten them in trouble with the police?"), and deviance with friends (e.g., "Have you ever stolen something together?"). These correlated scales (all $r_s \geq .62$, $p_s < .001$) were combined via principal component analysis to create scores for deviant friends at each grade; each first component accounted for 77%–81% of the total variance.

Adolescent alcohol use

Adolescent alcohol use was assessed as in major studies (e.g., Johnston et al., 2012; Wright et al., 2007). In the spring of Grades 9, 10, 11, and 12, adolescents reported if they had ever had an alcoholic drink and, if so, the typical number of drinks consumed per occasion in the past 30 days. The six response options were scored as 0 (*I don't drink alcohol*), 0.5 (*less than a drink*), 1 (*one drink*), 2 (*two drinks*), 3 (*three drinks*), and 5 (*five drinks*). At each grade, the number of drinks consumed per occasion ranged from 0 to 5 (Grade 9: $M = 0.74$, $SD = 1.72$; Grade 10: $M = 1.24$, $SD = 1.68$; Grade 11: $M = 1.52$, $SD = 1.72$; Grade 12: $M = 1.86$, $SD = 1.88$). We focused on per-occasion use because it has been studied in a range of preclinical research (e.g., Barr et al., 2009) and human adolescent studies (e.g., Englund et al., 2008), including our own (Burk et al., 2011), and because such work is important for understanding the well-documented growth across adolescence of both per-occasion use and the prevalence of heavy episodic drinking (Masten et al., 2008).

Preliminary data analyses

Data imputation. Per Little's Missing Completely at Random test, data were missing at random and thus were imputed with Amelia software (Honaker et al., 2009).

Data analysis plan. To address the first major question, regarding which early factors predicted alcohol use trajectories across high school, a two-level hierarchical linear model (HLM) separated within-individual ($n = 1,496$) and between-individual ($n = 374$) sources of variability in per-occasion alcohol consumption (Bryk and Raudenbush, 1992). Level 1 included years in high school (Time) as a within-individual

predictor capturing patterns of alcohol use across high school. The intercept thereafter reflects alcohol consumption at Grade 9. A quadratic function of years in high school (Time²) was also included in Level 1 to consider nonlinear progression of alcohol consumption. Early risk factors were entered as Level 2 predictors of between-individual variation in trajectories of alcohol use to identify variables that may influence consumption patterns.

To address the second major question, about which childhood factors moderated the covariation of alcohol use and deviant-friend affiliation, a second HLM was examined. Here, consumption was modeled as a function of affiliation with deviant friends (Level 1) to examine their covariation in high school. This allows HLM to provide an estimate of how changes in alcohol use covary with changes in deviant peer affiliation, modeling the dependency in the data (Sliwinski et al., 2006). Next, early risk factors were included as Level 2 predictors to examine how such factors may modulate the degree of covariation between alcohol use and deviant friends. In HLM models of covariation such as this, Level 2 predictors must interact with Level 1 predictors such that a Level 2 two-way interaction is, in effect, a three-way cross-level interaction (e.g., the Level 2 interaction of Disinhibition and Parental Alcohol Use interacts with Deviant Friends at Level 1). These analyses enable consideration of the extent to which adolescent drinking and deviant friends are associated within an individual across high school as well as factors that may influence their covariation.

For both models, secondary analyses included the adolescent maternal parenting variables to assess their possible mediation of childhood parenting. Although only mother's parenting was assessed in adolescence, and parental alcohol use was not measured in adolescence, these analyses begin addressing questions of developmental timing.

Independent variables were centered before analyses. All variables (main effects, two-way interactions between sex and each early factor and between temperament and parental factors, and three-way sex interactions) were entered simultaneously into models; for parsimony, interactions with p values greater than .1 were removed, although nonsignificant two-way interactions that were components of significant three-way interactions were retained.

Results

Table 1 provides correlations among the putative early risk factors. Associations were nonsignificant or small.

Preliminary analyses revealed significant variability in initial drinking levels, $\chi^2(373) = 1136.39$, $p < .001$, and linear consumption patterns, $\chi^2(373) = 804.81$, $p < .001$. In the first HLM, both time-related variables—years in high school and its square—were significant (Time $B = 0.507$, $t(373) = 7.13$, $p < .001$; Time² $B = -0.047$, $t(1493) = -2.06$, $p < .05$), indicating that amount of alcohol consumption increased

TABLE 1. Pearson correlations among putative early risk factors

	1	2	3	4
1. Sex				
2. Disinhibition	-.15**			
3. Parental alcohol use	-.02	.02		
4. Authoritarian parenting	-.01	.04	-.01	
5. Authoritative parenting	.07	.02	.16**	-.15**

Note: Sex is coded -0.5 = male, +0.5 = female.

** $p < .01$.

over time and that some individuals demonstrated faster rates of change than others.

Table 2 shows the effect of all retained variables and interactions on alcohol trajectories, with significant effects noted. A significant main effect of sex revealed that boys increased their per-occasion alcohol use across adolescence more than girls, as evidenced by a steeper slope. Parental alcohol use predicted higher levels of adolescent alcohol consumption in Grade 9, and this effect persisted over time.

Interactive effects were also identified. The Disinhibition \times Authoritative Parenting interaction predicted the intercept of alcohol use. Further examination revealed that individuals high in disinhibition who were raised by less authoritative parents displayed higher levels of drinking in Grade 9 compared with their counterparts. Further, the interaction of Disinhibition \times Authoritarian Parenting predicted the slope and slope² of alcohol use. As Figure 1 shows, the effect of early authoritarian parenting was evident only among adolescents who had exhibited low levels of childhood disinhibition, such that low-disinhibition children exposed to low authoritarian parenting displayed overall flatter slopes of adolescent alcohol use and, from Grade 11 to 12, slower rates of change, whereas low-disinhibition children exposed to high authoritarian parenting exhibited more rapidly increasing slopes at the end of high school. Further, the interaction of Sex \times Disinhibition \times Authoritarian Parenting

also predicted alcohol trajectories, with distinct patterns for females. Temperament-by-parenting interaction effects were found for both high- and low-disinhibition girls (Figure 2a). Whereas low-disinhibition girls demonstrated drinking patterns that varied as a function of parenting similar to the Disinhibition \times Authoritarian Parenting interaction effect outlined above, the opposite was found for high-disinhibition girls. For high-disinhibition girls, those exposed to low authoritarian parenting demonstrated consistently escalating patterns of alcohol consumption, whereas high-disinhibition girls exposed to high authoritarian parenting demonstrated consumption patterns that increased initially but flattened by Grade 12. There was no significant interaction between disinhibition and authoritarian parenting among boys (Figure 2b).

In the second HLM, which examined the covariation of drinking and deviant friends in high school, preliminary analyses revealed significant variability in the association between alcohol consumption and deviant friends, $\chi^2(373) = 531.72, p < .001$, and that deviant friends was a significant covariate of alcohol consumption ($B = 1.044, t(373) = 22.2, p < .001$), suggesting that drinking across adolescence fluctuated with corresponding changes in affiliation with deviant friends. Results examining possible early risk factors moderating the covariation of deviant friends and alcohol consumption across high school revealed a significant interaction of Disinhibition \times Parental Alcohol Use ($B = -0.223, t(360) = -2.54, p < .05$) such that low-disinhibition individuals exposed to low levels of early parental alcohol use were less likely to display adolescent drinking patterns that varied as a function of affiliation with deviant friends.

In secondary analyses for both models, which included measures of maternal parenting style in adolescence, the reported significant effects all persisted, except the trajectories intercept finding for the Disinhibition \times Authoritative Parenting interaction was reduced to a trend ($p = .054$).

TABLE 2. Prediction of per-occasion alcohol consumption across high school

Variable	Intercept		Slope		Slope ²	
	B (SE)	t	B (SE)	t	B (SE)	t
Intercept	0.75 (0.06)***	11.67	0.50 (0.07)***	7.21	-0.04 (0.02)	-1.95
Sex	-0.13 (0.13)	-1.04	-0.33 (0.14)*	-2.32	0.03 (0.04)	0.73
Disinhibition	0.10 (0.10)	0.98	0.17 (0.11)	1.54	-0.05 (0.04)	-1.43
Parental alcohol use	0.25 (0.09)**	2.70	0.07 (0.09)	0.71	-0.02 (0.03)	-0.73
Authoritarian parenting	0.10 (0.10)	1.02	-0.17 (0.11)	-1.50	0.05 (0.03)	1.45
Authoritative parenting	-0.22 (0.18)	-1.21	0.20 (0.20)	1.00	0.01 (0.06)	0.11
Disinhibition \times Parental Alcohol Use	-0.31 (0.16)	-1.85	-0.06 (0.14)	-0.40	0.04 (0.04)	0.87
Disinhibition \times Authoritarian Parenting	-0.12 (0.13)	-0.88	0.41 (0.17)*	2.34	-0.15 (0.05)**	-2.73
Disinhibition \times Authoritative Parenting	-0.51 (0.26)	-2.00*	0.28 (0.28)	0.99	-0.08 (0.09)	-0.91
Sex \times Disinhibition	-0.00 (0.20)	-0.00	0.17 (0.22)	0.79	-0.02 (0.07)	-0.28
Sex \times Authoritarian Parenting	0.03 (0.21)	0.13	0.28 (0.23)	1.19	-0.08 (0.07)	-1.12
Sex \times Authoritative Parenting	0.17 (0.36)	0.46	-0.08 (0.40)	-0.20	0.01 (0.13)	0.08
Sex \times Disinhibition \times Authoritarian Parenting	0.37 (0.27)	1.37	0.68 (0.35)	1.93	-0.26 (0.11)*	-2.33
Sex \times Disinhibition \times Authoritative Parenting	0.95 (0.52)	1.84	0.35 (0.55)	0.64	-0.09 (0.18)	-0.53

Notes: Sex is coded -0.5 = male, +0.5 = female. **Bold** indicates statistically significant result for predictors of interest.

* $p < .05$; ** $p < .01$; *** $p < .001$.

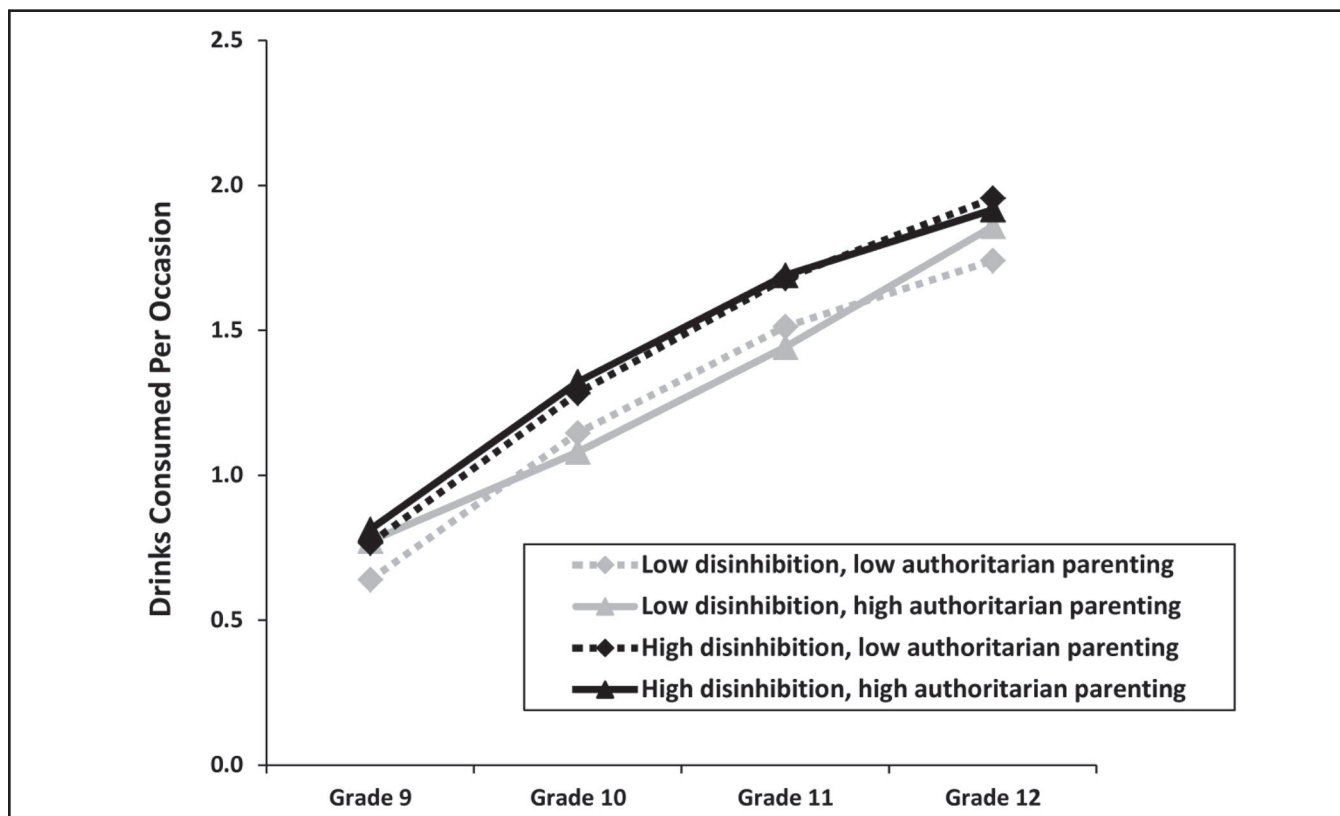


FIGURE 1. Effect of childhood disinhibition and early authoritarian parenting on slope and slope² of per-occasion alcohol consumption across high school for the full sample

Discussion

This study examined early risk factors influencing the course of per-occasion alcohol use across high school and the association between alcohol consumption and deviant friends during the same period. Consistent with findings from the National Longitudinal Study of Adolescent Health (Chen and Jacobson, 2012), sex was not associated with initial levels of alcohol use in Grade 9 but did predict increased use across high school, with a steeper slope for boys than girls. Also as expected, early parental alcohol use predicted increased initial levels of adolescent drinking that persisted over time, in keeping with prior studies of community (Alati et al., 2010; Duncan et al., 2006) and high-risk samples (Hussong et al., 2008; Wong et al., 2006). It may be that early parental drinking behaviors inform offspring's notions of normative drinking. However, because measures of parental alcohol use during adolescence were not available, developmental timing effects cannot be ascertained. It is possible that the influence of parental alcohol use during childhood is mediated by parental drinking during adolescence, when factors such as modeling of parental behavior and alcohol availability at home may be especially salient (Zucker et al., 2011).

Several interactive effects of childhood disinhibition with early parenting style and sex on trajectories of adolescent alcohol consumption were also identified. We anticipated that disinhibited children would drink more at the start of high school based on research associating childhood disinhibition, undercontrol, and novelty seeking with later alcohol use (Caspi et al., 1996; Kirisci et al., 2007; Mâsse and Tremblay, 1997). However, our findings suggest a more complex interplay between childhood disinhibition and early family factors in predicting adolescent alcohol use. Overall, early parenting style influenced the patterns of alcohol consumption in children low in disinhibition. Within low-disinhibition children, low authoritarian parenting predicted a more convex pattern of consumption, with a faster rate of change earlier in high school that leveled off by Grade 12, whereas high authoritarian parenting predicted a more concave pattern, with less consumption initially but a much steeper increase by Grade 12. We also observed a significant Sex \times Temperament \times Parenting interaction effect. Authoritarian parenting exerted a seemingly protective effect on highly disinhibited girls, such that highly disinhibited girls raised by less authoritarian parents demonstrated continuously increasing trajectories of alcohol consumption across adolescence, whereas those raised by highly authoritarian parents demonstrated less es-

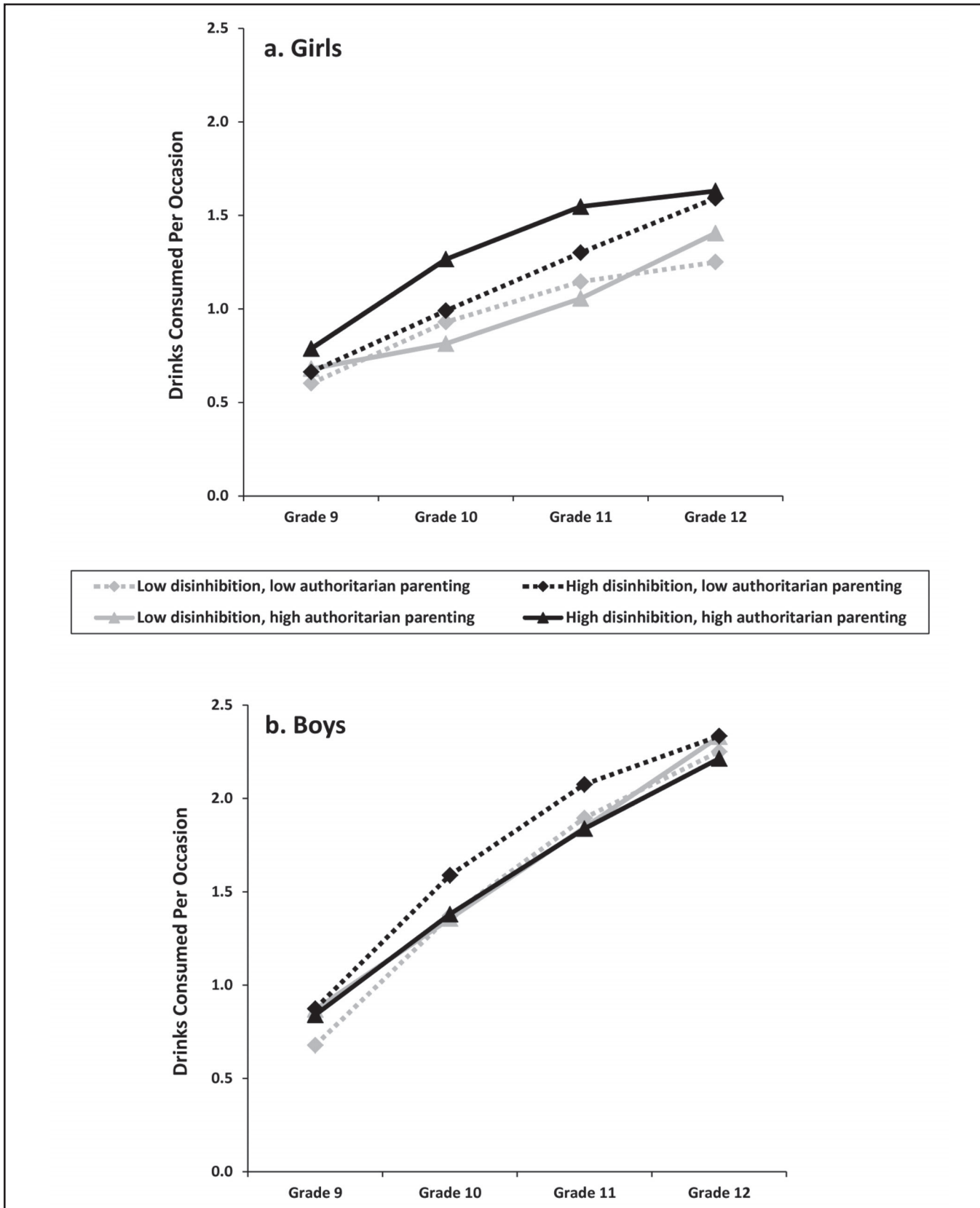


FIGURE 2. Effect of childhood disinhibition and early authoritarian parenting on slope² of per-occasion alcohol consumption across high school separately for (a) girls and (b) boys

calation over time. Furthermore, these effects persisted after controlling for the influence of more concurrent maternal parenting styles, suggesting that early parenting may exert lasting effects on offspring behavior. However, this finding must be interpreted with caution given that only mothers' parenting style was measured in adolescence.

The present findings support the notion of a temperament-by-parenting "goodness of fit" (Thomas and Chess, 1977) within low-disinhibition adolescents and high-disinhibition girls. This theory suggests that the interplay of parenting and temperament produces positive or negative effects. Kochanska (1991, 1993, 1995) has suggested that the combination of factors like these is important for the internalization of social norms and positive morals, because children must experience optimal levels of affective discomfort to develop an internalized conscience. For low-disinhibited children, low levels of control and punishment may be optimal for the development of internalization, as their own level of affective distress concerning a transgression may be sufficient for them to learn and internalize rules (Kochanska, 1991). Conversely, if low-disinhibited children are raised by overly punitive or controlling parents, they may have fewer opportunities for autonomous behaviors and thus be less likely to internalize social limits, or they may experience too much distress, resulting in a decreased ability to process and internalize parents' messages (Kochanska, 1995). Furthermore, authoritarian parenting of low-disinhibition children may result in later maladaptive behavior patterns when adolescents are under less parental supervision, possibly to assert their autonomy because they were unable to do so as children (Bates et al., 1998).

Highly disinhibited children may benefit from more authoritarian parenting because it elicits the level of arousal necessary to internalize social norms, thus curbing future externalizing behavior (Bates et al., 1998). The current findings suggest that this process may operate differently in boys and girls, with disinhibited girls' trajectories of alcohol use more positively influenced by this type of parenting. Although this is the first study to identify longitudinal sex differences in the interaction of disinhibition and authoritarian parenting predicting adolescent alcohol consumption, cross-sectional gender differences have been found for other parenting dimensions (Piko and Balázs, 2012) such that demandingness was protective for girls', but not boys', consumption patterns. An alternative explanation is that, overall, girls display higher levels of behaviors indicative of internalization (e.g., guilt and empathy; Kochanska et al., 1994; Zahn-Waxler and Robinson, 1995); therefore, highly disinhibited girls raised by authoritarian parents may better internalize parents' norms when younger, leading to less escalation in drinking over time. Further research is necessary, including examining whether girls with authoritarian parents develop different motivations for alcohol consumption than their male counterparts. To the extent that demanding parenting intensifies

internalizing processes for girls, in late adolescence and early adulthood they may become more likely to use alcohol as a solitary palliative for guilt and anxiety rather than for reasons of social conformity.

Disinhibition also interacted with authoritative parenting to predict the initial level of adolescent alcohol consumption, such that highly disinhibited children with low authoritative parenting demonstrated the highest level of alcohol consumption. These findings are in line with the notion that more cooperative, rather than power-assertive, parenting may promote the internalization of norms in disinhibited children (Kochanska, 1993, 1995). However, this effect was reduced to trend-level significance after including adolescent maternal parenting.

The only other study to examine early parenting styles in relation to adolescent alcohol trajectories found that authoritarian and authoritative parenting predicted similar trajectories of adolescent alcohol use over time (Luyckx et al., 2011); these divergent findings may be due to differences in parenting measures and analysis techniques. Additional research should examine which aspects of early authoritarian and authoritative parenting most influence adolescent alcohol consumption and whether the impact of early parenting is evident during the transition to young adulthood when alcohol use is more likely mediated by self-regulation rather than social regulation.

Childhood disinhibition, in interaction with family factors, was also important for the current study's second question: identifying moderators of the covariation of alcohol use and affiliation with deviant friends during high school. Consistent with other research (e.g., Barnes et al., 2006), adolescent drinking and deviant friends were associated across adolescence. Whereas most studies examine deviant peers as a predictor of alcohol use (Cruz et al., 2012; Duncan et al., 2006; Trucco et al., 2011; van der Vorst et al., 2009), we took a novel approach, examining how these behaviors covaried over time, and found that for most individuals the two were tightly linked. However, these effects were not universal: those low in childhood disinhibition and parental alcohol use were less likely to demonstrate tightly coupled drinking and deviant-friend affiliation across adolescence than same-age peers. This may result from two distinct processes. On the one hand, low-disinhibition children may be more likely to engage in adolescent alcohol consumption in response to internalizing problems and thus would not necessarily affiliate with deviant peers (Crum et al., 2008; Fröjd et al., 2011). On the other hand, children exposed to high levels of parental drinking may be genetically predisposed to engage in higher levels of adolescent drinking and affiliation with deviant peers (King et al., 2009). Thus, low-disinhibition children exposed to low parental drinking may be least likely to have a consistent link between their alcohol use and affiliation with deviant peers.

By taking an ecological, developmental perspective, the present study serves as a stepping-stone for future research. However, it is not without limitations. The relative racial and ethnic homogeneity limits generalizability. Also, although our adolescent alcohol use measure (i.e., per-occasion consumption) is well established, the results may not necessarily extend to other alcohol use measures. Further, because parallel assessments of early risk factors were not available in adolescence, we cannot rule out whether the observed effects would be mediated by later measures. Although secondary analyses suggested that the effects of early parenting style might be persistent, the availability of only mothers' scores in adolescence is limiting. Despite these drawbacks, our findings are consistent with existing research and extend it methodologically and conceptually. Future studies should build on this and other work both to identify early individual and contextual influences on alcohol use across adolescence and to examine the dynamic processes through which distal factors work together, extend into adolescence, and/or operate through other more proximal factors. Such research is needed to understand developmental timing effects, thereby providing much-needed information for applied and theoretical advancement regarding substance use etiology. Such information should improve our ability to identify individuals likely to experience the most negative outcomes, suggest new foci for prevention/intervention efforts, and ultimately contribute to the attenuation of the negative social, economic, and health impacts of underage drinking.

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