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Parental Alcohol Use, Parenting, and Child On-Time Development

Katarina Guttmannova[1], **Karl G. Hill**[2], **Jennifer A. Bailey**[2], **Lacey Hartigan**[2], **Candice M. Small**[2], and **J. David Hawkins**[2]

[1]Center for the Study of Health and Risk Behaviors (CSHRB), Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, Washington, USA

[2]Social Development Research Group (SDRG), School of Social Work, University of Washington, Seattle, Washington, USA

Abstract

This study examined whether parental alcohol use in adolescence, adulthood, and, for mothers, during pregnancy was related to their young children's functioning in terms of their on-time development as indicated by the number of developmental areas in which children experienced delay. Observed parenting practices and family socioeconomic status were tested as potential explanatory mechanisms of these links. Data came from the surveys and videotaped observations of a community sample of 123 biological parents and their 1-5 year old children followed longitudinally. Results suggest that the negative association between parental alcohol use and children's development operates primarily through fathers' alcohol use. Additionally, father's adolescent regular alcohol use predicted the family's low SES, which in turn predicted less-skilled maternal parenting practices and children's developmental delay.

Keywords

parental alcohol use; parenting; child on-time development; developmental delay

Young adulthood is the developmental period when alcohol use is at its peak (Centers for Disease Control and Prevention, 2012), with the majority of this alcohol use being at a regular but subclinical level (Harford, Grant, Yi & Chen, 2005; Windle, 2003). Young adulthood is also a time when many young adults are having children and starting to raise families of their own; however, very few studies have examined the effects of parents' subclinical levels of problem drinking on their young children's development. Subclinical drinking problems are prevalent in the general young adult population and their impact on child outcomes may be sizeable (Keller, Cummings, & Davies, 2005).

Most of the existing research on the consequences of parental alcohol use has focused on prenatal use and postnatal alcohol abuse and dependence. For example, it is clear that mother's heavy alcohol use during pregnancy can lead to fetal alcohol spectrum disorders

Correspondence: Katarina Guttmannova, Center for the Study of Health and Risk Behaviors, Department of Psychiatry and Behavioral Sciences, University of Washington, 1100 NE 45th St, Suite 300, Seattle, WA, 98105, USA. kg27@uw.edu.

(Grant, Huggins, Connor, & Streissguth, 2005; Streissguth, 2001; for review, see e.g., Larkby & Day, 1997; Mattson & Riley, 1998), reflecting a range of physical, behavioral, and cognitive problems. Moreover, studies of the consequences of parental postnatal alcohol abuse and dependence have shown it to be associated with a host of developmental difficulties in young children, including insecure attachment in infancy (Eiden, Edwards, & Leonard, 2002), lower behavioral adjustment in toddlers (Eiden, Leonard, & Morrisey, 2001), self-regulation problems (Eiden, Edwards, & Leonard, 2004), and behavior problems in early childhood (Edwards, Leonard, & Das Eiden, 2001).

Fewer studies have examined the association between sub-clinical levels of problem drinking in the general population on young children's development. Brook and her colleagues (Brook, Brook, Ning, Whiteman, & Finch, 2006; Brook & Tseng, 1995; 1996) found that maternal personality and current alcohol and illicit drug use interacted to impair toddler emotion regulation. Brook and Tseng (1996) also found that father protective factors offset the impact of current maternal drinking on toddler anger and negativity more than mother protective factors offset the impact of current paternal drinking. Keller and colleagues (2005) found that parental problem drinking, aggregated across mother and father dyads, predicted child behavior problems through its positive association with marital conflict and ineffective parenting. However, there is a lack of studies that examine longitudinally and explicitly the relationship between both mothers' and fathers' drinking in non-clinical samples, their parenting behaviors, and their children's developmental functioning.

Moreover, the studies of the impact of either parental clinical or subclinical drinking on early childhood functioning rarely consider the developmental history of parental drinking. Yet, research indicates that there is a developmental continuity in alcohol problems, particularly in the context of adolescent initiation of alcohol misuse (e.g., Guttmannova et al., 2011; Zucker, 2008). Alcohol problems typically do not arise suddenly in adulthood but are marked by a progressively more troubled involvement with alcohol. Specifically, studies indicate that early onset of alcohol misuse (particularly adolescent onset) predicts more severe alcohol problems in adulthood for both men and women (e.g., Dawson, Goldstein, Chou, Ruan, & Grant, 2008; DeWit et al., 2000; Grant & Dawson, 1997; Guttmannova et al., 2011; Hingson, Heeren, & Winter, 2006). Early onset of parental drinking may pose a risk for their children's development indirectly by increasing the likelihood of adult alcohol problems. Furthermore, women who misuse alcohol early (De Genna, Larkby, & Cornelius, 2007), and those with higher pre-pregnancy consumption (for review, see Skagerstrom, Chang, & Nilsen, 2011) are more likely to use alcohol in pregnancy. Alcohol use in pregnancy has been shown to predict a host of adverse outcomes for children. These have ranged from pervasive developmental damage as manifested in fetal alcohol syndrome resultant from heavy alcohol use in pregnancy (e.g., Larkby & Day, 1997; Mattson & Riley, 1998) to less drastic but nevertheless damaging effects of moderate alcohol exposure (Jacobson & Jacobson, 2002; Willford, Richardson, Leech, & Day, 2004); although results from some studies have been mixed (for review, see e.g., Testa, Quigley, & Eiden, 2003).

Importantly, early onset of alcohol misuse predicts not only more pronounced subsequent alcohol problems in adulthood but can also interfere with young people's educational

attainment and successful transition to adulthood (e.g., Bachman et al., 2008; Cook & Moore, 1993), which can have consequences for the well-being of their children. It may well be that adolescent onset of alcohol misuse is more associated with later toddler functioning than is current parental drinking. The present study examined the relationship between parental alcohol use in adolescence and young adulthood, and for mothers, during pregnancy and their young children's developmental functioning using an intergenerational, longitudinal, community sample.

Hypothesized developmental pathways of influence

Parental alcohol use may affect children's development through proximal as well as distal mechanisms. Specifically, we hypothesized that one pathway of influence of parents' alcohol use on their children's development involves the proximal mechanism of disrupted parenting practices. Studies indicate that parental alcohol misuse in adulthood, particularly clinical levels of misuse, predicts lower parenting skills. For example, fathers of infants who engage in problem drinking have been found to be less sensitive and have fewer positive verbal interactions than control fathers (Eiden, Chavez, & Leonard, 1999), and to be more likely to engage in corporal punishment of their young children (Lee, Perron, Taylor, & Guterman, 2011). Mothers who misuse alcohol are more likely to engage in harsh, punitive parenting (Miller, Smyth, & Mudar, 1999). Similarly, studies of alcohol and substance abusing mothers in clinical samples indicate that these mothers are less responsive to their child's positive or age-appropriate behavior and show more problems in affective and behavioral involvement with their infants than mothers in a non-substance abusing comparison group (Pajulo et al., 2001). Therefore, a proximal pathway of influence of parental alcohol misuse on child outcomes could involve its impact on parenting.

While mothers' and fathers' drinking behavior (e.g., Eiden et al., 2002; Keller et al., 2005) and their parenting skills (e.g., Eiden et al., 2002, Keller et al., 2008) have been shown to be positively related, these relationships are not perfect. One might expect that when one partner engages in substance use behaviors that could adversely impact their child's functioning, the other partner's parenting could buffer these effects (Brook & Tseng, 1996; Velleman, 1992a, 1992b). Some studies that examined the link between parental misuse of alcohol, parenting, and their children's outcomes have either not distinguished between maternal and paternal alcohol misuse, have examined them separately, or have focused solely on paternal use (Burke, Schmied, & Montrose, 2006; Christoffersen & Soothill, 2003; Keller et al., 2005; Miller et al., 1999; Velleman, 1992a). In other studies, maternal and paternal alcohol use was modeled separately but their parenting behaviors were combined into one construct (e.g., Keller et al., 2008). In this study, we examined the extent to which current maternal and paternal alcohol use predicts child functioning through the proximal mechanism and unique contribution of parenting of both mothers and fathers. Assessment of parenting skills was guided by the *Social Development Model* (SDM; Catalano et al., 2005; Hawkins & Weis, 1985), which builds on *Social Control Theory* (Hirshi, 1969), *Social Learning Theory* (Bandura, 1977), and *Differential Association Theory* (Sutherland & Cressey, 1970). The SDM specifies how interaction of individuals with their social environment relates to their development within and across generations. Tests of the SDM predicting a range of prosocial and antisocial outcomes have fit the data well and have

explained between 11% and 45% of the variance in outcomes (Catalano et al., 1996; Lonczak et al., 2001; Catalano et al., 2005; Huang, Kosterman, Catalano, Hawkins, & Abbott, 2001). According to the SDM, when developmental processes are consistent in matching opportunities, involvement, skills, and reinforcement for individuals, a social bond develops between those individuals and the socializing unit (e.g., family), which predicts subsequent development. The parenting skills assessed observationally in the present study draw on the key constructs in the SDM including *skills* to participate in the interaction, *opportunities* for involvement in activities and interactions, and *rewards for* prosocial interactions that parents provide for their children.

Alternatively, the pathway linking parental alcohol misuse and child development could involve more distal mechanisms of influence. Specifically, alcohol misuse in adolescence has been associated with a host of adverse outcomes in addition to the aforementioned substance use problems. For example, studies indicate that adolescent alcohol misuse can affect adolescent brain development and functioning (e.g., De Bellis, 2005; Ehlers & Criado, 2010; Volkow & Li, 2005; Witt, 2010), and interfere with prosocial involvement such as school engagement (for review, see Lynskey & Hall, 2000). Consequently, adolescent alcohol misuse has been associated with lower enrollment in postsecondary education, lower educational attainment and lower earning power in adulthood (e.g., Bachman et al., 2008; Staff, Patrick, Loken, & Maggs, 2008), all salient indicators of family socio-economic status in adulthood. Family SES has been, in turn, shown to predict children's health, socio-emotional, behavioral and cognitive outcomes either through differential access to resources or through exposure to stressful conditions of poverty (for review, see e.g., Bradley & Corwyn, 2002). Therefore, a distal pathway of influence from parents' alcohol misuse in adolescence to their children's functioning could lead through lower family SES indicative of a higher likelihood of diminished resources and potentially more stressful developmental environment. The present study examined the extent to which the relationship between parents' early alcohol misuse and their children's functioning operates through the distal mechanism of lower family SES.

The primary objective of the present study was to examine the relationship between parental alcohol use in adolescence, adulthood, and, for mothers, during pregnancy, and their young children's developmental functioning. A proximal pathway involving observed parenting practices and a distal pathway involving family SES were tested as potential explanatory mechanisms of these links. Furthermore, the study examined explicitly the roles of both maternal and paternal substance use and parenting behaviors on their children's developmental functioning.

Methods

Sample

The data came from two related longitudinal studies: the Seattle Social Development Project (SSDP) and The SSDP Intergenerational Project (TIP). SSDP is a longitudinal study that has followed youths from elementary school to adulthood, examining prosocial and antisocial development across the life span. In the fall of 1985, all fifth-grade students (N = 1053) in 18 Seattle public elementary schools serving higher crime areas were invited to participate

in the study. Consenting participants (N = 808, 77% of the eligible students) were assessed annually from ages 10 to 16 years, and then every 3 years from age 18 through age 33 in 2008.

TIP is a longitudinal study of the SSDP participants who had become parents, their children, and the children's other primary caregivers. In 2002, when the SSDP participants were about 27 years of age, they and their families were invited to participate in TIP if they had a biological child with whom they had a face-to-face contact on at least a monthly basis. In cases of multiple children, the oldest biological child was selected as the focal participant, these children ranged in age between 1 and 13 years in Wave 1. As the original SSDP participants became parents and therefore eligible for participation in TIP, a rolling enrollment strategy was used to recruit them on an annual basis. The present study uses data from the first three waves of the TIP study, which occurred between 2002 and 2005. By Wave 3, the SSDP parents were on average 30 years of age and their children, because of the rolling enrollment of SSDP participants as they became parents and therefore eligible for the TIP study, were between 1 and 16 years of age. About 43% of the original SSDP sample met the eligibility criteria for participation in TIP during this time period (N = 350), and 77.4% consented to participate (N = 271). SSDP mothers as compared to fathers and those participants who were married vs those were not were more likely to meet eligibility criteria for inclusion in the TIP study (i.e., regular, face-to-face contact with the child). Eligibility for TIP in the first three waves did not differ by ethnicity or childhood poverty status. Once eligible, families were more likely to be recruited if the SSDP parent was Caucasian American and less likely to be recruited if the SSDP parent was Asian American when compared to the rest of the sample. Retention rates were high, on average 90% between the three waves. TIP interviews with parents and their children were timed to occur within 6 weeks of the child's birthday each year and were conducted in person by trained interviewers.

The present study examines on-time development using a measure designed to assess developmental functioning of children up to the age of 5. Therefore, the data analytic sample includes the 123 1- to 5-year old children and their biological parents who participated in the first three waves of the TIP study (all age-eligible children from that time-frame). Of these 123 children, 53.7% were male, 40.5% were White, 13.2% African American, 9.9% Native American, 9.1% Asian, 16.5% multiple, and 10.7% other ethnicities. Because of the SSDP TIP sampling design and the specific focus on the 1- to 5-year-old children of this study, none of the biological mothers that were included in the present data analytic sample gave birth to the target child in adolescence (i.e., before age 18), and all but two mothers were at least 20 years of age at the time of birth. There were 111 biological mothers and 100 biological fathers who were primary caregivers of these children. Of these biological parents, 123 were the original SSDP participants (62 mothers, 61 fathers) and 88 (49 mothers, 39 fathers) were the other primary caregivers whose first data collection occurred within the TIP study. More than three quarters of mothers (75.9%) and 64% of fathers reported having some post-secondary or higher education; and 21.2% of families reported TANF receipt in the first wave they participated in the TIP study.

Measures

Predictors

Observed maternal and paternal parenting skills: The Intergenerational Study and its observational coding system are guided by the *Social Development Model* (SDM; Catalano et al., 2005; Hawkins & Weis, 1985). The maternal and paternal parenting skills were assessed observationally in the present study and draw on the key constructs of the SDM described in the introduction. The present study focused on the interaction between parents and their children. Parents and children participated in the Parent-Child Interaction Task (PCIT; Eyberg & Robinson, 1983; Forehand & McMahon, 1981) that included the following three play activities, organized in order of increasing constraint on child behavior: child-directed play, parent-directed play, and cleanup. Eight trained coders rated the videotaped interactions in order to assess parents' skills using Noldus Observer (v. 5.0) software. The observational coding produced two types of data: micro and macro system codes. The micro-system coded the moment-to-moment family interactions in a dynamic manner and focused on specific behaviors of the parent and child separately. The macro-system coded the global patterns of family interaction and assessed the behavioral and emotional characteristics of the family members, the nature of their behavioral exchanges and the overall attributes of the family processes. The coders used all behaviors that occurred during the tasks in their ratings. The macro coding was conducted by the same observers using a paper and pencil questionnaire including a combination of yes/no and Likert-type items either during or right after the micro-coding was completed. It was the macro-codes that were used in the present study.

The parenting skills composite was computed as an average of observer ratings on parenting competence, and prosocial socialization. These constructs have their roots in the Social Development Model and focus on parental *skills* to participate in the interaction, *opportunities* for involvement in activities and interactions, and *rewards for* prosocial interactions that parents provide for their children. Based on prior studies, the prosocial opportunities and rewards parenting constructs have been combined into a prosocial socialization scale (Bailey, Hill, Guttmannova, Oesterle, Hawkins, Catalano & McMahon, 2013; Huang et al., 2001; Lonczak et al., 2001). The child-directed play was the first task, the parent-directed play and cleanup were the second and third tasks respectively; the ratings on each item were averaged across these three tasks. The prosocial socialization composite included 15 items on prosocial opportunities and rewards (Bailey et al., 2013), such as “Caregiver expressed positive feelings about the child in response to the child's prosocial involvement” (α = .92 across the three tasks or play activities combined). The parenting competence composite, which included four items, assessing whether caregiver seemed “effective in parenting the child”, “confident of parenting skills”, “appeared to be overwhelmed or intimidated by the child” and “manipulated or controlled by the child” (α = .87 across the three tasks combined), was recoded to go in the same direction and standardized before averaging with the standardized prosocial socialization construct. The correlation between parenting competence, and prosocial socialization domains was high ($r=.52$, $p<.001$ for mothers and $r=.55$, $p<.001$ for fathers) and both domains related similarly to other variables in the study. Again, because of the rolling enrollment strategy and the accelerated longitudinal design of the study, some children did not join TIP until later waves,

while other children met criteria for participation in both waves. For those children who participated in both waves of the observational task (57.7% of the data analytic sample), their observational data was averaged across waves. The cross-wave stability in parenting constructs was acceptable (ranging from r=0.30 to 0.39, p<.001).

The psychometric attributes of the coding system were adequate. Coders received extensive training – between 160 and 175 hours – in coding, as well as in understanding the context, meaning, and cultural differences in behavior. Approximately 20% of the videos were selected randomly and double-coded for the purposes of checking coder reliability. The measure of inter-coder agreement for the macro coding data was computed by comparing the ratings each coder had entered on the macro-system forms for the same family. For Likert-type items, agreement was defined as coders either choosing the same response option or choosing a response option within 1 of the other coders. For example, two coders who, respectively, rated an item as 3 and 3, as 3 and 2, or as 4 and 3 were considered in agreement; if one coder rated an item as 3 and the other rated it as 5, the two coders were in disagreement. For yes/no items, agreement was defined as coders choosing the same response option. The percentage of agreement was calculated by deducting the number of disagreements, then dividing the number of similar answers by the total number of questions on the macro form. To be considered reliable on macro-codes, coders were required to maintain a minimum of 75% agreement with other coders. In waves 1 and 2, the two waves for which this observational data was available, coders achieved 90% agreement across the total of 144 items rated in the macro-code system that involved a wide range of task specific ratings of child behavior and affect (such as “Child enjoyed playing with toys”), parent behavior (“Caregiver reacted positively verbally or nonverbally to child's ideas or opinions”), and parent-child interaction (e.g., “Family members were actively engaged in tasks”). As described above, the scales used in the present study were computed from these ratings and focused on parenting behaviors and interactions with child related to prosocial socialization and parenting competence grounded in the Social Development Model (Catalano et al., 2005; Hawkins & Weis, 1985).

Adolescent regular alcohol use: A measure indicating whether or not the mothers and fathers initiated regular drinking before age 18 was based on prospective and retrospective assessments of their adolescent alcohol use. The new study participants (i.e., the biological parents who were not part of the original SSDP study) were asked whether, before they were 18 years old, there was ever a period when they drank alcohol weekly. Those that responded “yes” were coded as 1, “no” as 0. For the original SSDP participants, regular alcohol use was based on prospective data collected over the course of adolescence starting at age 10. The age at initiation of regular alcohol use was derived by computing the respondents' age at each interview and defined as the earliest age at which respondents reported having drunk alcohol 3 or more times a month (Guttmannova et al., 2011). To be consistent with the alternate caregiver measure from the TIP interview, the prospective age of onset of regular drinking was dichotomized, coding those with onset of regular drinking before age 18 (= 1) or not (= 0). About 26% of mothers and 22.4% of fathers initiated regular drinking before age 18.

Prenatal alcohol and tobacco use: Biological mothers reported on the frequency of gestational alcohol and tobacco use. As in prior studies with this sample (Gavin, Hill, Hawkins & Maas, 2011), alcohol use was coded as 0 = never (79.3%), 1 = almost never (16.2%), and the few mothers (4.5% of the data analytic sample) that reported alcohol use with any periodicity were coded 2; tobacco use was coded as 0 = never (82%), 1 = less than one cigarette a day (5.4%), and 2 = daily smoking of one or more cigarettes (12.6%). These measures were then standardized and averaged into an index of prenatal alcohol and tobacco use.

Young adult alcohol use: Mothers and fathers reported on the amount of alcohol they typically drink on those days when they drink alcohol (1 = never or less than one drink to 9 = 12 or more) in the first wave the family was interviewed for TIP. About 39.6% of mothers and 16% of fathers reported having less than one drink, while almost 20% of mothers and 32% of fathers reported having 3 or more drinks on days when they drink alcohol. Standardized maternal and paternal current alcohol use variables were used in these analyses.

Family low socioeconomic status: Low family SES was indicated by low parental educational attainment (1 = less than eighth grade to 11 = post 4-year college), low income (low annual income-to-needs ratio computed from annual household income adjusted for household size and the federal poverty guidelines), and the family receipt of welfare assistance including Temporary Assistance to Needy Families (TANF), Aid to Families with Dependent Children (AFDC), or Food Stamps (coded as 1 = yes, 0 = no) in the 1st year the family participated in the study. These indicators were recoded to go in the same direction, standardized, and averaged, with higher scores indicating lower family SES.

Outcomes

Child On-time Development: the overall on-time development status and the amount of developmental delay: Parents completed the Ages and Stages Questionnaire (ASQ; Squires, Bricker, & Potter, 1997) to assess on-time development in children ages 4 to 60 months in multiple domains of developmental functioning. The ASQ has been shown to have excellent psychometric properties in a wide range of national and international samples, including low- and middle-income families (Squires, Potter, Bricker, & Lamorey, 1998), and low birth weight (van Wyk et al., 2012) and preterm infants (Kerstjens et al., 2009). The reading level is approximately Grade 5 and it takes about 10 to 15 minutes to administer. In waves 1 – 3, the parents of age-eligible children completed the questionnaires in the domains of gross-motor, fine-motor, communication, problem-solving, and personal-social development. Each age-graded questionnaire contains 30 items divided across the five developmental domains such as “While holding onto furniture, does your baby lower herself with control (without falling or flopping down)?”, “Does your baby help turn the pages of the book?”(examples of items from 12 months questionnaire in gross motor and fine motor domains, respectively). Response options for each item are “yes,” “sometimes,” or “not yet”, scored 10, 5 or 0, respectively. Questionnaires are scored by summing up the domain scores and comparing each domain with the screening cut-off score for that domain (Squires, Potter, Bricker & Lamorey, 1998; Squires, Potter, & Bricker, 1999). The cut-off scores are

based on large standardized samples of children from diverse backgrounds and represent 2 standard deviations below the domain mean. A score at or below the screening cut-off scores in one or more domains indicates that the child is at "risk" and should be referred for further evaluation of developmental progress (Squires et al., 1998).

In order to assess the extent of the developmental delay, an indicator of developmental functioning was computed as a count variable of the number of areas below the screening cut-off in each wave (12.6% of sample had experienced a delay in two or more areas of development at Wave 1; 10.6% at Wave 2, and 6.5% at Wave 3 assessment). This outcome was favored over the simple summary score because of its practical and clinical significance. Overall, 39% of children had experienced a delay in at least one domain of development. In addition, sensitivity analyses were conducted with developmental functioning outcome operationalized as a dichotomous variable indicating on-time development status in each wave with 1 = on-time development with all areas above the screening cut-off (i.e., no developmental delay), and 0 = not all developmental areas above the screening cut-off (i.e., risk of delay some developmental areas). The results from these sensitivity analyses yielded analogous results (not shown but available from the first author).

Analytic Strategy—To capitalize on the accelerated longitudinal design of the study, the present analyses use random coefficient growth modeling with individually varying ages at observation over time, a powerful approach to modeling individual variation in outcomes across development (Muthén & Muthén, 2000). This approach allows for modeling of longitudinal outcomes within and across children while allowing for individually varying times of observation (Muthén, 2000), thereby enhancing the power and stability of parameter estimates (Singer & Willett, 2003). First, a series of unconditional models were fit to the data, and described the pattern of change in the outcome for each individual in the sample. Then, the conditional models that included the predictors of the outcomes were fit to the data. The number of areas below the screening cut-off at each time point was specified as a count indicator of the latent growth factors. In order to minimize potential bias due to some missing data, full information maximum likelihood estimation (FIML; e.g., Graham, 2009) was implemented using the maximum likelihood estimator with robust standard errors in Mplus 7 (Muthén & Muthén, 1998-2013) in all analyses.

Results

Descriptive findings

Zero-order correlations among the study variables and the descriptive statistics including means and standard deviations for all study variables are presented in Table 1. On a bivariate level, mothers' regular alcohol use in adolescence was positively related to their use of alcohol and tobacco in pregnancy as well as fathers' regular alcohol use in adolescence. Fathers' regular use of alcohol in adolescence was also positively related to maternal alcohol and tobacco use in pregnancy, their own alcohol use in adulthood, and the family's low SES as well as their later children's amount of developmental delay. Maternal alcohol and tobacco use in pregnancy was positively related to their alcohol use in adulthood and the family's low SES. Fathers' alcohol use in adulthood was positively related to low family

SES, which was negatively related to mothers' parenting skills. In addition, there was a positive association between mothers' and fathers' alcohol use in adulthood as well as between their parenting skills. Finally, the amount of children's developmental delay was also positively related to paternal alcohol use in adulthood, and negatively related to maternal and paternal parenting skills.

Unconditional and Conditional Models

Unconditional models: A series of unconditional latent growth models with no predictor variables were estimated to examine the pattern of change in the amount of developmental delay. The intercept-only model (sometimes called unconditional means model, Singer & Willett, 2003) was evaluated against the linear growth model (i.e., one that included the intercept and linear slope latent growth factors) in terms of absolute value on three comparative fit indices: the Akaike Information Criterion (AIC, Akaike, 1987); Bayesian Information Criterion (BIC, Schwarz, 1978); and Sample-size Adjusted BIC (SABIC, Sclove, 1987). The growth function that best fit the developmental functioning outcomes over time was the intercept-only model. The comparative fit indices are summarized in Table 2 and indicate a better fit for the intercept-only models across all indices. Accordingly, the mean and variance of the linear slopes in the linear growth models of both outcomes were not statistically significant (M_{s0}= 0.14, p=.15; V_{s0}=.01, p=.47 for the amount of developmental delay model). In other words, while there was a variation among children in terms of the amount of developmental delay, there was no systematic change in their developmental functioning over time. Consequently, the conditional models were estimated as intercept-only models and it was the variance of the intercept that was to be explained by the hypothesized predictors.

Conditional models: Associations between *maternal* alcohol use, parenting, family SES, and child developmental functioning examined in Model 1(predicting the amount of developmental delay) are presented in Table 3 and Figure 1. Maternal regular alcohol use in adolescence predicted greater use of alcohol and tobacco in pregnancy. Prenatal substance use was positively related to low family SES. There was also an indirect association between low family SES and child developmental functioning wherein low family SES predicted lower scores on parenting skills among mothers, and low parenting skills in turn predicted the amount of child's developmental delay, although this indirect effect was significant only at the trend level ($b_{indirect}$=.21 [se=.12], p=.073). There was also a direct negative relationship between mothers' regular alcohol use in adolescence and their children's developmental functioning.

Associations between *paternal* alcohol use, parenting, family SES, and child developmental functioning were examined in Model 2and the results are presented in Table 4 and Figure 2. Fathers' adult alcohol use was negatively associated with their children's developmental functioning: there was a positive association between fathers' adult alcohol use and the amount of developmental delay. Fathers' regular alcohol use in adolescence was indirectly related to child developmental functioning by being positively related to their own adult alcohol use, which in turn predicted worse developmental functioning of their children

($b_{indirect}$=.31 [se=.13], p<.05). Regular adolescent alcohol use was also positively related to low family SES in adulthood. No other paths were statistically significant.

Finally, Table 5 summarizes the results from Model 3 that used data from both parents and tested associations between *maternal* and *paternal* alcohol use, parenting skills, family SES, and the amount of developmental delay. Figure 3 offers a pictorial representation of the associations examined in Model 3. Again, maternal regular alcohol use in adolescence was positively related to her alcohol and tobacco use in pregnancy. Maternal and paternal alcohol use in adulthood was positively related, as was mothers' prenatal alcohol and tobacco use and low family SES. No other associations with maternal alcohol use variables were significant. In addition, the positive relationship between maternal and paternal alcohol use in adolescence that was statistically significant in bivariate associations (p<.05), was significant only at “trend level” in the full model (p=.07). The direct negative relationship between mothers' regular alcohol use in adolescence and their children's development that was evidenced in Model 1 was no longer significant. Statistically, the positive associations between mothers' and fathers' alcohol use in adolescence and adulthood described above could account for this attenuation. However, the present data do not allow us to explicitly test the plausibility of partner selection effects. The discussion section includes a brief discourse on this hypothesis.

As in the father-only model, fathers' regular alcohol use in adolescence predicted their increased alcohol use in adulthood, which in turn predicted worse developmental outcomes for their children. Fathers' regular alcohol use in adolescence also predicted lower family SES, which in turn predicted lower maternal parenting skills. Lower maternal parenting skills predicted lower child developmental functioning. Maternal and paternal parenting skills were positively related but no other variables were significantly related to fathers' parenting skills. The predictors explained a significant proportion of variance in the outcomes, i.e., a variation among children in terms of the amount of developmental delay: with their inclusion, the variance of the intercept of the amount of developmental delay latent variable, while still statistically significant, was sizably reduced (v_1=.78, SE_1=.33, p=.018 as compared to the variance of the intercept from the unconditional model v_0=1.42, SE_0=.41, p<.001).

Sensitivity analyses

Additional sensitivity analyses examined the relationship between adolescent family SES, adolescent onset of regular drinking, and adult family SES. Specifically, to explore the possibility that the association between adolescent alcohol use and adult family SES is spurious (i.e., one in which common risk factors give rise to both), we conducted a series of sensitivity analyses that included adolescent family SES (with the caveat that this data was available only for the parents who were part of the original SSDP study). As would be expected, adolescent family SES and adult family SES were positively related (r = .18, p < .05 for the biological mothers and r = .28, p < .001 for the biological fathers from the original SSDP sample). However, adolescent family SES was not related to regular adolescent alcohol use (r = .05 [se = .04], p = .20 for the biological mothers and r = .02 [se = .04], p = .64 for the biological fathers from the original SSDP sample). In fact, mothers' and fathers'

adolescent SES was unrelated to any other variables in the model. Therefore, adolescent family SES was not a plausible confound or “third variable” in this sample.

Discussion

In this study, we examined the relationship between both maternal and paternal adolescent and adult alcohol use and their children's developmental functioning. Observed parenting practices and family SES were tested as potential explanatory mechanisms of these links. We found evidence of both proximal and distal influences of parental alcohol use on child developmental outcomes.

The present analyses suggest that, in this longitudinal community sample, the associations between parental alcohol use and developmental functioning among 1- to 5-year-olds operate primarily through fathers' alcohol use. Specifically, fathers' adult alcohol use was strongly related to delays in their children's on-time development in the first five years of life. This finding is consistent with the body of research involving clinical samples of alcoholic fathers that documents the association between paternal alcohol misuse and maladjustment in younger children (e.g., Eiden et al., 1999) as well as in older children, particularly on their substance use problems (e.g., Chassin, Curran, Hussong, & Colder, 1997; Ohannessian & Hesselbrock, 1994). Furthermore, consistent with the literature, fathers who engaged in regular alcohol use in adolescence had higher alcohol consumption in adulthood. Thus, there was also an indirect association between fathers' early alcohol misuse and their child's developmental functioning.

In addition, we found that father's regular use of alcohol in adolescence predicted the family's low socioeconomic status, which in turn predicted poorer maternal parenting practices and children's developmental functioning. This further supports the notion that fathers' alcohol misuse in adolescence – before they establish their families – may have negative consequences for the developmental functioning of their children when they become parents. Furthermore, these results are consistent with the body of research that documents the relationship between adolescent onset of alcohol misuse in men and lower socioeconomic status in adulthood (e.g., Krohn, Lizotte, & Perez, 1997; Staff et al., 2008). Finally, the results are also in support of research documenting that low-skilled parenting is an important mechanism through which poverty affects child development (e.g., Garrett, Ferron, Ng'Andu, Bryant, & Harbin, 1994; McLoyd, 1990).

Parenting skills and practices predicted children's developmental functioning. Specifically, children's moment-to-moment interactions with their parents including their opportunities and rewards for prosocial interaction and parenting skills predicted the extent of developmental delay – the number of developmental areas below the screening cut-off. These findings are consistent with the Social Development Model (SDM), which hypothesizes that skilled parenting with opportunities and rewards for prosocial interaction predicts positive youth development in a variety of domains (e.g., Catalano, Fagan, Gavin, et al., 2012; Catalano & Hawkins, 1996). The SDM has, thus far, been primarily used to predict prosocial and antisocial behavior. This study is the first to extend the SDM to outcomes denoting fundamental developmental skills and milestones of early childhood.

However, only mothers' (and not fathers') parenting practices predicted child developmental functioning. This finding is consistent with some other studies of parental substance use (e.g., Brook & Tseng, 1996; Kandel, 1990) and could be because the children were still relatively young, so the mothers were more likely to be involved in their day-to-day care and possibly more attuned to their development. It is critical to stress that we are not suggesting that fathers are unimportant. Indeed, the main findings highlight one of the potential influences of fathers in their young children's development. However, it appears that in this study, given the children's young age and the developmental outcome under consideration, these associations did not operate directly through fathers' parenting skills. It is possible that for older children and a wider range of outcomes, the relationship between paternal parenting skills and child functioning would be evidenced.

In addition, mothers who began regular drinking before age 18 consumed more alcohol and tobacco during pregnancy, a finding that has also been found in samples of teen mothers (De Genna et al., 2007). Yet, we did not find an additional developmental continuity in mothers' alcohol use over time. Specifically, the relationship between mothers' alcohol use in pregnancy and their alcohol use postpartum, while positive, was not statistically significant. This could be because ours was a community (non-clinical) sample of mothers with a relatively low prevalence of substance use during pregnancy and their alcohol use postpartum was also relatively low. In other studies, the prevalence of substance use has been shown to decrease as women transition to marriage and parenthood (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997). Similarly, the lack of relationship between mother's alcohol use in pregnancy and postpartum and children's developmental functioning could be due to the same reason of relatively low prevalence. Furthermore, some studies suggest that the effects of maternal alcohol misuse on child functioning might be cumulative and manifest themselves in later years of development as the child's exposure to parental alcohol misuse steps up or lengthens (for review, see Burke et al., 2006). Future studies should examine these relationships in samples with higher prevalence of alcohol use and/or in mothers of older children (i.e., in later postpartum).

In the present study, we observed a direct association between fathers' adult alcohol use and child developmental functioning that was not explained by family SES or paternal parenting practices. Future studies should investigate other mechanisms by which paternal alcohol use may affect early childhood developmental functioning. For example, Keller and colleagues (2008) in their investigation of the relationship between community levels of drinking problems and school-age children's internalizing and externalizing problems demonstrated that fathers' problem drinking was positively related to marital conflict, which predicted lower parenting skills and more child behavior problems. In the discussion of their findings, they suggested that one occasion of problem drinking (as problem drinking was assessed on single occasion only in their study) might be indicative of previous or future occasions of problem drinking and the results of our study support this hypothesis. In the present study, there was a strong continuity between fathers' adolescent regular alcohol use and their alcohol use in adulthood. It is possible that had marital conflict been assessed in the present study, it could have mediated the relationship between father's adult drinking and their children's on-time development. On the other hand, some research suggests that alcohol can have heterogeneous effects on partnership and marriage, citing both positive effects such as

fostering warmth and intimacy between partners and negative effects of alcohol such as conflict and violence (Leonard & Eiden, 2007). Future studies, particularly those that assess marital conflict as well as partners' warmth toward one another should examine this hypothesis.

Relatedly, as described earlier, the observed parenting constructs used in this study were grounded in the Social Development Model assessing parenting skills in terms of competence and prosocial socialization and were psychometrically sound. However, they did not explicitly focus on the traditional construct of parental sensitivity or warmth. Based on the prior studies (e.g., Eiden et al, 2002), it is possible that the relationship between paternal adult alcohol use and child on-time development could be mediated by paternal sensitivity, as was demonstrated in a sample of alcoholic fathers and the relationship between their alcohol problems and the father-infant attachment security. Furthermore, the association between child developmental functioning and parenting practices is likely bidirectional and this has not been explicitly tested in the present study. Future studies should examine these hypotheses.

Finally, consistent with other studies, we found some evidence of alcohol-related partner selection (e.g., Agrawal et al., 2006). Under the partner selection (or assortative mating) hypothesis, mothers' and fathers' alcohol use would be positively related and that is indeed what we found for both adolescent and adult alcohol use. Furthermore, a sizeable, positive relationship was also evidenced for their parenting skills. While the present data and modeling approach cannot directly address it, future studies should explore the partner selection hypothesis and its effects on child outcomes. Specifically, a study that could both (a) explore the hypothesized link between the engagement in substance use and the selection of a mate with similar behaviors, and (b) examine prospectively the effects of such partner selection on child functioning, could expand the understanding of intergenerational transmission of problem behaviors.

In addition to the directions for future research described above, it is important to explicitly mention the limitations of the current study. Although we used extraordinarily rich, longitudinal, community sample data and observer ratings of parenting behavior, the outcome in this study was based on parent reports of child functioning using the Ages and Stages Questionnaire (ASQ) instead of objective assessment by a child development professional. However, the ASQ has been found to be an excellent diagnostic tool for identifying children at risk for developmental delay (Squires, Bricker, & Potter, 1997). Further, while this study collected a rich array of data on behaviors and experiences when the mothers were pregnant with the focal child, we did not collect data on the mothers' pregnancy status at the time of the interview. It is possible that some mothers were pregnant with another child at that time and may have lowered their substance use accordingly resulting in an under-estimation of their overall young adult drinking patterns. Future studies should assess the pregnancy status of women of child-bearing age, if collecting data on their substance use. In addition, the strength of the estimated relationships was relatively modest, most likely due to the fact that ours was a community sample of parents and their children. Moreover, the sample size was relatively small, which precluded testing of more complex relationships such as the interaction between child and parent gender, particularly in the

influence of parenting on child developmental functioning. Future studies with larger samples should examine these associations. In addition, because of the assessment tool, the age range of children included in this study was limited to 1-5 years. It is possible that some of the effects of alcohol misuse are cumulative and will manifest themselves later in development (e.g., Burke et al., 2006) or will be domain specific (e.g., involve substance use outcomes). Finally, these results likely generalize to young adult parents who are actively parenting their child.

Conclusions and implications

This study examined the developmental relationship between maternal and paternal alcohol use over time and their young children's developmental functioning, expanding the understanding of the roles of both mothers' and fathers' substance use and parenting behaviors. The evidence of both distal and proximal mechanisms of parental alcohol use on child developmental functioning stresses the importance of prevention and intervention efforts aimed at reducing alcohol misuse both in adolescence – even before the young people have children – and in young adulthood. Furthermore, prevention and treatment programs providing support and education in parenting skills to families with a history of alcohol misuse could show benefits across generations.

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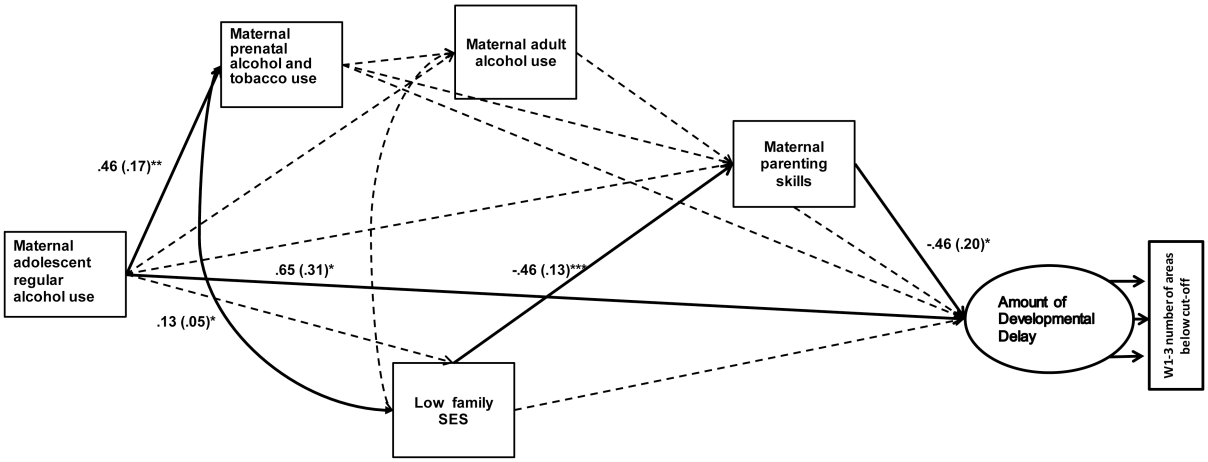

Figure 1.

Model 1: Associations between maternal alcohol use, parenting skills, family SES, and child developmental functioning.

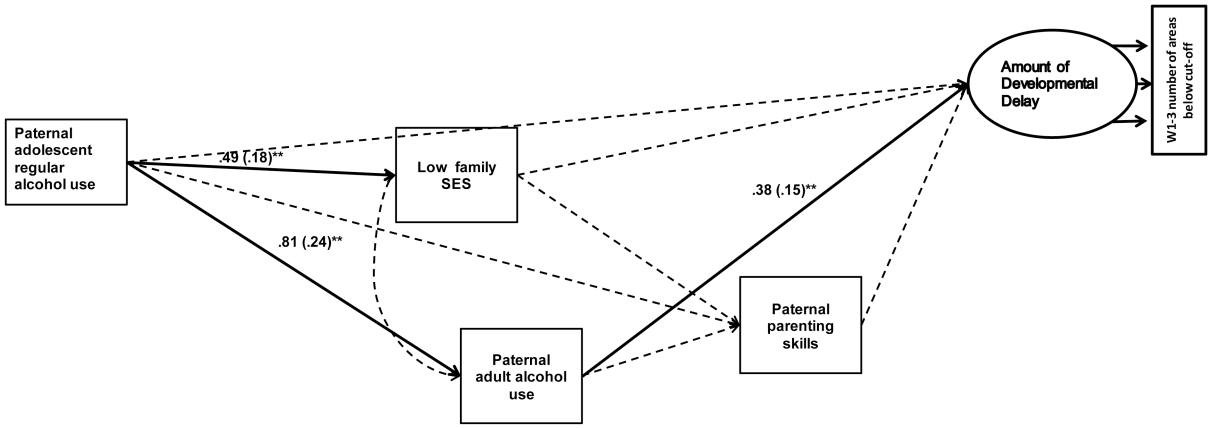

Figure 2.

Model 2: Associations between paternal alcohol use, parenting skills, family SES, and child developmental functioning.

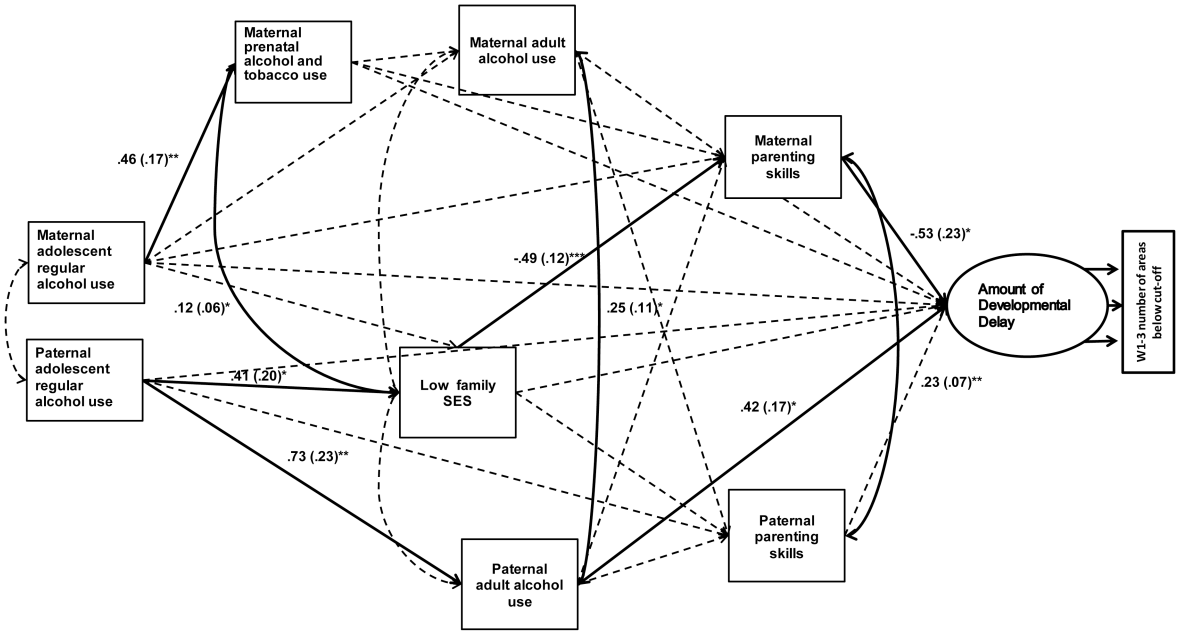

Figure 3.

Model 3: Associations between maternal and paternal alcohol use, parenting skills, family SES, and child developmental functioning.

Table 1

Zero-order Correlation Coefficients and Descriptive Statistics

Means, standard deviations and intercorrelations among the primary variables

Measures	1	2	3	4	5	6	7	8	9	10	11
1. Number of areas below clinical cut-off W1	1										
2. Number of areas below clinical cut-off W2	0.50*	1									
3. Number of areas below clinical cut-off W3	0.54*	0.59*	1								
4. Maternal Adolescent Regular Alcohol Use	0.17	0.03	0.1	1							
5. Paternal Adolescent Regular Alcohol Use	0.15	0.17	0.28*	0.20*	1						
6. Prenatal Aclohol and Tobacco Use	-0.09	-0.13	0.04	0.26*	0.26*	1					
7. Maternal Young Adult Alcohol Use	-0.12	0.01	-0.02	0.1	0.12	0.14*	1				
8. Paternal Young Adult Alcohol Use	0.25*	0.30*	0.11	0.15	0.35*	-0.02	0.29*	1			
9. Maternal Parenting Skills	-0.35*	-0.19*	-0.29*	-0.09	0.05	-0.2	-0.01	0.06	1		
10. Paternal Parenting Skills	-0.17	-0.41*	-0.13	0.01	-0.08	0.02	0.07	-0.07	0.35*	1	
11. Low Family SES	0.14	0.14	-0.01	0.05	0.27*	0.24*	0.18	0.18*	-0.43*	-0.16	1

*p<.05; W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; SES = socioeconomic status; M = mean; SD = standard deviation

Table 2

Fit indices for the Unconditional Models

	Amount of Developmental Delay	
Fit Index	**Intercept-only**	**Linear change**
AIC	433.26	438.25
BIC	438.89	452.31
SABIC	432.56	436.50

AIC=Akaike Information Criterion (Akaike, 1987); BIC=Bayesian Information Criterion (Schwarz, 1978); SABIC=Sample-size Adjusted BIC (Sclove, 1987); lower absolute value indicates a better fit.

Table 3

Parameter Estimates from Model 1 Testing Associations between Mothers' Alcohol Use, Parenting, Family SES, and Child Developmental Functioning

	Model 1	
	Amount of Developmental Delay	
Association tested	**Unstandardized estimate (SE)**	***p value***
Prenatal alcohol and tobacco use regressed on		
Maternal adolescent regular alcohol use	.46 (.17)*	<.01
Young adult alcohol use regressed on		
Maternal adolescent regular alcohol use	.13 (.21)	.54
Prenatal alcohol and tobacco use	.16 (.15)	.30
Maternal parenting skills regressed on		
Maternal adolescent regular alcohol use	-.16 (.19)	.41
Prenatal alcohol and tobacco use	-.12 (.12)	.32
Young adult alcohol use	.04 (.11)	.72
Low family SES	-.46 (.13)*	<.001
Low Family SES regressed on		
Maternal adolescent regular alcohol use	.06 (.15)	.70
Child developmental functioning regressed on		
Maternal adolescent regular alcohol use	.65 (.31)*	<.05
Prenatal alcohol and tobacco use	-.33 (.18)	.08
Young adult alcohol use	-.16 (.19)	.40
Low family SES	.10 (.22)	.64
Maternal parenting skills	-.46 (.20)*	<.05
Correlations specified in the model		
Young adult alcohol use with Low family SES	.10 (.06)	.08
Prenatal alcohol and tobacco use with Low Family SES	.13 (.05)	.01

Notes: SES = socioeconomic status; SE = standard error; all values rounded to two decimal places;

* significant at $p < .05$.

Table 4

Parameter Estimates from Model 2 Testing Associations between Fathers' Alcohol Use, Parenting, Family SES, and Child Developmental Functioning

	Model 2	
	Amount of Developmental Delay	
Association tested	**Unstandardized estimate (SE)**	***p value***
Young adult alcohol use regressed on		
Paternal adolescent regular alcohol use	.81 (.24)*	<.01
Paternal parenting skills regressed on		
Paternal adolescent regular alcohol use	.-.08 (.31)	.81
Young adult alcohol use	-.03 (.10)	.81
Low family SES	-.16 (.17)	.32
Low Family SES regressed on		
Paternal adolescent regular alcohol use	.49 (.18)*	<.01
Child developmental functioning regressed on		
Paternal adolescent regular alcohol use	.13 (.38)	.73
Young adult alcohol use	.38 (.15)*	<.01
Low family SES	.10 (.23)	.68
Paternal parenting skills	-.36 (.23)	.12
Correlations specified in the model		
Young adult alcohol use with Low family SES	.07 (.08)	.41

Notes: SES = socioeconomic status; SE = standard error;

* significant at $p < .05$.

Table 5

Parameter Estimates from Model 3 Testing Associations between Both Parents' Alcohol Use, Parenting, Family SES, and Child Developmental Functioning

	Model 3	
	Amount of Developmental Delay	
Association tested	**Unstandardized estimate (SE)**	***p value***
Prenatal alcohol and tobacco use regressed on		
Maternal adolescent regular alcohol use	.46 (.17)*	<.01
Maternal young adult alcohol use regressed on		
Maternal adolescent regular alcohol use	.08 (.20)	.67
Prenatal alcohol and tobacco use	.18 (.15)	.23
Maternal parenting skills regressed on		
Maternal adolescent regular alcohol use	-.18 (.18)	.27
Prenatal alcohol and tobacco use	-.12 (.11)	.28
Maternal young adult alcohol use	-.01 (.11)	.95
Paternal young adult alcohol use	.16 (.12)	.18
Low family SES	-.49 (.12)*	<.001
Low Family SES regressed on		
Maternal adolescent regular alcohol use	-.04 (.16)	.83
Paternal adolescent regular alcohol use	.41 (.20)*	<.05
Paternal young adult alcohol use regressed on		
Paternal adolescent regular alcohol use	.73 (.23)*	<.01
Paternal parenting skills regressed on		
Paternal adolescent regular alcohol use	-.19 (.32)	.55
Paternal young adult alcohol use	-.05 (.11)	.66
Maternal young adult alcohol use	.11 (.11)	.30
Low family SES	-.20 (.16)	.21
Child developmental functioning regressed on		
Maternal adolescent regular alcohol use	.37 (.34)	.27
Paternal adolescent regular alcohol use	.41 (.41)	.31
Prenatal alcohol and tobacco use	-.30 (.19)	0.1
Maternal young adult alcohol use	-.26 (.19)	0.17
Paternal young adult alcohol use	.42 (.17)*	<.05
Low family SES	-.13 (.22)	0.57
Maternal parenting skills	-.53 (.23)*	<.05
Paternal parenting skills	-.24 (.28)	0.39
Correlations specified in the model		
Maternal with Paternal adolescent regular alcohol use	.04 (.02)	.07
Prenatal alcohol and tobacco use with Low Family SES	.12 (.06)*	<.05
Maternal young adult alcohol use with Low family SES	.11 (.06)	.08

	Model 3	
	Amount of Developmental Delay	
Association tested	**Unstandardized estimate (SE)**	***p value***
Paternal young adult alcohol use with Low family SES	.06 (.08)	.49
Maternal with Paternal young adult alcohol use	.25 (.11)*	<.05
Maternal with Paternal parenting skills	.23 (.07)*	<.01

Notes: SES = socioeconomic status; SE = standard error;

*significant at p < .05.