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The effect of parental alcohol use on alcohol use disorder in young adulthood: Exploring the mediating roles of adolescent alcohol expectancies and consumption

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Abstract

Introduction: Parental alcohol use and problems are risk factors for alcohol use disorder (AUD), and these effects may be mediated by adolescent alcohol expectancies and consumption. In the present study, we tested the direct effects of mothers' and fathers' alcohol consumption on young adult AUD, as well as the indirect effects through adolescent maximum alcohol use, alcohol consumption, and alcohol expectancies.

Methods: Participants were 5,160 individuals (49.1% female) and their biological parents from the Avon Longitudinal Study of Parents and Children, a cohort study of children born in southwestern England during 1991 and 1992. Structural equation modeling (SEM) was used to test associations of mothers' and fathers' alcohol use (assessed when children were 12 years old) with age 24 AUD. Potential mediator variables included the maximum number of alcoholic drinks consumed within a 24-hour period by age 13.5 and alcohol expectancies and alcohol consumption at ages 17 and 20.

Results: Higher maternal and paternal alcohol use were associated with higher levels of alcohol consumption at age 17. Greater alcohol consumption, in turn, was related to a more severe presentation of AUD. The overall indirect effects of mothers' ($b = 0.033$, 95% CI = 0.006, 0.059) and fathers' drinking ($b = 0.041$, 95% CI = 0.018, 0.064) on AUD were modest but significant, and were primarily comprised of adolescent alcohol consumption rather than alcohol expectancies.

Conclusions: Our findings underscore the importance of both mothers' and fathers' drinking for the development of alcohol use and problems across adolescence and young adulthood.

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Conflict of Interest Disclosure. The authors declare no conflicts of interest.

Ethics Approval Statement. Data for this study were collected and analyzed in accordance with Institutional Review Board, ALSPAC Ethics and Law Committee, and the Local Research Ethics Committees' guidelines.

Keywords

adolescence; alcohol; alcohol expectancies; ALSPAC; parent drinking; SEM

Parental alcohol use and family history of alcohol use disorder (AUD) are among the most robust predictors of alcohol misuse and problems (Meque et al., 2019; Stone et al., 2012). The prevalence of AUD among individuals with no parental history is approximately 23%. By contrast, 40% of individuals with one AUD-affected parent experience AUD in their lifetime, and 54% of individuals with two AUD-affected parents report lifetime AUD (Yoon et al., 2013). Further, parental AUD is associated with early alcohol use onset and more rapid progression from alcohol use initiation to AUD diagnosis (Chassin et al., 2004; Hussong & Bauer, 2008). The deviance proneness pathway, proposed by Sher (1991), suggests that individuals with a family history of alcohol problems are prone to behavioral undercontrol, which yields more positive alcohol expectancies and higher levels of alcohol involvement. Thus, two mediating factors may be important for the effects of parental alcohol use and misuse on the development of AUD: adolescent alcohol consumption and alcohol expectancies.

Parental Alcohol Use, Adolescent Alcohol Consumption, and AUD

The effects of parents' alcohol problems on adolescent drinking behavior have been thoroughly examined (for reviews, see Sher et al., 2005; Wills & Yaeger, 2003; Windle, 1996), and a number of mechanisms have been proposed for the association between parental alcohol problems and adolescent drinking behavior. For instance, as summarized by Windle (1996), parents diagnosed with AUD may demonstrate more inconsistent parenting behaviors, engage in lower levels of parental monitoring, and provide less emotional support to their children. Adolescents thus turn to their peer group for support, and affiliation with deviant peers leads to early alcohol initiation and rapid escalation of alcohol consumption. Parental alcohol problems can also have broader impacts on family functioning, including increased marital conflict. Finally, effects of parents' drinking on adolescent alcohol consumption may be mediated by socialization processes: Exposure to parental alcohol use may facilitate the development of positive associations with alcohol consumption, portray heavy alcohol use as a coping strategy, or result in imitation (Windle, 1996).

Even in the absence of clinically significant problems, parental alcohol use and misuse are associated with elevated alcohol consumption. Parental heavy episodic drinking is associated with earlier alcohol use initiation, regular drinking, and heavy drinking in adolescence (Alati et al., 2014; Poelen et al., 2007; Vermeulen-Smit et al., 2012). Higher adolescent alcohol consumption, in turn, is related to elevated risk for alcohol dependence in adulthood (McCambridge et al., 2011). Such findings support the mediating role of adolescent alcohol consumption in the intergenerational transmission of drinking behavior.

Parental Alcohol Use, Adolescent Alcohol Expectancies, and AUD

Alcohol expectancies, defined as positive and negative beliefs about the behavioral, cognitive, and emotional effects of consuming alcohol (Montes et al., 2017; Sher et al.,

1997), present a second factor through which parental alcohol use and misuse contribute to the development of AUD. Alcohol Expectancy Theory proposes that the intergenerational transmission of drinking behavior via alcohol expectancies follows a two-process model. In the acquisition phase, parental modeling of drinking behavior guides children's alcohol expectancies and behavior when exposed to alcohol. In the maintenance phase, expectancies are reinforced once alcohol is consumed, promoting continued drinking behavior (Campbell & Oei, 2010; Oei & Baldwin, 1994).

The tenets of Alcohol Expectancy Theory have been largely supported by the literature. Children hold beliefs about the effects of alcohol before they have any personal experience with drinking, suggesting that alcohol expectancies are, in part, developed through observation (Bekman et al., 2011). Moreover, developmental changes in alcohol expectancies are closely tied to parental alcohol use and adolescent alcohol consumption. Across adolescence, perceived likelihood of negative consequences of alcohol use declines, and perceived likelihood of positive consequences increases (Colder et al., 2014). This shift toward more positive alcohol expectancies is an important precursor of alcohol use initiation (Montes et al., 2017; Smit et al., 2018). Notably, individuals who are exposed to higher levels of adult drinking exhibit a greater increase in positive alcohol expectancies across the transition to adolescence, underscoring the interplay among parental drinking, adolescent alcohol expectancies, and alcohol consumption.

Adolescent Alcohol Expectancies and Alcohol Consumption

Several studies have concluded that alcohol expectancies and consumption reciprocally influence one another (Sher et al., 1997; Smit et al., 2018). Following initiation of alcohol use, social enhancement and relaxation expectancies increase and show an accelerated change over time (Jester et al., 2015; Young-Wolff et al., 2015). More positive alcohol expectancies, in turn, are associated with heavier and more frequent alcohol use (Cranford et al., 2010; Smit et al., 2018). Adolescents with alcohol-related problems expect more positive changes and facilitation of social behavior from consuming alcohol when compared to adolescents with no drinking problems (Brown et al., 1995). Thus, reinforcement of positive alcohol expectancies through adolescent drinking experiences may contribute to the development of AUD.

Roles of Parent and Child Sex

Although the associations among parental drinking, adolescent alcohol expectancies, and alcohol consumption are well-established, findings for the separate effects of maternal and paternal drinking on adolescent alcohol use are quite mixed. One systematic review found that, of eight studies that examined the influence of both mothers' and fathers' drinking, three concluded that both parents' alcohol use influenced the child's drinking behavior, three found that only maternal alcohol use exerted an effect, and two identified paternal alcohol use as the only significant predictor (Rossow et al., 2016). Findings are also inconsistent regarding the joint roles of parent and child sex in the intergenerational transmission of alcohol use and problems. Some studies provide evidence to suggest that the relationship between parental alcohol use and child alcohol use is stronger for the same-sex parent (Yeh

et al., 2006). However, stronger influences of paternal drinking on sons' alcohol use and maternal drinking on daughters' alcohol use are not consistently observed, with some studies suggesting that alcohol consumption by the opposite-sex parent is more influential (Cranford et al., 2010; Homel & Warren, 2019; Tran et al., 2018), and others finding no evidence for sex- or gender-based differences (Alati et al., 2014; Poelen et al., 2009). Such mixed evidence highlights the need to separately consider the influence of maternal and paternal drinking on the development of alcohol problems among male and female offspring.

The Current Study

In the present study, we investigated the effects of alcohol consumption by mothers and fathers in early adolescence on the development of AUD in young adulthood. In addition, we evaluated the degree to which associations are mediated by maximum alcohol use, alcohol consumption, and alcohol expectancies in adolescence. We add to the rich literature on the intergenerational transmission of alcohol misuse and problems in several ways. First, the majority of studies have focused on parental alcohol misuse and problems, as opposed to parental alcohol consumption, as risk factors for AUD: Presently, we examine the pathways by which normative levels of parental alcohol consumption impact risk for AUD within a population-based sample. Second, we estimate the influence of parental alcohol use on young adult AUD separately for mothers and fathers and test whether pathways from parents' alcohol consumption to young adult alcohol problems differ by child sex. Third, building upon prior evidence that alcohol expectancies and alcohol consumption reciprocally influence one another (Sher et al., 1997; Smit et al., 2018), we test cross-lagged associations between alcohol expectancies and alcohol consumption. Fourth, we examine the interplay between alcohol expectancies and alcohol consumption in late adolescence, which has been under-studied in comparison to early adolescence. Finally, we include early adolescent maximum alcohol use as a putative mediator to address prior observations that parental alcohol problems are associated with initiation of alcohol use and binge drinking in early adolescence, and early adolescent drinking experiences have robust effects on alcohol expectancies (Jester et al., 2015). These analyses provide insight into the interplay between parental alcohol use, early alcohol misuse, alcohol expectancies, alcohol consumption, and risk for AUD across development. In addition, our findings have potential implications for preventive intervention efforts: A positive relationship between parental alcohol use and AUD in the presence of key covariates within a longitudinal model, for example, suggests that levels of parental alcohol consumption may be used to detect children at-risk for developing alcohol problems. Accordingly, findings from the current study may be of interest to both clinicians and members of the alcohol research community.

Materials and Methods

Sample

Participants were from the Avon Longitudinal Study of Parents and Children (ALSPAC), a longitudinal, population-based study designed to investigate a wide array of influences on child health and development (Boyd et al., 2013; Fraser et al., 2013; Northstone et al., 2019). Pregnant women residing in the southwest of England who had an estimated delivery date

between April 1991 and December 1992 were invited to participate. The initial study cohort consisted of 14,541 pregnancies and 13,988 singletons and twins (52% boys and 48% girls) still alive at 12 months of age. The study website contains detailed information on the data, which is available through a fully searchable data dictionary (<http://www.bris.ac.uk/alspac/researchers/our-data/>). Ethical approval for the study was obtained from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committees. Informed consent for the use of data collected via questionnaires and clinics was obtained from participants following the recommendations of the ALSPAC Ethics and Law Committee at the time.

Assessments have been administered frequently and provide extensive information on the children, as well as on the mothers and their partners (Boyd et al., 2013). The present analyses were limited to individuals with complete data on biological mothers' and biological fathers' alcohol consumption when the children were 12 years old ($N = 5160$, 49.1% female). Child-reported data were drawn from assessments completed at 13.5, 17, 20, and 24 years.

Measures

Self-Reported Parental Alcohol Consumption—When children were 12 years old, mothers and fathers self-reported their alcohol consumption via postal questionnaire: 49 items were used to evaluate the number of half pints of beer, lager, or cider; glasses of wine; measures of spirits; measures of martini, sherry, port, or other fortified wine; number of ready-mixed alcoholic drinks; number of other alcoholic drinks; and number of low-alcohol drinks consumed each day of the week. Among individuals with complete data on 25 or more items, drinks per week was computed using a prorated sum score.

Partner-Reported Alcohol Consumption—In addition, mothers and fathers reported on each other's alcohol consumption using one item: 'Which of the following statements about alcohol best describes your [husband/wife]?' They selected from six response options: "never drinks alcohol," "very occasionally (less than once a week)," "occasionally (at least once per week)," "drinks 1–2 glasses nearly every day," "drinks 3–9 glasses every day," and "drinks at least 10 glasses a day." Responses were transformed to a pseudo-continuous measure of drinks per week, such that "never" was coded as 0, "very occasionally (less than once per week)" was coded as 0.5, "occasionally (at least once per week)" was coded as 3.5, "drinks 1–2 glasses nearly every day" was coded as 10.5, "drinks 3–9 glasses every day" was coded as 42, and "drinks at least 10 glasses a day" was coded as 70.

Maximum Alcohol Use—During a clinic visit when participants were 13.5 years of age, they reported on their maximum number of whole drinks consumed within a 24-hour period using one item. Prior studies have shown that maximum alcohol use, reported using a single item, is highly correlated with vulnerability to excessive alcohol consumption and alcohol dependence (Grant et al., 2009; Kendler et al., 2010).

Alcohol Expectancies—Participants reported on their alcohol expectancies using items from the Adolescent Alcohol Expectancy Questionnaire (AEQ-A) (Brown et al., 1987). The AEQ-A was completed during a clinic visit at age 17 ($\alpha = 0.74$) and via postal

questionnaire at age 20 ($\alpha = 0.73$). In view of limited time available in the ALSPAC protocol, researchers administered three items with the highest factor loadings from four AEQ-A scales of interest: Changes in Social Behavior (e.g., “Alcoholic beverages make parties more fun”), Improved Cognitive and Motor Abilities (e.g., “People understand things better when they are drinking alcohol”), Sexual Enhancement (e.g., “Alcohol makes people feel more romantic”), and Arousal (e.g., “Alcohol makes people stand up to others”) (Schuckit et al., 2011). For each item, response options were zero (false) and one (true).

Alcohol Consumption—Alcohol consumption was measured using the first three items from the Alcohol Use Disorder Identification Test (AUDIT-C), which evaluate participants’ frequency of alcohol consumption, quantity of alcohol consumption, and frequency of consuming six or more drinks on one occasion (Bush et al., 1998). The validity and reliability of the AUDIT-C have been established previously (Barry et al., 2015; Bush et al., 1998). The AUDIT-C was completed during a clinic visit at age 17 ($\alpha = 0.67$) and via postal questionnaire at age 20 ($\alpha = 0.67$).

Alcohol Use Disorder (AUD)—At age 24, questions from the Semi-Structured Assessment of the Genetics of Alcoholism (SSAGA) (Bucholz et al., 1994) were used to assess *Diagnostic and Statistical Manual of Mental Disorders, 5th edition* (DSM-5) criteria for AUD. Data were collected during a clinic visit and managed using REDCap (Harris et al., 2009, 2019). Individuals who reported zero or one symptom were considered unaffected (coded as 0). Mild AUD (coded as 1), moderate AUD (coded as 2), and severe AUD (coded as 3) were defined by the presence of two to three symptoms, four to five symptoms, and six or more symptoms, respectively.

Covariates—Mediation analyses make four key assumptions with respect to confounding: The effects of the exposure on the outcome, the mediator on the outcome, and the exposure on the mediator are unconfounded conditional on covariates, and none of the mediator-outcome confounders are affected by the exposure (VanderWeele et al., 2014). In the present analyses, several measures of socioeconomic position (SEP) were considered potential confounders of all paths and were thus included as covariates. SEP variables were assessed via maternal self-report during pregnancy. These measures, selected and coded to be consistent with Mahedy et al. (2018), included: maternal age at delivery, social class (professional, managerial/technical, non-manual, skilled manual, semiskilled manual, unskilled), maternal education (< O-level indicating no formal education, O-level indicating completion of school examinations at 16 years of age, and > O-level indicating completion of college or university education at or after age 18 years), maternal smoking during first trimester of pregnancy (yes/no), and housing tenure (mortgaged, subsidized renting, and private renting).

Statistical Methods

Descriptive statistics were computed for each variable. Ordinal and continuous variables were then standardized to facilitate interpretability.

To investigate the latent factor structure of the alcohol expectancies measure at ages 17 and 20, one- and two-factor models were constructed using the R {umx} package (Bates et al., 2019). After selecting the appropriate number of latent factors, factor loadings were constrained to be equal across the age 17 and age 20 assessments to test for metric invariance. Next, one-factor models were constructed to represent alcohol consumption at ages 17 and 20. Because AUDIT-C is traditionally represented as a sum score (Bush et al., 1998), each item was constrained to equally contribute to the construct. Factor loadings were then constrained to be equal across assessments to test for metric invariance. Analyses were conducted using the {lavaan} package in R (Rosseel, 2012). The Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), and likelihood ratio test were used to evaluate model fit.

A mediation model was estimated to examine the direct effects of mothers' and fathers' alcohol consumption on AUD, as well as the indirect effects through maximum alcohol use, alcohol expectancies, and alcohol consumption. Two correlated latent factors were specified for mothers' and fathers' alcohol consumption. For each latent factor, self-report and partner-report variables were included as indicators; for instance, for the factor representing mothers' alcohol consumption, self-reported maternal alcohol consumption and fathers' reports on the mothers' alcohol consumption were included as indicators. Because individuals typically report on their own behavior more accurately than on another person's behavior, we fixed the factor loadings for self-reported variables to 1. Indirect effects were obtained by multiplying the parameters of paths from exposure to outcome. To evaluate whether the mediational paths from parental alcohol use to AUD differed by child sex, separate models were specified for males and females. Parameter estimates were then constrained to be equal, and change in model fit was assessed using the likelihood ratio test. Analyses were performed using the R {lavaan} package, and 95% confidence intervals (CIs) were derived using bootstrapped standard errors with 1,000 resamples.

Robust full information maximum likelihood (RFIML) estimation was employed to handle missing data in the mediator and outcome variables, as RFIML generally outperforms multiple imputation methods to handle missing ordinal data (Jia & Wu, 2019). RFIML assumes that data are at least missing at random (MAR), meaning that the missingness mechanism may depend on observed variables but does not depend on unobserved data. This assumption was made more plausible by the inclusion of a number of socioeconomic variables as covariates. As shown in Figure S1, retention rate did vary systematically based on social class, maternal education, maternal smoking, and housing tenure.

Results

Frequencies for socioeconomic covariates can be found in Table 1. Frequencies for the primary study variables are shown in Figure 1, and intercorrelations can be found in the Supporting Information (Table S1). When children were 12 years old, the median self-reported alcohol consumption was 5 drinks per week for mothers ($M = 6.72$, $SD = 8.45$) and 10 drinks per week for fathers ($M = 13.73$, $SD = 13.43$). Approximately 48% of the children had consumed a whole drink of alcohol by age 12, which increased to 94% by age 17.

Preliminary Analyses: Alcohol Expectancies

One- and two-factor models were constructed to evaluate the latent factor structure of the alcohol expectancies measure. A two-factor model provided superior model fit for alcohol expectancies at ages 17 (one-factor model: $\chi^2(54) = 988.31, p < .001, CFI = 0.79, RMSEA = 0.06$; two-factor model: $\chi^2(43) = 407.65, p < .001, CFI = 0.92, RMSEA = 0.04$) and 20 years (one-factor model: $\chi^2(54) = 897.18, p < .001, CFI = 0.82, RMSEA = 0.06$; two-factor model: $\chi^2(43) = 463.47, p < .001, CFI = 0.91, RMSEA = 0.04$). However, only three items loaded highly on the second latent factor: “a person can do things better after a few drinks of alcohol,” “people understand things better when they are drinking alcohol,” and “people can control their anger better when they are drinking alcohol.” Because these three items were also endorsed by very few individuals (Figure 1), they were removed from subsequent analyses. All remaining items loaded highly on the first latent factor. Therefore, alcohol expectancies at ages 17 and 20 years were each represented by one latent factor with nine indicators. When factor loadings were constrained to be equal across the age 17 and age 20 assessments, a significant decrement in model fit was observed, $\chi^2(8) = 29.87, p < .001$. However, the robust CFI, robust RMSEA, and robust SRMR each shifted by less than 0.01, providing evidence for metric invariance (Chen, 2007). Factor loadings for alcohol expectancies at ages 17 and 20 were thus constrained to be equal in the mediation model.

Preliminary Analyses: Alcohol Consumption

One-factor models were constructed to represent alcohol consumption at ages 17 and 20. Within each assessment, items were required to equally contribute to the latent construct. Factor loadings were constrained to be equal across the age 17 and age 20 assessments to test for metric invariance, $\chi^2(1) = 1.55, p = .214$. The robust CFI and robust SRMR values did not change, and the RMSEA improved by 0.04 in the constrained model. Thus, the likelihood ratio test and changes in model fit indices provided converging evidence for metric invariance, and factor loadings at ages 17 and 20 were constrained to be equal in the mediation model.

Structural Equation Model

To explore the possibility of different pathways from parental alcohol use to AUD by child sex, we specified a mediation model with parameters freely estimated across males and females, then constrained the factor loadings and regression paths to be equal across groups. The constrained model was favored based on the non-significant likelihood ratio test, $\chi^2(59) = 62.73, p = .346$, the improvement in Akaike Information Criterion (AIC) values (136,705 versus 136,754), and the improvement in Bayesian Information Criterion (BIC) values (137,922 versus 138,351). Because the constrained model was supported, indicating no differences in the relationships among variables based on child sex, we ran a final model using the full sample. Parameter estimates and 95% CIs are displayed in Table 2.

As shown in Figure 2, higher levels of maternal and paternal alcohol consumption at age 12 were associated with higher levels of alcohol consumption at age 17. Maternal alcohol consumption was also related to more positive alcohol expectancies, though the 95% CI overlapped zero (Table 2). The associations between maternal and paternal alcohol consumption and maximum alcohol use at age 13.5 were non-significant and small in

magnitude ($\beta = 0.060 - 0.074$). However, greater maximum alcohol use was related to more positive alcohol expectancies and greater alcohol consumption at age 17.

Alcohol expectancies and consumption were highly correlated within time points, but cross-lagged associations between alcohol expectancies and alcohol consumption were not statistically significant and were small in magnitude ($\beta = 0.036 - 0.074$). Alcohol consumption, but not alcohol expectancies, at age 20 was associated with young adult AUD. The overall indirect effects of mothers' ($b = 0.033$, 95% CI = 0.006, 0.059) and fathers' ($b = 0.041$, 95% CI = 0.018, 0.064) alcohol consumption on AUD were significant, and the total effects of mothers' and fathers' drinking were 0.063 [-0.048, 0.174] and 0.040 [-0.048, 0.127], respectively. Adolescent maximum alcohol use, alcohol expectancies, and alcohol consumption accounted for 51% of the total effect of maternal drinking and 100% of the total effect of paternal drinking on young adult AUD. In total, the model accounted for 13% of the variance in AUD.

Discussion

The present study provides evidence for indirect effects of mothers' and fathers' alcohol consumption on young adult AUD via adolescent maximum alcohol use, alcohol expectancies, and alcohol consumption. Specifically, maternal and paternal drinking were positively associated with alcohol consumption at age 17. Greater adolescent alcohol consumption, in turn, was associated with a more severe presentation of AUD in young adulthood. Effects of maternal and paternal alcohol consumption on AUD were primarily mediated by adolescent alcohol consumption rather than alcohol expectancies. This finding is largely inconsistent with Alcohol Expectancy Theory (Campbell & Oei, 2010; Oei & Baldwin, 1994) and suggests that parental drinking may play a more prominent role in shaping beliefs about alcohol in childhood, before individuals have any personal experience with alcohol, when compared to late adolescence. Finally, the pattern of associations did not substantially differ based on child sex, which is consistent with some (Alati et al., 2014; Poelen et al., 2009) but not all (Cranford et al., 2010; Homel & Warren, 2019; Tran et al., 2018; Yeh et al., 2006) studies of the relationship between parental alcohol consumption and adolescent drinking behavior by parent and child sex. Ultimately, these findings highlight the importance of both mothers' and fathers' drinking for the development of alcohol-related behavior across adolescence and young adulthood.

Separate Effects of Mothers' and Fathers' Alcohol Consumption

Our findings align with previous work demonstrating that parental alcohol use is a robust predictor of alcohol consumption and problems across adolescence and young adulthood (Alati et al., 2005; Meque et al., 2019). Research on the separate effects of mothers' and fathers' alcohol use is more limited and has proven inconclusive, with some studies indicating that both parents' alcohol use is influential and others highlighting either maternal or paternal alcohol use as more important (Rossow et al., 2016). Presently, the indirect effects of maternal and paternal alcohol consumption on young adult AUD were similar in magnitude, suggesting that both parents' drinking behaviors influence alcohol problem severity.

We did, however, note one difference in the pattern of associations with maternal versus paternal alcohol use: Mothers' alcohol use appeared to be more strongly related to alcohol expectancies at age 17 than fathers' alcohol use, though 95% CIs overlapped zero. Though speculative, one possibility is that high levels of alcohol use by mothers may be less normative than high levels of alcohol use by fathers: The prevalence of AUD is markedly higher among males than females (Grant et al., 2015), and, in the current sample, fathers reported consuming 14 drinks per week, on average, compared to 7 drinks per week among mothers. As a relatively uncommon phenomenon, heavy drinking among mothers may play a more substantial role in shaping adolescent alcohol expectancies. Our findings thus provide very preliminary evidence that the associations between parental drinking and alcohol expectancies may differ for mothers and fathers, though this pattern of effects warrants replication in other samples.

Interplay Between Adolescent Alcohol Expectancies and Alcohol Consumption

Notably, the current findings are not entirely consistent with the extant literature on adolescent alcohol expectancies and consumption. Several studies have demonstrated that expectancies and consumption reciprocally influence one another (Sher et al., 1997; Smit et al., 2018), such that positive alcohol expectancies increase after alcohol use initiation and are prospectively associated with heavier and more frequent alcohol use (Cranford et al., 2010; Jester et al., 2015; Smit et al., 2018; Young-Wolff et al., 2015). In the current study, higher maximum alcohol use in early adolescence predicted more positive alcohol expectancies at age 17. Positive alcohol expectancies were strongly related to concurrent drinking behavior but did not prospectively predict alcohol consumption or problems. Thus, we did not observe reciprocal influences between alcohol consumption and alcohol expectancies across late adolescence.

These findings are perhaps unsurprising when interpreted within the context of Alcohol Expectancy Theory, which proposes that alcohol expectancies are initially shaped by parental modeling of drinking behavior and then reinforced by early drinking experiences (Campbell & Oei, 2010; Oei & Baldwin, 1994). Because alcohol expectancies and consumption were measured at ages 17 and 20, it is possible that alcohol expectancies had already been shaped by early adolescent drinking experiences and were relatively well-formed at age 17. This explanation seems plausible, given the sizeable autoregressive coefficient for alcohol expectancies at ages 17 and 20. Further, the vast majority of the sample (94%) had initiated alcohol use prior to the age 17 assessment, and the mean age of alcohol use initiation was 13.8 years, suggesting that most adolescents in the sample were not newly initiated drinkers.

Strengths and Limitations

The current study had a number of strengths. Alcohol expectancies and alcohol consumption were evaluated at multiple time points, and we investigated the interplay between expectations for alcohol use and levels of alcohol use in late adolescence. Data were collected separately for mothers and fathers, allowing us to disentangle the effects of maternal and paternal alcohol consumption on the development of alcohol use and problems. Further, we leveraged the availability of self- and partner-reported data to address the

possibility that social desirability concerns may drive individuals to underreport their own alcohol consumption.

However, our findings should also be considered in light of several limitations. First, the alcohol expectancies measure available in ALSPAC only reflects positive expectations for alcohol use. Negative expectations are also associated with adolescent drinking behavior (Cranford et al., 2010), and the balance between positive and negative alcohol expectancies significantly predicts alcohol use initiation (Montes et al., 2017). Therefore, it will be important for future work to examine whether the combination of adolescents' positive and negative alcohol expectancies is similarly associated with maternal alcohol consumption and maximum alcohol use. Second, measures of maternal and paternal alcohol consumption may not adequately capture adolescents' exposure to and perceived levels of parental drinking, both of which are relevant to the development of alcohol expectancies in middle childhood and early adolescence (Bekman et al., 2011; Cumsille et al., 2000). Third, our measure of partner-reported alcohol consumption consisted of a single item. However, self- and partner-reported alcohol consumption were included as indicators of a latent factor to more adequately capture patterns of parental alcohol use. Fourth, because ALSPAC is a population-based sample, the present findings may not apply to clinically ascertained samples of parents affected by AUD. Fifth, analyses were limited to individuals with complete data on both of their biological parents' alcohol consumption at age 12. Future work should address whether the pattern of effects observed here apply to other family structures (e.g., families with a single parent, one or more parental figures that are not biologically related to the child, or same-sex parents).

Finally, patterns of attrition in the present study varied substantially by socioeconomic status (Figure S1), such that economically advantaged families were much more likely to be retained from pregnancy through the age 12 assessment. Though it is encouraging that association estimates are relatively robust to selective attrition (Gustavson et al., 2012), our findings should be considered within the context of the population from which they were drawn. Concerns about selective attrition in longitudinal studies are, of course, not unique to the present work, and the observed relationship between study retention and socioeconomic status underscores the need for targeted retention strategies to maintain participants at greatest risk for dropout; such efforts are ongoing within the ALSPAC study.

Conclusions

The current study yields novel insights by exploring the separate effects of mothers' and fathers' drinking on young adult AUD through maximum alcohol use, alcohol expectancies, and alcohol consumption. Findings suggest that higher levels of alcohol consumption by both mothers and fathers is related to greater alcohol consumption in late adolescence. Higher levels of adolescent alcohol use, in turn, facilitate a more severe presentation of AUD in young adulthood. The results further support parental drinking as a risk factor for alcohol use and problems. In addition, given the observed stability of alcohol expectancies and consumption from ages 17 to 20, early prevention efforts may be needed to address the interplay between positive alcohol expectancies, earlier age at alcohol use onset, and likelihood of drinking to intoxication in early adolescence.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data Availability Statement.

The present study is an approved secondary analysis of data from the Avon Longitudinal Study of Parents and Children (ALSPAC). The procedures for accessing ALSPAC data are detailed at <http://www.bristol.ac.uk/alspac/researchers/access/>.

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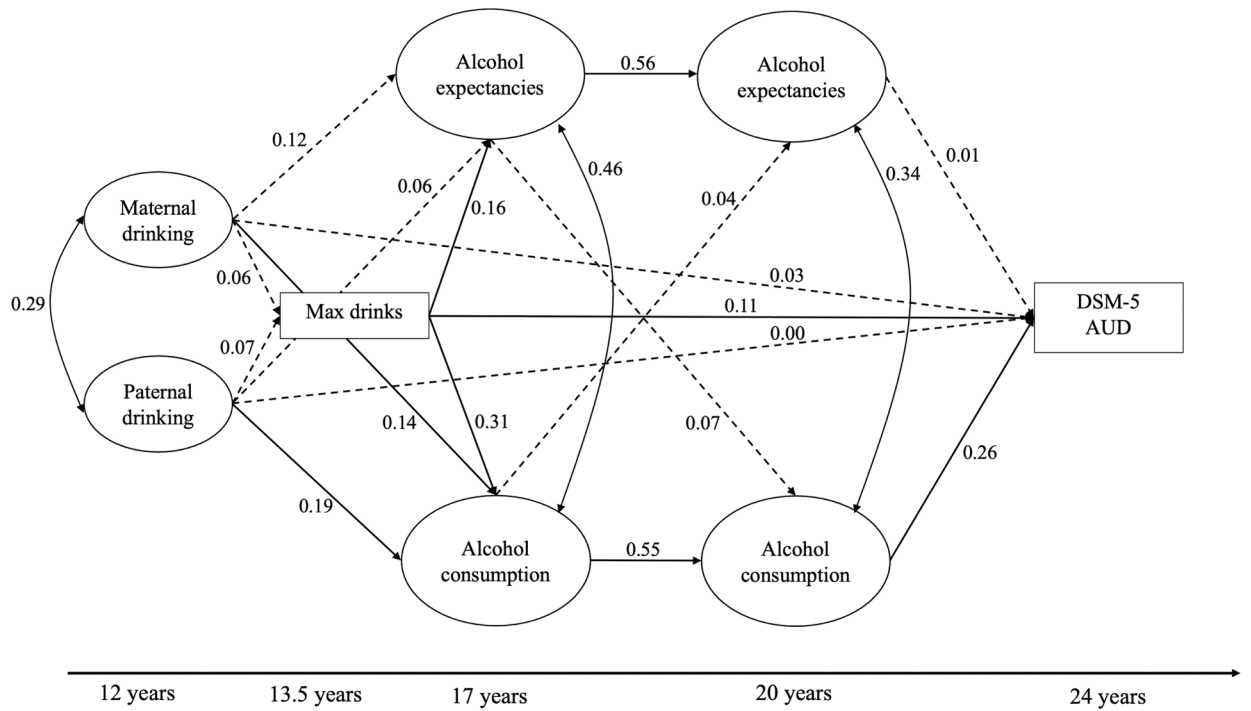
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Figure 1. Frequency distribution of each study variable. Bars are color-coded by as follows: measures of fathers’ alcohol consumption are shown in dark blue; measures of mothers’ alcohol consumption are shown in light blue; variables measured at ages 17 and 20 are shown in light pink and dark pink, respectively; variables measured at age 13.5 are shown in green; and variables measured at age 24 are shown in brown. Alcohol expectancies items marked with an asterisk were not carried forward for subsequent analyses. *Abbreviations.* AUD = alcohol use disorder; DSM-5 = *Diagnostic and Statistical Manual of Mental Disorders, 5th edition*; AUDIT-C = Alcohol Use Disorder Identification Test, Consumption sub-scale; x = times; <= less than.

**Figure 2.**

Structural equation model assessing the direct and indirect effects of parental alcohol use on AUD. Regression coefficients are shown for each structural path. Dotted directional arrows indicate a non-significant association (95% confidence intervals overlap zero). For clarity of presentation, indicators for maternal alcohol consumption, paternal alcohol consumption, alcohol expectancies, and alcohol consumption are not shown; factor loadings can be found in Table 2.

Table 1.

Descriptive statistics for measures of socioeconomic position.

Continuous Measures	Range	Mean (SD)
Maternal age at delivery	17 – 44	29.71 (4.22)
Categorical Measures	n (%)	
Social class	<i>N</i> (available) = 4734	
Professional	933 (19.7)	
Managerial/technical	2197 (46.4)	
Non-manual	1081 (22.8)	
Skilled manual	380 (8.0)	
Semiskilled manual	122 (2.6)	
Unskilled	21 (0.4)	
Maternal education	<i>N</i> (available) = 4890	
< O-level	871 (17.8)	
O-level	1676 (34.3)	
> O-level	2343 (47.9)	
Maternal smoking during first trimester	<i>N</i> (available) = 4913	
No	4248 (86.5)	
Yes	665 (13.5)	
Housing tenure	<i>N</i> (available) = 4873	
Mortgaged	4326 (88.8)	
Subsidized renting	265 (5.4)	
Private renting	282 (5.8)	

Parameter estimates from the model describing pathways from parental alcohol use to young adult alcohol use disorder.

Table 2.

Regression Coefficients		
<i>Outcome</i>	<i>Predictor</i>	β [95% CI]
Maximum alcohol use	Maternal alcohol consumption	0.060 [-0.021, 0.142]
	Paternal alcohol consumption	0.074 [-0.002, 0.151]
Alcohol expectancies (age 17)	Maternal alcohol consumption	0.123 [-0.004, 0.250]
	Paternal alcohol consumption	0.058 [-0.043, 0.159]
	Maximum alcohol use	0.158 [0.105, 0.211]
Alcohol consumption (age 17)	Maternal alcohol consumption	0.136 [0.003, 0.268]
	Paternal alcohol consumption	0.193 [0.083, 0.303]
	Maximum alcohol use	0.305 [0.221, 0.389]
Alcohol expectancies (age 20)	Alcohol expectancies (age 17)	0.562 [0.482, 0.641]
	Alcohol consumption (age 17)	0.036 [-0.034, 0.107]
Alcohol consumption (age 20)	Alcohol expectancies (age 17)	0.074 [-0.003, 0.152]
	Alcohol consumption (age 17)	0.554 [0.478, 0.631]
	Maternal alcohol consumption	0.031 [-0.072, 0.134]
Alcohol use disorder	Paternal alcohol consumption	-0.001 [-0.083, 0.080]
	Maximum alcohol use	0.112 [0.052, 0.172]
	Alcohol expectancies (age 20)	0.012 [-0.034, 0.058]
	Alcohol consumption (age 20)	0.258 [0.205, 0.310]
Latent Variances and Covariances		
<i>Factor 1</i>	<i>Factor 2</i>	ρ [95% CI]
Maternal alcohol consumption	Maternal alcohol consumption	0.528 [0.373, 0.683]
Paternal alcohol consumption	Paternal alcohol consumption	0.634 [0.511, 0.757]
Maternal alcohol consumption	Paternal alcohol consumption	0.293 [0.246, 0.340]
Alcohol expectancies (age 17)	Alcohol consumption (age 17)	0.460 [0.412, 0.508]
Alcohol expectancies (age 20)	Alcohol expectancies (age 20)	0.344 [0.271, 0.418]

Factor Loadings and Indicator Variances			
Latent Factor	Item	λ [95% CI]	ϵ [95% CI]
Maternal alcohol consumption	SR maternal alcohol consumption	1.000	0.524 [0.223, 0.825]
	PR maternal alcohol consumption	1.014 [0.836, 1.191]	0.422 [0.307, 0.537]
Paternal alcohol consumption	SR paternal alcohol consumption	1.000	0.389 [0.274, 0.505]
	PR paternal alcohol consumption	0.983 [0.837, 1.129]	0.396 [0.301, 0.492]
Alcohol expectancies (age 17)	More caring and giving	0.193 [0.180, 0.206]	0.195 [0.187, 0.203]
	Join in with others	0.211 [0.197, 0.224]	0.178 [0.169, 0.187]
	Make parties more fun	0.194 [0.180, 0.208]	0.116 [0.107, 0.125]
	Easier to talk to people of the OS	0.215 [0.202, 0.228]	0.137 [0.128, 0.146]
	Makes people feel more romantic	0.184 [0.172, 0.196]	0.193 [0.187, 0.200]
	More interested in people of the OS	0.216 [0.203, 0.229]	0.109 [0.100, 0.117]
	Increases arousal, feel stronger	0.202 [0.188, 0.216]	0.162 [0.153, 0.171]
	Helps people stand up to others	0.249 [0.236, 0.262]	0.158 [0.149, 0.167]
	Easier to speak in front of people	0.211 [0.198, 0.224]	0.132 [0.123, 0.141]
	More caring and giving	0.193 [0.180, 0.206]	0.203 [0.195, 0.211]
	Join in with others	0.211 [0.197, 0.224]	0.197 [0.189, 0.205]
	Make parties more fun	0.194 [0.180, 0.208]	0.153 [0.144, 0.163]
Alcohol expectancies (age 20)	Easier to talk to people of the OS	0.215 [0.202, 0.228]	0.114 [0.105, 0.122]
	Makes people feel more romantic	0.184 [0.172, 0.196]	0.180 [0.173, 0.187]
	More interested in people of the OS	0.216 [0.203, 0.229]	0.121 [0.113, 0.129]
	Increases arousal, feel stronger	0.202 [0.188, 0.216]	0.163 [0.153, 0.172]
	Helps people stand up to others	0.249 [0.236, 0.262]	0.163 [0.153, 0.172]
	Easier to speak in front of people	0.211 [0.198, 0.224]	0.150 [0.141, 0.159]
	Drinking frequency	0.645 [0.623, 0.667]	0.617 [0.570, 0.664]
	Drinking quantity	0.645 [0.623, 0.667]	0.654 [0.609, 0.699]
	Frequency of heavy drinking	0.645 [0.623, 0.667]	0.367 [0.337, 0.396]
	Drinking frequency	0.645 [0.623, 0.667]	0.517 [0.474, 0.559]
	Drinking quantity	0.645 [0.623, 0.667]	0.770 [0.720, 0.821]
	Frequency of heavy drinking	0.645 [0.623, 0.667]	0.277 [0.250, 0.304]

Note. Alcohol expectancies items are represented by abbreviated phrases. See Figure 1 for complete item descriptions. Abbreviations: OS = opposite sex