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Interactive Effects of Maternal Alcohol Problems and Parental Separation on Timing of Daughter's First Drink

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Abstract

Background—Few studies examine risk to offspring who experience both parental alcohol problems and parental separation, and still fewer consider gender of the affected parent. We examined interactive effects of maternal versus paternal alcohol problems and parental separation on timing of first alcoholic drink in daughters.

Methods—Data were drawn from a sample of 3539 European (or other) ancestry (EA) and 611 African ancestry (AA) female twins born between 1975 and 1985, median age 15 at first assessment. Cox proportional hazards regression models were estimated predicting age at first full drink from parental history of alcohol problems (mother only, father only, or both parents), parental separation during childhood, and the interaction of parental alcohol problems and parental separation. Cox models were estimated without and with adjustment for correlated risk factors, separately for EA and AA twins.

Results—For both EA and AA twins, a significant interaction between parental separation and mother only alcohol problems was observed, suggesting reduced risk of drinking associated with mother only alcohol problems in separated versus intact families.

Conclusions—Findings highlight parental separation as an important moderator of risk to children of mothers who have a history of problem drinking, with interactive effects observed consistently across racial group. To identify underlying processes, additional research is needed with more detailed characterization of separated families where mother only has a history of alcohol problems.

Keywords

parental alcohol problems; parental separation or divorce; onset of alcohol use

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INTRODUCTION

Problem drinking is highly predictive of relationship dissolution (Kessler et al., 1998, Waldron et al., 2011, Cranford, 2014), including dissolution of parental marital and marriage-like relationships (Waldron et al., 2013). Parental alcohol problems and parental separation are each associated with early-onset drinking by offspring (Grant et al., 2015, Jackson et al., 2016, Sartor et al., 2007, Waldron et al., 2014a, Waldron et al., 2014b), which in turn predicts later problem drinking, including alcohol use disorder (Dawson et al., 2008, Grant and Dawson, 1997, Hingson et al., 2006). To inform understanding of challenges faced by offspring who experience *both* parental alcohol problems and parental separation, we examined their combined or interactive effects on timing of first drink, beyond previously documented unique effects. To date, surprisingly few such studies have been conducted.

Our research group previously examined age at first use of alcohol in a young adult sample of European and African American female twins and their parents, comparing offspring from alcoholic separated, alcoholic intact, and nonalcoholic separated families to offspring from nonalcoholic intact families (Waldron et al., 2014b). “Alcoholic” families included those where one or both parents met criteria for DSM-IV alcohol dependence by self- or co-parent report, or by twin report of either parent as an excessive and problem drinker. In European American families, daughters of alcoholic or separated parents were more likely to initiate drinking, especially during early adolescence. Risk to daughters of alcoholic separated parents was further increased. Findings in African American families were nonsignificant, owing in part to reduced numbers of participating African American twins and parents, but also reduced effects.

More recently, Jackson, Rogers and Sartor (2016) examined the relationship between parental separation and onset of alcohol use in a sample of middle school students and their parents. Included in models adjusted for highly correlated other family influences were parent history of problem drinking (whether either parent “ever had a drinking problem”) and a continuous measure of current drinking behavior, both assessed by self- and co-parent report. In analyses pooling across racial group, a main effect of parental separation was found, with nonsignificant effects of parental problem drinking and current drinking. Although the interaction of parental separation and parental problem drinking was also nonsignificant, risk of early drinking associated with parental separation was greater at higher levels of current drinking by parents.

Unfortunately, neither Waldron nor Jackson et al. studies distinguished between maternal and paternal alcohol problems. Because minor-age children typically reside with their mother following parental separation or divorce (Kelly, 2007, Child Trends Databank, 2015), whether mother or father is affected has particular relevance in the context of parental relationship dissolution. To our knowledge, there is a single study to examine maternal versus paternal alcohol problems in the presence of parental separation, and in this study offspring alcohol dependence was the outcome. Using data drawn from the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), Thompson and colleagues (Thompson et al., 2013) found that either maternal or paternal alcohol

problems experienced in combination with parental separation predicted increased risk of lifetime alcohol dependence, relative to intact families. Where both parents had a history of alcohol problems, risk to offspring whose parents separated was further increased.

In the present study, we extend prior research by examining interactive effects of parental history of alcohol problems and parental separation during childhood on timing of first drink, taking into consideration gender of the affected parent. Consistent with earlier work (Waldron et al., 2014b), we focus on outcomes for daughters, given that sex differences in alcohol use continue to narrow (Johnston et al., 2017; White et al., 2015) suggesting that girls are drinking earlier and more frequently than in the past. Based on earlier work, including findings reported by Jackson et al. (2016), we hypothesized that daughters who experience *both* parental alcohol problems and parental separation would demonstrate a pattern of earlier initiation of drinking, relative to those experiencing one or neither risk factor. Given limited research linking offspring drinking outcomes to maternal as opposed to paternal alcohol problems (e.g., Bucholz et al., 2000, Chassin et al., 1999, Lieb et al., 2002), we considered as exploratory tests of differences by parent gender, defined as mother only, father only, or both parents affected.

MATERIALS AND METHODS

Participants

Data were drawn from the Missouri Adolescent Female Twin Study (MOAFTS; Heath et al., 2002, Waldron et al., 2013). MOAFTS is a prospective longitudinal study of female like-sex twins, born between July 1975 and June 1985 to Missouri-resident parents, identified through birth records [$N=370$ African American (AA), 1999 European or Other Ancestry (EA) pairs, the latter total including 26 of Asian/Pacific Islander or other ancestry]. A cohort-sequential sampling design was used, with initial cohorts of 13, 15, 17, and 19 year-old twins and their families recruited during the first two years of data-collection. Continued recruitment of 13 year-olds occurred in years three and four of Wave 1. Baseline (Wave 1) telephone diagnostic interviews were conducted with parents. All available twin pairs were targeted for three waves of telephone interviews (Waves 1, 4 and 5, at median ages 15, 22 and 24, respectively). Subsamples of twins also completed a brief one-year follow-up (Wave 2) and/or a three-year retest interview (Wave 3). A Wave 7 follow-up targeted the youngest of twins in the birth cohort ($N=2059$), who as of 2011–2014 were in their early 30s. For each wave, participants gave verbal consent (or assent if minors, subsequent to parental verbal consent) following procedures approved by the institutional review board at Washington University. A detailed summary of wave-specific response rates by reporter through Wave 5 is provided elsewhere (Waldron et al., 2013).

Primary analyses were based on Wave 1 parent interviews and Waves 1, 3, 4, and 5 twin interviews. Post-hoc analyses incorporated data from Wave 7. The sample was limited to 611 AA and 3539 EA twins with data on lifetime alcohol use, age at first use of alcohol (if any), and both parental alcohol problems and parental separation. This includes the majority of AA and EA twins participating in any of Waves 1, 3, 4 and 5: 96% and 99%, respectively. For primary analyses, twins ranged in age from 13 (Wave1) to 32 (Wave 5) years. Sample sizes as a joint function of parental alcohol problems and separation history separated are

shown in Table 1. Additional sample characteristics are presented in Table 2, separately by race.

Measures

Individual measures were administered as part of an abbreviated telephone adaptation of the Semi-Structured Assessment of the Genetics of Alcoholism (SSAGA; Bucholz et al., 1994, Hesselbrock et al., 1999), a semi-structured interview developed for the Collaborative Study on the Genetics of Alcoholism (COGA; Begleiter et al., 1995). At Wave 1, parents completed a telephone adaptation of the SSAGA-II—the DSM-IV update to the DSM-IIIIR-based SSAGA—as did twins at Wave 5. At Waves 1, 3 and 4, twins completed the child or adolescent version of the SSAGA-II, also adapted for telephone administration.

Timing of first drink—Lifetime alcohol use was assessed of twins at Waves 1, 3 and 4. Twins were asked whether they had ever consumed a full drink of alcohol, defined as a standard can or bottle of beer, a glass of wine, or a shot of liquor. Twins who reported consuming a full drink were coded positive for lifetime alcohol use with age at first full drink subsequently queried. For those with differing cross-wave reports of age at first drink, youngest reported age was analyzed consistent with previous work (Waldron et al., 2014b).

Parental alcohol problems—We coded parental alcohol problems from parent self-report history of DSM-IV alcohol dependence (AD), co-parent report of AD symptoms, and Wave 4 twin report of each parent as a problem and excessive drinker. Parent interviews included self-report assessment of lifetime history of AD, with AD symptoms experienced by the twins' biological co-parent assessed using an adaptation of the Family History Assessment Module (FHAM; Rice et al., 1995). A probable dependence diagnosis without requiring 12-month clustering was coded for co-parent AD as temporal clustering of co-parent symptoms was not assessed. Twin report was drawn from Wave 4, when all twins were aged 18 or older. At Wave 4, twins were asked whether “drinking ever caused your biological (mother/father) to have problems with health, family, job or police, or other problems,” an item that originated in the Family History Research Diagnostic Criteria assessment (FHRDC; Andreasen et al., 1977), and whether they ever felt that their biological parent was an “excessive drinker.” Endorsement of both problem and excessive drinking items was required to code a parent positive by twin report. Consistent with prior work (Waldron et al., 2013), three dummy variables were coded based on parent self-report of AD or any positive family history rating: mother only, father only, or both parents with a history of alcohol problems, relative to neither parent. Parental remission, examined in post-hoc analyses, was coded from parent self-report at Wave 1 and twin report at Wave 7, the latter limited to a subsample of twin respondents. Parents were asked their age the last time they experienced three or more symptoms of AD within a 12-month period. At Wave 7 only, twins were asked parent age when s/he last had alcohol or drug problems, or was an excessive drinker.

Parental separation—Parental separation prior to twins' age 18 was coded from non-diagnostic items included in parent and Waves 1, 3, 4 and 5 twin interviews. Consistent with previous work (Waldron et al., 2013, Waldron et al., 2014b), parental separation was defined

as change in marital and/or cohabitation status for reasons of relationship dissolution. Twins' age at parental separation was computed from year parents' marriage ended or, if missing, age last lived with both parents. Age at separation in families where separation occurred prior to twins' birth was coded as a fraction of a year. Post-separation residence was examined in post-hoc analyses and coded from parent reports of ages twins lived with each parent prior to age 18.

Covariates—We modeled as covariates highly correlated sociodemographic characteristics, histories of parental and offspring psychopathology, and childhood physical and sexual abuse. Sociodemographic covariates included maternal age at twins' birth and maternal educational attainment. Dummy variables for twins' birth occurring before maternal age 20, between ages 20–24, and on/after age 35 were coded, with ages 25–34 comprising the reference group. Maternal education was measured using mother self-report and, if missing, twin report at Wave 5. Dummy variables for mothers who dropped out of high school and those who attended at least some college were coded, with completion of high school only comprising the reference group. Parental psychopathology data (in addition to parental alcohol problems) included parental histories of DSM-IV conduct disorder (CD) and major depressive disorder (MDD) coded from parent self-report, with an additional dummy variable used to identify parents with missing self-report data. Parental histories of regular smoking were coded from parent self- and co-parent report and twin reports at Waves 1, 3 and 4. Among offspring psychopathology measures, we modeled history of DSM-IV inattention symptoms, hyperactivity symptoms, oppositional defiant disorder (ODD), CD, social anxiety disorder (SAD), MDD and suicidality (any of suicidal ideation, plan or attempt). CD, SAD, MDD, and suicidality were assessed by twin self-report at Waves 1, 3 and 4. Inattention, hyperactivity and ODD were assessed in the parent interview, with two dummy variables computed to distinguish affected twins from those with missing parent-report data. Lastly, abuse histories were assessed by twin self-report at Waves 1, 3 and 4. Twins who reported having been physically injured or hurt on purpose by an adult or reported physical abuse as a child were coded positive for physical abuse. Twins who reported forced sexual intercourse or rape, forced sexual contact with a relative, forced sexual contact with non-relative more than 5 years older, or sexual molestation as a child were coded positive for sexual abuse.

Zygosity—Twin pair zygosity was coded from Wave 4 twin (or Wave 1 parent, if missing) responses to standard questions regarding similarity and the degree to which others confused them (Nichols and Bilbro, 1966).

Analytic Strategy

Analyses were performed in STATA version 13 (StataCorp, 2013), with the Huber-White robust variance estimator used to compute standard errors and confidence intervals adjusted for non-independence (i.e., the correlated nature) of twin-family data. In preliminary descriptive analyses, cumulative failure curves were estimated using the Kaplan-Meier (KM) survivor function (Kaplan and Meier, 1958), with log-rank tests to identify significant differences in equality of survivor functions by race. Log-rank tests were also conducted to identify differences by twin pair zygosity. Although monozygotic (MZ) twinning occurs at

random, dizygotic (DZ) twinning is associated with maternal age and socioeconomic status (Bulmer, 1970). Thus, differences between MZ and DZ twins flag potential limitations to the generalizability of twin data to singleton populations. Multiple logistic regression was conducted to examine differences by race and zygosity in rates of parental alcohol problems (mother only, father only, or both parents with a history of alcohol problems).

Following preliminary analyses, a series of Cox proportional hazards (PH) models were estimated predicting age at first drink from (i) parental alcohol problems (mother only, father only, or both parents) and parental separation (Model I), and (ii) parental alcohol problems, parental separation, and the interaction of parental alcohol problems and parental separation (Model II). Cox PH Models I and II were estimated without and with covariate adjustment, and conducted separately for AA and EA twins. We conducted separate analyses for AA and EA twins for both substantive and statistical reasons. Substantively, there are well-documented racial/ethnic differences in problem drinking, including alcohol use disorder (Chartier and Caetano, 2010), family structure (Vespa et al., 2013), and the association of both risk factors with child outcomes (Amato, 2014; Waldron et al., 2014b; Waldron et al., 2015). Consequently, for statistical reasons, we were compelled to stratify to avoid bias associated with *covariate imbalance* (Imbens & Rubin, 2015).

Because age of onset of AD is available from parent self-report only, parental alcohol problems was modeled as a time-invariant predictor in Cox PH models. Parental separation was modeled as time-varying to ensure onset before or at the same time as first alcohol use. Intact families were right-censored at twins' age at last interview if younger than age 18, and in the case of parental death during childhood, right-censored at twins' age when their parent(s) died. Control variables with available ages of onset (CD, SAD, MDD, suicidality, and physical and sexual abuse) were examined as time-varying predictors in adjusted models. To examine potential violation of the proportional hazards assumption, such as might be the case if the effects of parental alcohol problems or parental separation (or their interaction) differ for earlier versus later risk (age) periods, the Grambsch and Therneau test of Schoenfeld residuals (Grambsch and Therneau, 1994) was employed, with age-interactions modeled to correct observed violations (Cleves et al., 2004).

Where significant interactions between parental alcohol problems and parental separation were observed, we conducted follow-up analyses to examine, at a descriptive level, remission rates of affected parents with available self-report data and post-separation residence of offspring.

RESULTS

Descriptive Analyses

As shown in Table 2, proportionally more EA than AA twins reported having consumed a full drink of alcohol as of their last assessment ($X^2_1 = 53.03, p < 0.0001$), with EA twins younger at first drink on average (log-rank $X^2_1 = 84.34, p < 0.0001$). AA twins were more likely than EA twins to have a parent with a history of alcohol problems—either mother only ($X^2_1 = 9.54, p < 0.01$) or father only ($X^2_1 = 4.07, p < 0.05$). AA twins were also more likely than EA twins to experience their parents' separation during childhood ($X^2_1 = 285.39$,

$p < 0.0001$), with AA twins younger at time of separation (log-rank $X^2_I = 441.02$, $p < 0.0001$). Differences by zygosity were significant for EA twin-families, where dizygotic (DZ) twins were at increased likelihood of drinking compared to monozygotic (MZ) twins (log-rank $X^2_I = 13.08$, $p < 0.001$). Differences in parental alcohol problems by zygosity were also significant, where prevalence of father only alcohol problems was elevated among DZ relative to MZ twins ($X^2_I = 7.57$, $p < 0.01$). Given such differences, zygosity was included as an additional covariate in all adjusted Cox regression models. Cumulative failure curves of time to first drink as a function parental separation and parental alcohol problems are shown separately for EA and AA families in Figures 1 and 2, respectively.

Cox Analyses

Results of Cox PH models for EA twins are summarized in Table 3. Note that age interactions were modeled to correct for PH violations related to parental alcohol problems, parental separation, and the interaction of parental alcohol problems and parental separation, with risk periods selected based on best correction of observed violations. In Model I, mother only alcohol problems predicted over three times increased likelihood of alcohol use through age 10, relative to twins from families where neither parent had a history of alcohol problems; from ages 11–17, mother only alcohol problems was associated with a 43% and 26% increased likelihood in unadjusted and adjusted Model I, respectively. Through age 13, father only alcohol problems predicted over two times increased likelihood of drinking, an effect that reduced only slightly in adjusted analyses (HR = 1.91). Where both parents had a history of alcohol problems, likelihood of drinking was increased over three times through age 12, relative to twins from families where neither parents had a history of alcohol problems; in adjusted analyses, likelihood of drinking was increased over two and a half times also through age 12. Parental separation was associated with earlier alcohol use, especially through age 14 (unadjusted HR = 1.63, adjusted HR = 1.52). In Model II, a significant interaction between parental separation and maternal alcohol problems was observed—from age 15 onwards (in unadjusted Model II) and across risk period (in adjusted Model II). In unadjusted and adjusted Model II, respectively, mother only alcohol problems predicted a 64% and 34% reduced likelihood of drinking in separated versus intact families, relative to families where neither parent had a history of alcohol problems.

Results of Cox PH models for AA twins are shown in Table 4. As for EA families, age interactions were necessary to correct for PH violations related parental alcohol problems, parental separation, and the interaction of parental alcohol problems and parental separation. In Model I, mother only alcohol problems predicted over two times increased likelihood of alcohol use through age 14, relative to twins from families where neither parent had a history of alcohol problems. In adjusted Model I, parental separation predicted 41% reduced likelihood of alcohol use from age 15 onwards, compared to intact families. In adjusted Model II, a significant interaction between parental separation and parental alcohol problems was observed from age 15 onwards, where mother only alcohol problems was associated with an 82% reduced likelihood of drinking in separated versus intact families, relative to families where neither parent had a history of alcohol problems.

Post-hoc Analyses

We conducted post-hoc analyses of both maternal remission and post-separation residence of daughters in an effort to help explain observed interactions between mother only alcohol problems and parental separation. Data necessary to code maternal remission, including timing of remission, were available for a subset of families: 40 of 87 EA families where mother only had a history of alcohol problems ($n = 25$ separated, 15 intact) and 10 of 23 AA families where mother only had a history of alcohol problems ($n = 9$ separated, 1 intact). Among EA families, 4% of mothers in separated families versus 27% of mothers in intact families were in remission at twins' birth; 16% of mothers in separated families were in remission at time of separation, with 24% remitted within two years of separating. Among the 10 AA families, no mothers were in remission at twins' birth or at time of separation; one separated mother was in remission within two years of separating.

Of separated families where mother only had a history of alcohol problems, 43 of 56 EA and 12 of 20 AA families had data to code post-separation residence of twins through age 17. Among EA families, the majority of twins continued to reside with their mothers: 64% lived full-time with their mother, with 26% living part-time with their mother (for example, in a shared custodial arrangement with father or another relative or adult). Among AA twin-families, equivalent rates were 50% of twins living full-time with their mother and 50% of twins living at least part-time with their mother.

DISCUSSION

Although children whose mother or father has a history of alcohol problems are at elevated risk of experiencing parental separation (Waldron et al., 2013), few studies have examined jointly the effects of parental alcohol problems and parental separation on offspring drinking outcomes, with a single report taking into consideration gender of the affected parent (Thompson et al., 2013). In the present study, we examined both main and interactive effects of maternal versus paternal history of alcohol problems and parental separation during childhood on timing of daughter's first drink.

Consistent with prior research (Grant et al., 2015; Waldron et al., 2014a, 2014b), risk associated with parental alcohol problems was most pronounced during the early adolescent years, particularly among European American families. In African American families, mother only alcohol problems was uniquely predictive. Parental separation predicted increased risk in European American families only. In separate analyses, parental separation was found to moderate risk associated with maternal but not paternal alcohol problems in both European and African American families: where mother only had a history of alcohol problems, parental separation was associated with *delayed* onset of drinking relative to intact families, suggesting separation-related protection may be unique to mother only alcohol problems.

Findings of delayed drinking associated with mother only alcohol problems in separated versus intact families were surprising given prior (albeit limited) studies documenting increased risk to children of separated parents with a history of problem drinking. We conducted a number of follow-up analyses in attempt to clarify observed interactions,

including analyses of maternal remission among the subset of mothers with available remission data. Although the transition from marriage to divorce is typically associated with increases in alcohol use (e.g., Bachman et al., 1997; Temple et al., 1991), there are a handful of studies suggesting higher rates of remission among divorced women with a prior history of problem drinking (McCutcheon et al., 2014; Wilsnack et al., 1991). Thus, maternal remission may help to explain our findings. However, in post-hoc analyses, very few separated mothers were remitted at the time of separation or shortly thereafter (within two years).

Removal of a parent with alcohol problems from the child's household may also protect against early-onset drinking, although we can locate no prior studies testing this hypothesis directly. Findings from post-hoc analyses of post-separation residence indicated that most daughters of an affected mother (where father is not also affected) had substantial contact with their mother. Indeed, nearly all daughters continued to reside with their mother on either a full- or part-time basis, consistent with national data on living arrangements of children whose mother and father are no longer together (Kelly, 2007; Child Trends Databank, 2015). In the present sample, very few European American offspring and no African American offspring lived exclusively with their father (or another adult) following separation when mother only had a history of alcohol problems.

In attempt to further clarify observed interactions, future studies will ideally include a more detailed characterization of post-separation residence, together with father contact and support (emotional and financial) in families where mother is the sole or primary custodian. Also important will be to examine presence and duration of co-residence of other support figures, such as extended family members or stepparents. Extended family support is a well-documented protective factor in single-parent African American families (Amato, 1994), but has received far less attention in studies of single-parent European American families. Incorporation of these variables—post-separation residence, father contact, and support from extended family and other parent-like figures—will be critical to more fully understand observed interactions.

Offspring perceptions of parental alcohol problems, including perceived harms caused by drinking, may also play a role (Haller & Chassin, 2010; Harburg et al., 1982, 1990). It is possible that children delay drinking, or avoid drinking altogether, because they witnessed the consequences of maternal drinking for their parents' relationship, such as drinking-related conflict and violence (Leonard & Eiden, 2007). Unfortunately, daughters' perceptions of the consequences of parental alcohol problems were not assessed in the present study. In future research, data on perceived harms may prove fruitful in helping to understand potentially protective effects of parental separation in the context of maternal alcohol problems.

Strengths and Limitations

The present study contributes to a small but growing literature documenting interactive effects of parental alcohol problems and parental separation on offspring substance involvement (Jackson et al., 2016, Thompson et al., 2013, Waldron et al., 2014b). Ours is the first such study to consider gender of the affected parent in the prediction of first drink, an

early alcohol milestone strongly associated with later alcohol use disorder (Dawson et al., 2008, Grant and Dawson, 1997, Hingson et al., 2006). Study design is another strength. We analyzed data drawn from a population-representative birth cohort of females twins, most of whom have been followed prospectively from adolescence. We also conducted analyses separately for European and African ancestry families. With a single exception (Waldron et al., 2014b), prior research has largely ignored racial/ethnic differences, aside from including racial/ethnic group as a control variable. Additionally, by employing a survival-analytic framework, we ensured temporal precedence of parental separation while retaining in our sample offspring who had yet to initiate drinking as of last completed assessment.

There are a number of limitations of our study, including reliance on lifetime measures of parental alcohol problems. Although post-hoc analyses suggest many mothers (in families where mother only has a history of problem drinking) continue to experience problems related to drinking, we have limited data necessary for a more comprehensive analysis of the role of remission in explaining our findings. This is especially true of analyses specific to African American families, given relatively fewer numbers of participating twins and parents. In addition, because we focused on daughters, we are unable to examine potential differences as a function of gender match to the affected and/or custodial parent (see Dawson & Grant, 1998). Given observed differences as a function of twin pair zygosity, generalizability of findings to singleton populations is also uncertain.

Conclusions

Results from the present study highlight parental separation as an important moderator of risk to children of mothers with a history of problem drinking, with interactive effects observed consistently across racial group. Prior to informing design of preventive and early intervention programs, additional research is needed to more fully understand observed interactions, including new data collection to aid analysis of post-separation custody and parent involvement, parental remission, and offspring perceptions of parental alcohol problems and their consequences. Such research will necessarily require replication in independent samples that include both male and singleton offspring and larger numbers of African American participants.

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Abbreviations

AA	African Ancestry
EA	European or other Ancestry
AD	Alcohol Dependence
MOAFTS	Missouri Adolescent Female Twin Study
SSAGA	Semi-Structured Assessment of the Genetics of Alcohol problems

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Figure 1.

Kaplan Meier failure curves of time to first drink as a function parental separation (intact or separated) and parental alcohol problems (neither parent, mother only, father only, or both parents with a history of alcohol problems) in EA twins.

Figure 2. Kaplan Meier failure curves of time to first drink as a function parental separation (intact or separated) and parental alcohol problems (neither parent, mother only, father only, or both parents with a history of alcohol problems) in AA twins.

Table 1

Sample sizes (and associated percentages) as a joint function of parental alcoholism and parental separation history, by race.

Parental Alcohol Problems	Parental Separation	African American twins, <i>n</i> (%)	European American twins, <i>n</i> (%)
Neither parent	No	109 (18)	1721 (49)
	Yes	247 (40)	564 (16)
Mother only	No	6 (<1)	60 (2)
	Yes	39 (6)	107 (3)
Father only	No	36 (6)	371 (10)
	Yes	133 (22)	513 (14)
Both	No	5 (<1)	49 (1)
	Yes	36 (6)	154 (4)

Table 2

Sample characteristics, by race

	African American twins <i>n</i> = 611	European American twins <i>n</i> = 3539
Alcohol use, <i>n</i> (%)	456 (75)	3050 (86)
Age of onset, <i>M</i> (<i>SD</i>)	17.22 (3.45)	16.04 (2.82)
Parental alcohol problems, <i>n</i> (%)		
Mother only	45 (7)	167 (5)
Father only	169 (28)	884 (25)
Both parents	41 (7)	203 (6)
Parental separation, <i>n</i> (%)	455 (75)	1338 (38)
Age of onset, <i>M</i> (<i>SD</i>)	6.86 (7.28)	13.08 (6.70)

Table 3

Hazard Ratios (and 95% CIs) from Cox models predicting timing of first alcohol use in European American twins

Predictor (risk period in years of age)	Unadjusted HR (95% CI)	Adjusted ^a HR (95% CI)
<i>Model I</i>		
Mother only alcohol problems (<11)	3.72 (1.71–8.10)	3.67 (1.60–8.39)
Mother only alcohol problems (11–17)	1.43 (1.14–1.80)	1.26 (1.01–1.56)
Mother only alcohol problems (18)	0.92 (0.61–1.37)	
Father only alcohol problems (<13)	2.09 (1.52–2.88)	1.91 (1.38–2.66)
Father only alcohol problems (13–17)	1.31 (1.16–1.47)	1.06 (0.94–1.20)
Father only alcohol problems (18)	1.03 (0.82–1.30)	
Both parents alcohol problems (<13)	3.35 (2.16–5.20)	2.53 (1.61–3.97)
Both parents alcohol problems (13–17)	1.35 (1.07–1.71)	1.03 (0.81–1.31)
Both parents alcohol problems (18)	1.00 (0.62–1.60)	
Parental separation (<15)	1.63 (1.39–1.91)	1.52 (1.28–1.81)
Parental separation (15)	1.22 (1.09–1.37)	1.23 (1.08–1.40)
<i>Model II</i>		
Mother only alcohol problems (<11)	1.86 (1.43–2.42)	4.63 (1.97–10.89)
Mother only alcohol problems (11)		1.62 (1.20–2.19)
Father only alcohol problems (<13)	2.26 (1.64–3.13)	1.91 (1.34–2.70)
Father only alcohol problems (13)	1.28 (1.10–1.49)	1.06 (0.90–1.25)
Both parents alcohol problems (<13)	3.42 (2.02–5.82)	2.40 (1.36–4.24)
Both parents alcohol problems (13–17)	1.25 (0.86–1.83)	0.98 (0.65–1.48)
Both parents alcohol problems (18)	0.94 (0.52–1.68)	
Parental separation (<15)	1.41 (1.23–1.60)	1.56 (1.28–1.92)
Parental separation (15)		1.26 (1.08–1.46)
Mother only alc prob*Parental separation (<15)	1.19 (0.77–1.84)	0.66 (0.44–0.99)
Mother only alc prob*Parental separation (15)	0.38 (0.25–0.59)	
Father only alc prob*Parental separation	0.93 (0.74–1.15)	1.00 (0.79–1.25)
Both parents alc prob*Parental separation	1.06 (0.69–1.63)	1.05 (0.66–1.68)

Note. Reference group for mother only, father only, and both parents with a history of alcohol problems (alc prob) = neither parent with alcohol problems. Reference group for parental separation = intact families. Where brackets are shown, reported risk is equivalent across risk periods.

^acontrolling for maternal age at twins' birth, maternal educational attainment, histories of parental psychopathology (DSM-IV conduct disorder and major depressive disorder, regular smoking), offspring psychopathology (DSM-IV inattention symptoms, hyperactivity symptoms, oppositional defiant disorder, conduct disorder, social anxiety disorder, major depressive disorder, and suicidality), and childhood physical and sexual abuse.

Table 4

Hazard Ratios (and 95% CIs) from Cox models predicting timing of first alcohol use in African American twins

Predictor (risk period in years of age)	Unadjusted HR (95% CI)	Adjusted ^a HR (95% CI)
<i>Model I</i>		
Mother only alcohol problems (<15)	2.46 (1.27–4.79)	2.58 (1.31–5.06)
Mother only alcohol problems (15)	1.02 (0.66–1.57)	0.93 (0.54–1.59)
Father only alcohol problems	0.95 (0.74–1.21)	0.85 (0.64–1.13)
Both parents alcohol problems	1.50 (0.98–2.30)	1.41 (0.95–2.35)
Parental separation (<15)	0.81 (0.65–1.01)	1.03 (0.65–1.65)
Parental separation (15)		0.59 (0.44–0.78)
<i>Model II</i>		
Mother only alcohol problems	3.10 (1.35–7.70)	4.65 (2.10–10.29)
Father only alcohol problems	0.68 (0.44–1.05)	0.66 (0.38–1.12)
Both parents alcohol problems (<15)	1.67 (0.81–3.46)	1.94 (0.52–7.20)
Both parents alcohol problems (15)		1.05 (0.35–3.11)
Parental separation (<15)		1.07 (0.63–1.83)
Parental separation (15–17)	0.75 (0.57–0.99)	0.66 (0.42–1.03)
Parental separation (18)		0.47 (0.31–0.71)
Mother only alc prob*Parental separation (<15)	0.38 (0.13–1.07)	0.36 (0.11–1.18)
Mother only alc prob*Parental separation (15)		0.18 (0.07–0.47)
Father only alc prob*Parental separation	1.57 (0.94–2.64)	1.40 (0.76–2.57)
Both parents alc prob*Parental separation	0.90 (0.37–2.16)	1.12 (0.34–3.65)

Note. Reference group for mother only, father only, and both parents with a history of alcohol problems (alc prob) = neither parent with alcohol problems. Reference group for parental separation = intact families. Where brackets are shown, reported risk is equivalent across risk periods.

^acontrolling for maternal age at twins' birth, maternal educational attainment, histories of parental psychopathology (DSM-IV conduct disorder and major depressive disorder, regular smoking), offspring psychopathology (DSM-IV inattention symptoms, hyperactivity symptoms, oppositional defiant disorder, conduct disorder, social anxiety disorder, major depressive disorder, and suicidality), and childhood physical and sexual abuse.