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TEMPERAMENT AND BEHAVIORAL PROBLEMS AMONG INFANTS IN ALCOHOLIC FAMILIES

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Abstract

This study examined the association between paternal alcoholism and 12-month infant temperament and 18-month behavior problems. The role of associated parental psychopathology and maternal drinking in exacerbating risk for maladaptive behavioral outcomes was also examined. Participants were 213 families (102 control families, 94 paternal alcoholic families, and 17 families with alcoholic fathers and heavy drinking mothers) who were assessed when their child was 12 months old and reassessed again when their child was 18 months old. Infants of alcoholics displayed marginally more stubborn/persistent temperaments at 12 months of age, but significantly more internalizing problems at 18 months. Analyses suggested that internalizing problems in the infants of alcoholics could be attributed to the paternal depression concomitant with paternal alcoholism. In addition, an interaction was observed, indicating that paternal alcohol problems predicted 18-month externalizing problems among families with low maternal depression, but not among families with high maternal depression. Children of depressed mothers exhibited uniformly higher externalizing scores, but were not further impacted by paternal alcohol problems. However, children of nondepressed mothers were adversely affected by fathers' drinking as reflected by higher externalizing behavior scores. The results highlight the necessity of addressing the overall contextual risks that occur with paternal alcoholism in studies of the development of children in alcoholic families.

For more than 2 decades, research has documented the increased risk for maladaptive developmental outcomes among children of alcoholics. For example, the risk for future alcohol and substance use problems has been shown in studies of young adults (e.g., Finn, Sharkansky, Viken, West, Sandy, & Bufferd, 1997; Sher, Walitzer, Wood, & Brent, 1991). Higher levels of depression and anxiety and lower levels of self esteem have also been reported among adult children of alcoholics (Belliveau & Stoppard, 1995; Domenico & Windle, 1993). Studies of older and younger adolescents (Johnson, Leonard, & Jacob, 1989; Weinberg, Dielman, Mandell, & Shope, 1994) have also demonstrated that these children are at an increased risk for problems in emotional and behavioral adaptation. Lynskey, Fergusson, and Horwood (1994) interviewed a birth cohort of New Zealand children at age 15, and reported higher rates of psychiatric disorders among the offspring of alcoholics relative to offspring of nonalcoholics. Moreover, these differences, though reduced, remained significant after controlling for a variety of confounding factors. Similarly, Chassin, Rogosch, and Barrera

(1991) reported higher levels of internalizing and externalizing problems among children of alcoholics in contrast to children of controls, although these problems were restricted to current alcoholics, and were mediated by other parental psychopathology and environmental stress.

Recent research has begun to document that these problems may be observable prior to adolescence, and possibly, in early childhood. For example, Clark, Moss, Kirisci, Mezzich, Miles, and Ott (1997) compared preadolescent sons (ages 10 through 12) of fathers with and without substance use disorders. Paternal substance abuse was associated with a higher prevalence of disruptive behavior disorders and anxiety disorders among the boys. Carbonneau, Tremblay, Vitaro, Dobkin, Saucier, and Pihl (1998) collected teacher reports of boys who were either 6 or 12 years old. Paternal alcoholism was related to oppositional and hyperactive behavior, and this effect was not moderated by the child's age. Nor was it moderated by the presence of the father in the home, raising the possibility of genetic influences on these behaviors. Studies evaluating even younger children have also reported behavioral problems among the offspring of alcoholics. Puttler, Zucker, Fitzgerald, and Bingham (1998) compared 3–8-year-old children of antisocial alcoholics, nonantisocial alcoholics, and controls. Children of antisocial and nonantisocial alcoholics were rated higher than children of controls on the total score and the externalizing subscale of the Child Behavior Checklist. Children of antisocial alcoholics were rated higher than children of nonantisocial alcoholics and controls on the internalizing subscale.

One potential pathway for the behavioral problems observed among children of alcoholics is through the impact of fathers' alcoholism and associated factors on infant temperament (Jansen, Fitzgerald, Ham, & Zucker, 1995; Tarter, Alterman, & Edwards, 1985; Tarter, Kabene, Escallier, Laird, & Jacob, 1990). Zucker (1979) suggested that biologically mediated temperamental characteristics needed to be considered within developmental approaches to alcoholism. Similarly, Tarter and Vanyukov (1994) have argued that temperamental factors, specifically high activity, high emotionality, low soothability, low attention span-persistence, and low sociability are associated with a high risk for alcoholism and may be a reflection of the child's genetic liability to later addiction. Although most of the research supporting this position has been conducted with older children (e.g., Tarter et al., 1990), there is some support in studies of younger children as well (Fitzgerald, Sullivan, Ham, Zucker, Bruckel, & Schneider, 1993). These investigators found evidence of greater impulsivity among the 3-year-old offspring of alcoholics in comparison to offspring of controls, suggesting temperamental difficulties, although they did not find differences with respect to behavioral problems. Moreover, there is some evidence to suggest that temperamental difficulties might mediate the relationship between parental alcoholism and childhood problems. Blackson, Tarter, Martin, and Moss (1994) evaluated this hypothesis among 10–12-year-old boys, and reported that a "difficult affective temperament" mediated the relationship between paternal alcoholism and child maladjustment. Among younger children, Jansen et al. (1995) examined the relationship between temperament and problem behavior in the sample studied by Fitzgerald et al. (1993). They found that sons of alcoholics who scored in the clinically significant range on the Child Behavior Checklist were more likely to have difficult temperamental characteristics. These results suggest that a child with a biological, and presumably genetic, predisposition for substance abuse raised in an alcoholic environment may be at heightened risk for the development of behavior problems.

Although temperament may serve as a mediator of childhood problems, it has also been suggested that temperament and parental alcoholism may interact to predict subsequent behavioral problems. For example, Tarter and Vanyukov (1994) suggest that "a child who displays a difficult temperament, especially if living in a family where there is parental substance abuse, manifests behavior features" such as hyperactivity and aggressiveness. Further, poor impulse control in preschool has been found to be predictive of substance abuse

problems in adolescence (Block, Block, & Keyes, 1988). Sanson, Oberklaid, Pedlow, and Prior (1991) found that infant temperament in combination with one or more risk factors was predictive of externalizing and internalizing disorders at 4 to 5 years of age, particularly in young boys.

Bates (1987) determined that temperament has modest predictive power for behavior problems that may be increased when examining it in combination with other risk factors, such as parental psychopathology, family stress, or parental discipline. One way that the relationship between infant temperament and later problem behavior may be explained is in terms of the development of self-control and the ability to internalize society's rules. Temperament, defined as the expression and experience of arousal and emotion (Goldsmith & Campos, 1982), has been linked to the development of a conscience in toddlers. Specifically, felt anxiety levels are believed to contribute to feelings of guilt or shame associated with misbehavior, while differences in impulsivity affect toddlers' abilities to control their behavior in situations that require they do so (Kochanska, 1991, 1995). Thus, around 2 years of age toddlers begin to develop inhibitory control abilities that are reflective of their temperaments and parental socialization (Emde, Biringen, Clymen, & Oppenheim, 1991; Kopp, 1982; Rothbart, 1989). Infants labeled temperamentally difficult have been found to have higher levels of impulsivity and lower thresholds of arousal as toddlers than "easy" babies (Olson, 1980). As such, the capacity for internalization of rules and behavioral control in these children may be impaired leading to behavior problems.

This study is part of an ongoing longitudinal study focused on the development of children in alcoholic and control families from 12 months of age through 5 years of age. The present article explores the relationship between parental alcoholism, infant temperament, and the behavioral development of toddlers. In particular, we examine five interrelated questions: (1) Is there a relationship between paternal alcoholism and infant temperament at 12 months of age?; (2) Is there a relationship between paternal alcoholism and behavioral problems at 18 months of age?; (3) Does temperament mediate the relationship between paternal alcoholism and behavioral problems?; (4) Do temperament and alcoholism interact to predict behavioral problems?; and (5) Do the associated parental factors mediate or moderate the above relationships?

METHOD

Participants

The participants were 213 families with 12-month old infants who volunteered for an ongoing longitudinal study of parenting and infant development. Of these families, 102 were in the control group (both parents light drinking or abstaining). In 94 families, the father was alcoholic and mother was light drinking or abstaining, and in 17 families, the father was alcoholic and the mother was a heavy drinker. The majority of the mothers in the study were Caucasian (94%), about 4% were African American, and 2% were Hispanic or Native American. Similarly, the majority of fathers were Caucasian (90%), a few were African American (7%), and 2% were Hispanic or Native American. The majority of the mothers had a post-high school education such as an associate or vocational degree (31%) or were college graduates (27%). There were very few who were not high school graduates (2%). The educational level of the fathers was similar, with 33% receiving a college degree and 18% receiving some post-high school education. Only 5% had not graduated from high school. All of the mothers were cohabiting with the father of the infant in the study. Most of the parents were married to each other (88%), about 11% had never been married, and 1% had previously been married. Mothers' ages ranged from 19 to 41 ($M = 30.7$, $SD = 4.46$) and fathers' ages ranged from 21 to 58 ($M = 32.95$, $SD = 5.94$). About 62% of the mothers and 92% of the fathers were working outside the home at the time of the 12 month assessment, with very similar percentages working at the 18 month assessment (66% of mothers and 92% of fathers).

Procedure

The names and addresses of these families were obtained from New York State birth records for Erie County. These birth records were preselected to exclude families with premature (gestational age of 35 weeks or lower), or low birth weight infants (birth weight of less than 2,500 grams), maternal age of less than 19 and greater than 40 at the time of the infant's birth, plural births (e.g., twins), and infants with congenital anomalies, palsies, or drug withdrawal symptoms. Introductory letters were sent to a large number of families ($n = 9,457$) who met the above-mentioned basic eligibility criteria. Each letter included a form that all families were asked to complete and return. Approximately 25% of these families completed the form and, of these, 2285 replies (96%) indicated an interest in the study. Respondents were compared to the overall population with respect to information collected on the birth records. These analyses indicated a slight tendency for infants of responders to have higher Apgar scores ($M = 8.97$ vs. 8.94 on a scale ranging from 1 to 10), higher birth weight ($M = 3516$ vs. 3460 grams), and higher number of prenatal visits ($M = 10.50$ vs. 10.31). Responders were also more likely to be Caucasian (88% of total births vs. 91% of responders), have higher educational levels, and have a female infant. These differences were significant given the very large sample size, even though the size of the differences was minimal.

Parents who indicated an interest in the study were screened by telephone with regard to sociodemographics and further eligibility criteria. A maternal screen was done first to determine provisional group status. Initial inclusion criteria consisted of both parents cohabiting since the infant's birth, the target infant being the youngest child in the family, mother was not pregnant at recruitment, no mother – infant separations for over a week, parents were the primary care-givers, and the infant did not have any major medical problems. These criteria were important to control because each of these has the potential to markedly alter parent – infant interactions. Additional inclusion criteria were utilized to minimize the possibility that any observed infant behaviors could be the result of prenatal exposure to drugs or heavy alcohol use. These additional criteria were that there could be no maternal drug use during pregnancy or the past year except for mild marijuana use (no more than twice during pregnancy), the infant was not premature or low birth weight (one of the most consistent effects of prenatal alcohol and drug exposure), mother's average daily ethanol consumption was .50 or less, and she did not engage in binge drinking (five or more drinks per occasion) during pregnancy. Families meeting these basic inclusion criteria were provisionally assigned to one of three groups on the basis of parental screens (control, father alcoholic/mother light drinker, father alcoholic/mother heavy drinker), with final group status assigned on the basis of both screen and questionnaire. A father was considered alcoholic if he met any one of the following three criteria: (1) he met Family History Research Diagnostic Criteria for Alcoholism (FHRDC; Andreason, Endicott, Spitzer, & Winokur, 1977; Andreason, Rice, Endicott, Reich, & Coryell, 1986) according to maternal report; (2) he acknowledged having a problem with alcohol or having been in treatment for alcoholism, was currently drinking, and had at least one alcohol-related problem in the past year; (3) he indicated having alcohol-related problems in three or more areas in the past year according to responses on a screening interview based on the University of Michigan-Composite International Diagnostic Interview (UM-CIDI; Anthony, Warner, & Kessler, 1994; Kessler et al., 1994) screen; or (4) he met DSM-IV criteria for abuse or dependence in the past year based on his responses to a questionnaire based on the UM-CIDI. A mother was considered to be a heavy drinker if she met any of the following criteria: (1) average daily ethanol consumption of 1.00 or higher; (2) she acknowledged drinking five or more drinks per occasion at least once/month; or (3) she met DSM-IV diagnosis for abuse or dependence based on the UM-CIDI. Families were classified as control if neither father nor mother met the criteria for alcoholism or heavy drinking, respectively. Families were classified as father alcoholic/mother light drinker if the father met criteria for alcoholism and the mother did not meet criteria for heavy drinking, and they were classified as father alcoholic/

mother heavy drinker if father met criteria for alcoholism and mother met criteria for heavy drinking. Nearly all of the mothers who met criteria for heavy drinking also met criteria for alcohol abuse or dependence (15 of 17, 81%). It should be noted that women who reported drinking moderate to heavy amounts of alcohol during pregnancy (see criteria above) were excluded from the study. Because we had a large pool of families potentially eligible for the control group, control families were matched to the two other groups with respect to race/ethnicity, maternal education, child gender, parity, and marital status.¹

To date, families have been asked to visit the Institute at five different infant ages (12, 18, 24, 36, and 60 months), with three visits at each age. Two weeks before each visit, parents were sent a packet of questionnaires, one for each parent. Both parents were asked to complete the questionnaires independently and return them in sealed envelopes at the first visit. A variety of observational procedures and developmental assessments were conducted at each visit and families were paid for participation. This paper focuses on the 12 and 18 month questionnaire assessments.

Measures

Parental alcohol use—Although parental alcohol abuse and dependence problems were partially assessed from the screening interview, self-report versions with more detailed questions were used to enhance the alcohol data and check for consistent reporting. A self-report instrument based on the UM-CIDI interview (Anthony et al., 1994; Kessler et al., 1994) was used to assess alcohol abuse and dependence. Several questions of the instrument were reworded to inquire as to “how many times” a problem had been experienced, as opposed to whether it happened “very often.” DSM-IV criteria for alcohol abuse and dependence diagnoses for current alcohol problems (in the past year) were used to assign final diagnostic group status. For abuse criteria, recurrent alcohol problems were defined as those occurring at least three to five times in the past year or one to two times in three or more problem areas. This instrument was also used to derive continuous measures of the number of alcohol-related abuse and dependence symptoms in the past year. A quantity-frequency measure of alcohol use adapted from Cahalan, Cisin, and Crossley (1969) was used to obtain a measure of average daily ethanol intake for both parents. Finally, a measure indicating severity of heavy drinking was computed. This five-item measure assessed the frequency of drinking six or more drinks, getting drunk, blacking out, passing out, and getting sick. Because of different variances, these items were standardized before summing. The internal reliability of this measure was excellent ($\alpha = .85$).

All of the alcohol measures were highly skewed, and were transformed using square root transformations. The resulting alcohol variables for each parent were strongly correlated with each other. Factor analyses were conducted to create composite factors with the three measures of last year alcohol problems for each parent: number of last year abuse or dependence problems, severity of heavy drinking, and average daily ethanol intake. The factor analyses yielded a single factor for each parent with high communality values ranging from .82 to .91 for fathers and .71 to .87 for mothers. Two composite scores were created, representing paternal and maternal last year alcohol problems. These scores were used in all analyses of continuous alcohol problems.

Parents — antisocial behavior—A modified version of the Antisocial Behavior Checklist (ASB; Zucker & Noll, 1980) was used in this study. Because of concerns about causing family conflict as a result of parents reading each others responses, items related to sexual antisociality

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¹In several instances in which unusual families were recruited, it was not possible to match controls to cases on all five variables, and they were matched on three or four of the variables.

and those with low population base rates (Zucker, 1995, personal communication) were dropped. This resulted in a 28-item measure of antisocial behavior. Parents were asked to rate their frequency of participation in a variety of aggressive and antisocial activities along a four-point scale ranging from 1 (“never”) to 4 (“often”). The measure has been found to discriminate among groups with major histories of antisocial behavior (e.g., prison inmates, individuals with minor offenses in district court, and university students, Zucker & Noll, 1980), and between alcoholic and nonalcoholic adult males (Fitzgerald, Jones, Maguin, Zucker, & Noll, 1991). Parents’ scores on this measure were also associated with maternal reports of child behavior problems among preschool children of alcoholics (Jansen et al., 1995). The original measure has adequate test – retest reliability (.91 over 4 weeks) and internal consistency (coefficient alpha = .93). The antisocial behavior scores for both fathers and mothers were skewed and were transformed using square-root transformations. The internal consistency of the 28-item measure in the current sample was quite high for both parents (alpha = .90 for fathers and .82 for mothers).

Parents — depression—Parents’ depression was assessed with the Center for Epidemiological Studies Depression Inventory (CESD; Radloff, 1977), a scale designed to measure depressive symptoms in community populations. The CESD is a widely used, self-report, four-point Likert-type measure. Parents were asked to report how often they experienced 20 depressive symptoms (e.g., poor appetite, feeling sad, inability to concentrate) during the past week with responses including rarely or none, some or a little of the time (1–2 days), occasionally or a moderate amount of time (3–4 days), or most or all of the time (5–7 days). The scale has high internal consistency (Radloff, 1977), and strong test – retest reliability (Boyd, Weissman, Thompson, & Myers, 1982; Ensel, 1982). In the present study, the depression scores for both parents were skewed and were transformed using square-root transformations. The internal consistency of this scale for the current sample ranged from .87 for fathers to .90 for mothers.

Parents — aggression—Two measures of verbal and physical aggression were used in this study. Mother and father reports of physical aggression were obtained from a modified version of the Conflict Tactics Scale (CTS; Straus, 1979). The items focusing on moderate (e.g., push, grab, or shove) to severe (e.g., hit with a fist) physical aggression, but not the very severe items (e.g., burnt or scalded, use of weapons) were used in this study. Parents were asked to report on the frequency of their own and their partners’ aggression toward each other on a seven-item scale. Two composite physical aggression scores, one for each parent, were created by taking the maximum of each parent and the partners’ reports of aggression. The resulting scores were highly skewed, and were transformed using square root transformations. Verbal aggression was measured by a modified version of the Index of Spouse Abuse scale (ISA; Hudson & McIntosh, 1981). Only the verbal aggression items were used from the original scale. Parents were asked to report on the frequency of their partners’ verbal aggression toward them on the resulting 15-item measure along a five-point scale ranging from “never” to “frequently.” A composite verbal aggression measure was created by summing the items and transforming the summed score. Factor analyses were conducted to create a composite measure of aggression reflecting both verbal and physical aggression. The factor analyses yielded a single factor for each parent with high factor loadings ranging from .86 for fathers’ aggression toward mother to .85 for mothers’ aggression toward father. Two composite scores were created representing overall paternal and maternal aggression. The internal consistencies of these two measures were quite high (alpha = .92 for maternal aggression and alpha = .91 for paternal aggression).

Infant temperament—Infant temperament was assessed with the 13-month version of the Infant Characteristics Questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979), a self-report measure with 32 items rated on a seven-point scale. The ICQ was completed by both mothers

and fathers. The ICQ consists of four subscales: infant fussy/difficult ($\alpha = .82$ for mother report and $.77$ for father report), persistent ($\alpha = .71$ for mother report and $.77$ for father report), unadaptable ($\alpha = .74$ for mother report and $.76$ for father report) and unsociable ($\alpha = .42$ for mother report and $.52$ for father report). Because of its unacceptably low alpha, infant unsociability was excluded from all further analyses. Higher scores indicate more problematic infant temperaments.

Behavior problems—Behavior problems at 18 months were assessed with the 2–3-year-old version of the Child Behavior Checklist (CBCL; Achenbach, 1992). The CBCL is a widely used measure of children's behavioral/emotional problems. It consists of 100-items on a three-point response scale ranging from “not true” to “very true,” with some open-ended items designed to elicit detailed information about a particular problem behavior. The behavior ratings yield two broad-band dimensions of internalizing and externalizing behaviors as well as a total score. Higher scores indicate more toddler behavior problems. The CBCL has well-established psychometric properties, and allows for identification of problem behavior syndromes as well as an overall problem behavior score (Achenbach, 1992). Although the CBCL has not yet been extended to 18 month olds, it has demonstrated validity for 24-month-olds. Moreover, an 18-month version is being developed with few differences from the 24-month version (Achenbach, 1999; personal communication). In the present study, internal consistencies were $.80$ and $.84$ for mother Internalizing and Externalizing subscales, and $.80$ and $.89$ for father Internalizing and Externalizing subscales.

RESULTS

Demographics and Psychopathology Differences

Analyses of variance were used to examine group differences on variables including family income, parental education, and parental age. These analyses yielded no group differences on any of the demographic variables other than fathers' education, $F(1,211) = 7.17, p < .01$. Alcoholic fathers were less educated ($M = 13.07, SD = 2.60$) compared to those in the control group ($M = 14.15, SD = 3.29$). Because of the possibility that fathers' educational level was a consequence of the developmental precursors of alcoholism, we did not utilize it as a covariate in the group comparisons.

Similar analyses were conducted to determine group differences in mother and father psychopathology. The results of these analyses appear in Table 1. Briefly, alcoholic fathers scored significantly higher than control fathers on alcohol use, $F(1,211) = 213.15, p < .001$, depression, $F(1,211) = 6.78, p = .01$, antisocial behavior, $F(1,211) = 39.50, p < .001$, and aggression, $F(1,211) = 13.30, p < .001$. In addition, the women married to the alcoholics also scored significantly higher than women married to control fathers on alcohol use, $F(1,211) = 34.49, p < .001$, depression, $F(1,211) = 4.31, p < .05$, antisocial behavior, $F(1,211) = 19.59, p < .001$, and aggression, $F(1,211) = 18.76, p < .001$.

Temperament at 12 months

Analyses of variance were conducted for two between groups factors (group; alcoholic vs. control group; and child gender) and one within group factor (mother report vs. father report) for the subscales of the ICQ.² Marginal group differences were observed for the persistence

²Initially, we compared temperament ratings and behavior problems of families with alcoholic fathers/light drinking mothers to families with alcoholic fathers/heavy drinking mothers and found no group differences. The mean differences across these two groups were very small, and generally not consistent with the hypothesis that the children of alcoholic fathers/heavy drinking mothers were more severe. Given that these comparisons did not have sufficient power to detect small to medium effect size differences, we also conducted all of the analyses with just families with alcoholic fathers/light drinking mothers. For both the Analysis of Variance and the Regression analyses, the results were nearly identical and in most instances, somewhat stronger.

subscale, $F(1,207) = 2.91, p < .10$. Infant children of alcoholics were reported to be more stubborn/persistent than children of controls. In addition to these main effects, there was a main effect of informant for persistence, $F(1,207) = 5.62, p < .001$, indicating that mothers rated the infants as more persistent or stubborn than did fathers. Finally, there was group by member interaction on the unadaptable subscale, $F(1,207) = 5.31, p < .05$, that suggested that alcoholic fathers rated their infants as more unadaptable than control fathers, but that mothers in the alcoholic group rated their infants as less unadaptable than mothers in the control group. Group means for mother and father report are displayed in Table 2.

Behavior Problems at 18 Months

Analyses of variance were conducted on the 18 month scores on the Internalizing and Externalizing factors of the CBCL. As above, these analyses used group and child gender as between groups effects and informant (mother vs. father) as a within group effect. There was a significant group effect for the Internalizing subscale, $F(1,208) = 4.90, p < .05$, with infants in alcoholic families receiving higher scores than infants in control families. The group effect for Externalizing did not approach significance, $F(1,208) = 1.35, p > .15$. There were no other significant effects for either subscale.³ Group means are displayed in Table 2.

Alcohol Problems and Temperament as Predictors of Behavioral Problems

Possible mediating effects of behavior problems were then examined. A variable is said to act as a mediator to the extent that it accounts for the relation between a predictor and the criterion. For example, with respect to temperament, we wanted to determine whether the relationship between paternal alcoholism and 18-month behavior problems could be explained by the child's temperament at 12 months of age. For these analyses, mother and father reports of infant temperament and behavior problems were averaged.⁴ Hierarchical regression analyses were then conducted focusing on predicting Internalizing and Externalizing scores at 18 months. For these analyses, we first entered the continuous measure of fathers' alcohol problems. Given the group differences in fathers' education and the nature of our design, which included women with alcohol problems, these factors were then entered to determine whether these factors accounted for the observed relationship between paternal alcoholism and behavior problems. In the next step, the infant temperament subscales were entered as a block to determine if 12 month temperament mediated the relationship. Finally, to examine whether the predictive value of paternal alcohol problems with respect to Internalizing and Externalizing scores reflected a direct association of alcoholism or whether the concomitant risk factors played a role, maternal and paternal depression, antisocial behavior, and aggression were entered stepwise until there were no further significant contributions to the equation. The results of these analyses are presented in Tables 3 and 4.

In prediction of Internalizing problems, father alcohol problems contributed 5% of variance in understanding 18 month old Internalizing problems. Fathers' education contributed an additional 1% variance to prediction of Internalizing scores. However, after controlling for this variable, fathers' alcohol problems remained significantly associated with Internalizing scores. Maternal alcohol problems did not aid in prediction and fathers' alcohol problem scores remained significantly associated with Internalizing scores. Infant temperament factors contributed an additional 17% variance to prediction of Internalizing problems above and

³To explore the group differences, separate analyses of the component subscales of anxious/depressed, sleep problems, withdrawn, somatic problems, destructive, and aggressive were conducted. Some caution should be exercised in interpreting these subscales inasmuch as they were developed and validated with 24–36-month-old children, rather than 18-month-old children. Children of alcoholics were rated as significantly higher on the anxious/depressed sub-scale, $F(1,205) = 6.76, p < .01$, and as marginally higher on the withdrawn subscale, $F(1,204) = 2.94, p < .10$ than children of controls.

⁴Mother and father reports of temperament correlated .60, .25, .49, and .22 for fussy/difficult, persistent, and unadaptable, respectively. Mother and father Internalizing scores correlated .21 while Externalizing scores correlated .31.

beyond the contribution made by father alcohol problems. Specifically, the factors fussy/difficult and persistent provided additional variance to the understanding of 18-month-old Internalizing problems. However, after controlling for these two temperament scores, alcohol problem severity remained significantly associated with Internalizing scores. Fathers' depression contributed an additional 2% variance to prediction of Internalizing problems. Mother and father aggression and antisocial behavior and maternal depression were not significant predictors of Internalizing behaviors. The predictive value of the temperament factors was not influenced by the inclusion of fathers' depression. Overall, 26% of the variance in Internalizing problems was explained with the current model, $F(1,204) = 6.83, p < .05$.

In prediction of Externalizing problems, father alcohol problems contributed 2% of variance in understanding 18-month-old Externalizing problems. The fact that the continuous measure of alcohol problems was related to Externalizing scores while the categorical measure of alcohol diagnosis was not may be attributed to the lack of severity information in the categorical approach. Fathers' education and maternal alcohol problems did not aid in prediction and fathers' alcohol problem scores remained marginally related to Externalizing scores. Infant temperament factors contributed an additional 12% variance to prediction of Externalizing problems above and beyond the contribution made by father alcohol problems. Specifically, the factors fussy/difficult and persistent provided additional variance to the prediction of 18-month-old Externalizing problems. However, after controlling for these two temperament scores, alcohol problem severity was not significantly associated with Externalizing scores. Mothers' depression contributed an additional 4% variance to prediction of Externalizing problems, and fathers' depression contributed an additional 2%. As described above, fathers' alcohol problem severity was not significant after controlling for the temperament scale. The temperament scales, however, continued to be associated with Externalizing problems after controlling for both maternal and paternal depression. Mother and father antisocial behavior and aggression were not significant factors in the prediction of Externalizing behavior. Overall, 21% of the variance in Externalizing problems was explained with the current model, $F(1,203) = 5.40, p < .05$.

The possible moderating effects of temperament on the relationship between alcohol problem severity and behavior problems were then examined. A moderating variable is one that affects the direction and/or strength of the relationship between an independent and dependent variable. To evaluate this possibility, multiplicative variables representing the interaction of alcohol problems with each of the four 12-month temperament scales were calculated. These interactions were added to the regression equations in an additional step. None of these terms were significantly associated with Internalizing or Externalizing scores, either when entered individually, or when entered as a block.

As a final step, we explored the possibility that the relationship between alcohol problems and Internalizing or Externalizing problems was moderated by any of the other parental risk factors. Specifically, six interaction terms were constructed by multiplying paternal alcohol problems by paternal and maternal aggression, antisocial behavior, and depression. These interactions were tested by entering the relevant main effects into the equation if they were not already included, and then assessing the incremental value of the interaction. Only one of these interactions proved significant — the interaction of father alcohol problem with maternal depression in the prediction of Externalizing problems, $\beta = -.16, F(1,202) = 5.60, p < .05$. This interaction suggests that mothers with high scores on depression had children with higher levels of externalizing behavior than children of mothers with low depression. However, children of mothers with high depression were not impacted by fathers' alcohol problems, while mothers with low depression were. This interaction is displayed in Figure 1.⁵

DISCUSSION

Although it has been hypothesized that children of alcoholics manifest difficult temperaments, little research has examined this hypothesis among very young children. In the present study, we assessed 12-month-old children and observed an association between parental alcoholism and the temperament subscale stubborn/persistent. Although this association was consistent with the hypothesis, it should be emphasized that this difference was marginal. Given the fairly large sample size, the study had power in excess of .90 to identify a group difference of .25 standard deviations. Thus, it is difficult to attribute the weak effect to statistical power. Instead, it may be that difficult temperament characterizes only a subset of the offspring of alcoholics. In particular, it has been suggested that these temperamental characteristics may represent biobehavioral dispositions that reflect genetic liability to alcoholism and particularly severe alcoholism. Although the present sample did include some individuals that would be considered severely alcoholic, overall the sample of alcoholics was more moderate. Consequently, the weak association may reflect the fact that our sample contained relatively few severe alcoholics.

Although not displayed in all children of alcoholics, these temperamental characteristics may be indicative of behavioral dysregulation, and may lay the initial groundwork for later maladaptive developmental patterns and even addiction (Tarter, 1988; Tarter et al., 1985, 1990). In the current study, infant temperament was found to be predictive of internalizing and externalizing problems in toddlers. Although not surprising, as these constructs are similar and are reflections of parental perceptions of their child over a 6-month period, it may also be indicative of a maladaptive developmental trajectory. Similarly, Bates, Pettit, and Bayles (1982) found that difficult temperament at 6 months has been linked to maternal perceptions of externalizing and internalizing problems in male and female children between 3 and 5 years of age. This finding is also consistent with work by Bates, Pettit, Dodge, and Ridge (1998), which found that infant resistance to control, a composite measure utilizing items from the difficult and persistent subscales of the ICQ, was related to externalizing behaviors in 7-year-old children, particularly when mothers were low in control actions, such as prohibitions, warnings, and scoldings.

Although the present study provided only marginal support with regard to temperamental differences among children of alcoholics, it provided stronger support for the early emergence of behavioral problems as observed by the parents. These differences were more clearly observed with respect to internalizing problems, which were associated with paternal alcoholism in the ANOVA results and with alcohol problem severity in the regression analysis. The differences were not restricted to any specific subset of internalizing problems but included items indicating anxiety, depression, and withdrawal. Moreover, the association between alcohol problem severity and internalizing problems was not mediated by earlier infant temperament, despite the association between 12-month temperament and 18-month internalizing problems. Further analyses suggested that the internalizing problems in the infants of alcoholics could be attributed to the paternal depressive qualities concomitant with paternal alcoholism.

These results may reflect several possible processes. Even though we sought to minimize it by utilizing mean parental scores, it is possible that the longitudinal relationship between father depression and internalizing problems might reflect a perceptual bias in which depressed alcoholic fathers perceive their children more negatively. This process could also account for

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⁵Although not significant, the interaction of father alcohol problems and maternal depression was marginally significant in the prediction of Internalizing problems ($\beta = -.11$, $F(1,202) = 3.09$, $P < .10$). The nature of this interaction was very similar to the observed significant interaction for Externalizing problems.

the usefulness of both paternal and maternal depression in predicting externalizing problems. This perceptual bias has been documented with respect to depressed mothers. It is also consistent with our earlier findings that alcoholic fathers reported greater aggravation with their infants, and that this relationship was also mediated by paternal depression (Eiden & Leonard, 2000). However, it is important to recognize that this perceptual bias may have behavioral consequences. For example, we also found that paternal depression mediated the relationship between paternal alcoholism and fathers' lack of sensitivity during free play with his 12 month old (Eiden, Chavez, & Leonard, 1999). Moreover, father's lack of sensitivity was associated with reduced responsivity of the child. Hence, the parent's report of internalizing problems may reflect actual child behavior elicited through interactions with a depressed parent. It is worth noting that these processes are quite similar to processes that have been suggested with respect to the impact of maternal depression on child functioning. Depressed mothers have been found to be less sensitive, and more punitive, negative, and rejecting of their infants than nondepressed mothers (Field, Healy, Goldstein, & Guthertz, 1990; Lyons-Ruth, Zoll, Connell, & Grunebaum, 1986; Radke-Yarrow, Cummings, Kuczynski, & Chapman, 1985), all of which may contribute to behavioral difficulties.

The finding that maternal depression moderated the relationship between paternal alcohol problems and externalizing behavior problems requires some cautious comment. Although it might have been expected that the combination of alcohol problems and maternal depression would be associated with very high scores on externalizing behaviors, the current results did not suggest this. Children of depressed mothers exhibited uniformly higher externalizing scores, but were not further impacted by paternal alcohol problems. However, paternal alcohol problems were predictive of externalizing problems in families in which the mother displayed low levels of depression. This finding is similar to findings of our previous research that were based on an entirely different sample (Eiden & Leonard, 1996). In this previous study, the father's drinking level was associated with less sensitive mothering behavior only among mothers who were low on depression. These findings suggest that maternal depression, whether it reflects an independent maternal psychopathology or whether it arises in the context of contextual stresses such as marital discord, violence, or paternal alcoholism, is associated with difficulties parenting and problem behaviors in the children. However, the unique impact of these other factors, such as alcoholism, may be observed primarily in the absence of this major risk factor. Inasmuch as there is little research that evaluates both maternal and paternal psychopathology, additional research is needed to examine this possibility more carefully.

Clearly, the effects of parental alcoholism on infant and toddler development cannot be considered in isolation. Zucker (1991) highlights the necessity of examining sociocultural, familial, peer, psychological, and biological factors, with varying levels of focus at different time periods, to produce a complete picture of the transactional influences on risk and resiliency in the development of alcoholism. By examining such risk longitudinally, rather than retrospectively, one is able to examine mediational as well as moderational influences on pathogenic development and resiliency. The findings from this study suggest that depression associated with paternal alcoholism may be a critical dimension impacting the development of parent-child relationships and child behavior in these families.

There are several limitations of this study. First, while deriving our sample from birth records has important advantages over newspaper or clinic-based samples, there are also limitations. The response rate to our open letter of recruitment was slightly above 25%. This raises the possibility that respondents to our recruitment may have been a biased group. Our comparison of respondents with the entire population of birth records suggested that the bias was small with respect to the variables that we could examine. However, there could have been more significant biases in variables that we could not assess. Further, it should be noted that as a community sample, levels of average daily ethanol consumption by parents in this study (range

of .14 to 5.73, $M = 1.43$ for the alcoholic group) were significantly lower than ethanol consumption reported in treated and untreated clinical samples (Babor, Kranzler, & Lauerma, $M = 9.94$; 1989; Jacob & Krahn, 1987, $M = 6.47$; York & Welte, 1994, $M = 11.65$). Further, antisocial behavior and depression evident in parents in this study were also identified at subclinical levels. As a consequence, we would view our assessment of the association between alcoholic behavior, parental psychopathology, and child development to be conservative. Finally, while the reliance on self-report data may be considered a study liability, it should be noted that self-reports of parental drinking were confirmed by collateral reports by spouses. Further, it has been found that parent report on childhood behavior is predictive of later objective outcomes in children, and thus may be viewed as a valid means of assessment (Stanger, MacDonald, McConaughy, & Achenbach, 1996).

The results of this study highlight the importance of studying children of alcoholics in the infant and toddler years. Clearly, the effects of parental alcoholism on infant development are not a product simply of parental alcohol consumption alone. Multiple risk factors present in alcoholic families may influence both perceptions of infant temperament and the subsequent development of maladaptive behavior patterns in their children. An exploration of the processes at work in these early time periods is essential to developing a potential developmental trajectory for alcoholism and a greater understanding the etiology of alcoholism in children of alcoholics.

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Figure 1. Interaction between father alcohol problems and maternal depression on 18-month externalizing behaviors.

TABLE 1

Means and Standards Deviations for Parental Psychopathology as a Function of Group Status and Parent Gender

	Control		Alcoholic	
	Mother	Father	Mother	Father
Alcohol problems	2.19(0.81)	1.63(0.86)	3.46(2.03)	6.99(3.60)
Depression	7.39(6.37)	6.36(6.29)	9.37(7.49)	8.86(7.56)
Antisocial behavior	34.31(4.51)	36.14(6.42)	37.61(6.16)	43.33(9.74)
Aggression	2.62(1.81)	2.33(1.96)	3.75(1.99)	3.33(2.06)

TABLE 2
Means and Standards Deviations for Infant Temperament and Toddler Behavior Problems as a Function of Group Status and Parent Gender

	Control		Alcoholic	
	Mother	Father	Mother	Father
Temperament				
Fussy/difficult	28.23(6.94)	28.61(5.43)	29.21(6.76)	29.94(6.4)
Persistent	13.16(3.22)	12.83(2.70)	13.92(2.79)	13.25(2.82)
Unadaptable	15.41(4.47)	14.71(4.29)	15.02(4.49)	15.45(4.2)
Behavior problems				
Internalizing	30.31(3.80)	30.69(4.62)	31.30(4.19)	31.88(5.33)
Externalizing	36.01(7.14)	36.96(7.61)	37.46(7.31)	37.48(7.03)

TABLE 3
Regression Analyses: Prediction of 18-Month Internalizing Scores from Alcohol Problems and 12-Month Temperament

Predictor Variables	Standardized Regression Coefficient							
	R ²	R ² Inc.	F ch	Step 1	Step 2	Step 3	Step 4	Step 5
Predicting internalizing problems								
1. Father alcohol problems	.05	.05	10.92**	.22**	.20**	.22**	.17*	.11
2. Father education	.06	.01	2.96 [†]		-.12 [†]	-.12 [†]	-.14*	-.14*
3. Mother alcohol problems	.07	.00	.70			-.06	-.07	-.05
4. Infant temperament	.23	.17	14.84***					
Fussy/difficult							.24**	.23**
Persistent							.18**	.19**
Unadaptable							.10	.07
5. Father depression	.26	.02	6.83*					.17*

[†]Note. $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$

[†]Inconsistencies between R^2 and R^2 Inc. reflect rounding errors.

TABLE 4
Regression Analyses: Prediction of 18-Month Externalizing Scores from Alcohol Problems and 12-Month Temperament

Predictor Variables	Standardized Regression Coefficient									
	R ²	R ² Inc.	F ch	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	
Predicting externalizing problems										
1. Father alcohol problems	.02	.02	4.95*	.15*	.14*	.13 [†]	.08	.05	.00	
2. Father education	.02	.00	.40		−.04	−.04	−.07	−.06	−.06	
3. Mother alcohol problems	.03	.00	.32			.04	.04	.05	.06	
4. Infant temperament	.15	.12	9.72***							
Fussy/difficult							.24**	.23**	.23	
Persistent							.18*	.14 [†]	.14*	
Unadaptable							−.03	−.09	−.10	
5. Mother depression	.19	.04	9.52**					.21**	.20**	
6. Father depression	.21	.02	5.40*						.16*	

[†] Note. $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$

[†] Inconsistencies between R^2 and R^2 Inc. reflect rounding errors.