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During the Early Elementary School Years

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PREDICTORS OF ACADEMIC FUNCTIONING OF SONS OF MALE ANTISOCIAL AND NONANTISOCIAL ALCOHOLICS DURING THE EARLY ELEMENTARY SCHOOL YEARS

By

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Abstract

Predictors of Academic Functioning of
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Academic underachievement is one of the strongest correlates of family history of alcoholism, and academic underachievement is also a risk factor for the later development of alcoholism. The present study examined the academic functioning of sons of male alcoholics (SOMAs) in the Michigan State University-University of Michigan Longitudinal Study during the early elementary school period. Family/contextual factors and individual factors associated with academic functioning were also investigated.

Multivariate analysis of variance (MANOVA) was used to compare sons of antisocial alcoholics (n=33), sons of nonantisocial alcoholics (n=112), and sons of controls (n=91) on six domains of academic functioning: school behavior problems, intellectual development, social development, school achievement, aggression, and school maladjustment. Compared to controls, sons of antisocial alcoholics had more school behavior problems and lower levels of intellectual development, social development, and school achievement. Sons of nonantisocial alcoholics had lower levels of intellectual development and lower levels of school achievement. There were no group differences in aggression nor school maladjustment. Sons of antisocial alcoholics were significantly more likely to be rated by teachers in the clinical range of school behavior problems.

Multivariate regression analyses revealed that for alcoholic families, the factor of paternal antisocial symptomatology (but not paternal alcoholism) was related to children's academic functioning; other factors related to children's academic functioning included maternal intelligence, paternal ratings of children's difficult temperament, and children's cognitive functioning. For control families, the factors related to children's academic functioning included maternal intelligence, paternal alcohol problems, and children's cognitive functioning. In all models, children's early childhood cognitive functioning was an important predictor of academic functioning in elementary school.

Considered together, these findings indicate aggregation of risk factors as a function of paternal alcoholism subtype, with the most deleterious outcomes apparent among those children with higher numbers of contextual and individual risk factors. As early as the elementary school period, SOMAs evidence increased school behavior problems and achievement difficulties, which place them at increased risk for academic and social difficulties in adolescence, as well as negative outcomes, including alcoholism, in adulthood.

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Introduction

Children of alcoholics (COAs) have been identified as a high-risk population due to their heightened incidence of psychopathological symptoms during childhood and adolescence (El-Guebaly & Offord, 1977; Rydelius, 1997; Woodside, 1988) and their increased probability of developing alcoholism in adulthood (Cotton, 1979). Studies of COAs indicate that they are three to four times more likely to develop alcoholism than are children of nonalcoholics (Goodwin, 1985; Knop et al., 1993). In the United States alone, it is estimated that the prevalence of alcohol abuse and dependence is greater than seven percent of the adult population, representing more than 14 million adults (Grant, Harford, Dawson, Chou, Dufour, & Pickering, 1994). Thus, alcoholism is a widespread problem in our society, and the millions of COAs who are living in homes with alcoholics are at elevated risk for a host of negative outcomes, only one of which is the development of alcoholism.

One difficulty for which COAs are at risk during childhood and adolescence is impaired academic achievement; Sher (1991) reports that academic underachievement is one of the strongest correlates of family history of alcoholism. Impaired academic achievement, in turn, has been identified as one of many risk factors for the later development of alcoholism. In a review of longitudinal studies of alcoholism, Zucker and Gomberg (1986) concluded that poor school performance, failure to complete high school, and school truancy have all been linked to alcoholic outcome.

However, impaired academic achievement is only one of many difficulties for which COAs are at risk. Some of the other psychopathological symptoms that have been noted among COAs include externalizing behavior problems such as oppositional and conduct disorders (Reich, Earls, Frankel, & Shayka, 1993; Robins, 1991), internalizing behavior problems such as anxiety and depression (Rubio-Stipec, Bird, Canino, Bravo, & Alegria, 1991), as well as deficits in cognitive and neuropsychological functioning (Tarter & Edwards, 1988). To the extent that a COA exhibits any of these behavioral or cognitive difficulties, it is likely that these characteristics could negatively affect school achievement.

Among COAs, the group at highest risk for school difficulties is sons of male alcoholics (SOMAs). Although SOMAs are recognized to be at risk for impaired academic functioning, the majority of studies documenting this finding have focused on adolescents; fewer studies have focused on younger SOMAs. In addition, there have not yet been prospective, longitudinal studies to determine how and why academic difficulties emerge among SOMAs during adolescence. The factors that mediate the relationship between parental alcoholism and problem behaviors in SOMAs have yet to be clearly identified. Finally, it is not known whether the subtype of alcoholism exhibited by a parent has a bearing on the academic adjustment of SOMAs. Because different subtypes of alcoholism are associated with different constellations of parental behavior patterns, it is conceivable that factors other than alcoholism may play a role in the adjustment of SOMAs.

The present study represents an examination of the academic functioning of

SOMAs in the prospective Michigan State University-University of Michigan Longitudinal Study as they begin interacting in contexts outside of the home. Academic and behavioral functioning during the early elementary school years are examined, and factors predictive of academic success or underachievement in this period are investigated.

Review of the Literature

Alcoholism as a Heterogeneous Disorder: Subtypes of Alcoholism

Alcoholism is a widespread and expensive societal problem. Current conceptions of alcoholism recognize the complexity and heterogeneity of this disorder, and the importance of interactive biological, psychological, and social factors in its etiology (Litt, Babor, DelBoca, Kadden, & Cooney, 1992). Evidence supports the existence of several distinct subtypes of alcoholism, each with its own characteristic etiology, onset and course, presenting symptoms, and associated drinking patterns (Babor et al., 1992; Zucker, 1987; Zucker, Ellis, Bingham, & Fitzgerald, 1996).

Many researchers have attempted to distinguish meaningful typologies of alcoholism, whether based on age of onset, personality variables of the individual, or family history of alcoholism (Babor, 1996). Jellinek's (1960) typology consisted of five subtypes (alpha, beta, gamma, delta, and epsilon). These subtypes were based on drinking patterns and degree of physiological dependence. Alpha alcoholics were

those who were psychologically dependent on alcohol, but were not physiologically dependent. Beta alcoholics, like the alpha alcoholics, were psychologically dependent, but also had tissue damage. Gamma alcoholics were physiologically addicted, as evidenced by tolerance, withdrawal, and a loss of control over drinking. Delta alcoholics were physiologically addicted and unable to abstain from alcohol. Finally, epsilon alcoholics were characterized by binge drinking.

Shortly after this time other researchers noted the co-occurrence of alcoholism with affective disorder (Pitts & Winokur, 1966) and with sociopathy (Guze, Wolfgram, & McKinney, 1967). In addition, some suggested that alcoholism's differential manifestations in men and women reflected different disease models. Schuckit, Pitts, Reich, King, and Winokur (1969) identified two major groups of female alcoholics based on demographic and clinical attributes as well as family history of alcoholism: those with primary alcoholism and those with alcoholism secondary to affective disorder.

Later, Penick, Read, Crowley, and Powell (1978) distinguished two subtypes of alcoholism based on family history: familial and nonfamilial alcoholism. Those with a positive family history of alcoholism also showed an early age of onset of alcohol problems and more severe social and psychological problems. Conversely, those with a negative family history showed a later age of onset and fewer alcohol-related problems.

Cloninger, Bohman, and Sigvardsson (1981) studied a sample of 862 male Swedish adoptees, their biological parents, and adoptive parents. They found that

the adoptees fell into two groups with respect to their alcohol abuse patterns and presence of alcoholism in their biological parents. Cloninger et al. identified two alcoholic subtypes, referred to as Type I (milieu-limited) and Type II (male-limited). Type I alcoholics were those who had a later age of onset, a loss of control over drinking, and guilt and fear about alcohol dependence. Any alcohol abuse in the birth parents of Type I alcoholics was quite mild and was not associated with criminality. Later research revealed that this type of alcoholism is associated with the personality traits of high reward dependence, high harm avoidance, and low novelty seeking (Cloninger, 1987).

In contrast, Type II alcoholics were those who had an early adulthood onset and showed aggressive, impulsive behavior when drinking. Birth parents of Type II alcoholics often experienced severe alcoholism that required treatment and also was associated with significant criminality. This type of alcoholism is associated with the personality traits of high novelty seeking, low harm avoidance, and low reward dependence (Cloninger, 1987). This adoption study has been replicated with a second group of adoptees, and many of the findings of the original study have been confirmed, including differences in neurophysiological markers between these two alcoholic subtypes (Cloninger, Sigvardsson, & Bohman, 1996). However, it has been noted that it may be difficult to clearly identify the two subtypes in clinical samples because many of the patients satisfy criteria for both Type I and Type II symptom clusters (Penick, Powell, Nickel, Read, Gabrielli, & Liskow, 1990).

Zucker (1987) noted the variable course of the different alcoholisms with an

emphasis on changes across life stages. He proposed a typology of alcoholism that takes into account the relevance of developmental theory in considering the varying etiologies of alcoholism typologies. Zucker initially proposed four alcoholism subtypes: (a) Type 1: antisocial alcoholism, (b) Type 2: developmentally cumulative alcoholism, (c) Type 3: developmentally limited alcoholism, and (d) Type 4: negative affect alcoholism. Zucker (1994) later concluded that there were at least four alcoholisms, and modified the typologies such that developmentally cumulative alcoholism (Type 2) was expanded to include the primary alcoholisms (isolated alcohol abuse, episodic alcoholism, and developmentally cumulative alcoholism), thus resulting in six alcoholism subtypes.

According to Zucker's typology, Type 1 or antisocial alcoholism has an early onset concurrent with a history of antisocial activities. It appears to have a strong genetic diathesis and a poor prognosis. It occurs more frequently among males and also occurs more frequently in lower socioeconomic populations. In addition, research indicates that antisocial alcoholics tend to have higher reported rates of psychiatric symptoms and illicit drug use and abuse (Cadoret, Troughton, & Widmer, 1984), and more psychosocial problems (Stabenau, 1984).

According to Zucker, isolated, episodic, and developmentally cumulative alcoholism comprise the primary alcoholisms. As alcohol-specific mechanisms aggregate with nonspecific factors over the life course they may produce increasing frequencies of alcohol problems. Primary alcoholism I (isolated alcohol abuse) involves a single incident of alcoholism in response to stressful events in the life

course. Primary alcoholism II (episodic alcoholism) occurs when there is periodic alcoholic symptomatology, and more closely approximates a clinical syndrome. Primary alcoholism III (developmentally cumulative alcoholism) occurs due to sustained risk exposure, with clusters of drinking occurring increasingly frequently.

Type 3 or developmentally limited alcoholism is life stage-specific in that it involves frequent, heavy drinking during adolescence, but then remits as the individual assumes adult responsibilities. This type of alcoholism represents a normative developmental stage for a large subset of individuals.

Finally, according to Zucker, Type 4 or negative affect alcoholism is more commonly found among females and often involves use of alcohol to cope or to enhance relationships. This type of alcoholism is thought to have a genetic diathesis in association with use of alcohol for mood regulation. Although the comorbidity literature suggests a strong association between negative affective processes and alcoholism, further research is required to understand the etiology of this type of alcoholism.

According to Zucker and colleagues (Zucker, 1994; Zucker, Fitzgerald, & Moses, 1994), an alcoholic outcome is the result of a probabilistic framework comprised of interacting biological, psychological, and social risk factors. Thus, alcoholism etiology begins early in the developmental process when an individual is placed on a risky trajectory. The development of alcoholism is the result of a cumulative process in which an individual is embedded in a risk structure that restricts the range of variation. To the extent that an individual exists in a high-risk

nesting environment, it is more likely that these cumulative and sustained risk factors will aggregate to pressure the individual toward negative developmental outcomes. Thus, there are multiple processes operating that may or may not place an individual at risk, depending on how densely they aggregate with other risk factors and whether or not they are sustained over time.

There are multiple pathways to the development of alcohol problems, leading to the different subtypes of alcoholism. In particular, the etiology of antisocial alcoholism is distinguished by the presence of antisocial behavior throughout the developmental process. This subtype of alcoholism has a poor prognosis for the individual, partly due to its comorbidity with antisocial personality disorder and association with lower socioeconomic status. Some researchers view alcoholism and antisocial personality disorder as differing forms of disinhibitory psychopathology and suggest that the high comorbidity of these two disorders may be due to a common underlying vulnerability to both alcoholism and antisociality (Sher & Trull, 1994).

Alcoholism Subtypes in the MSU-UM Longitudinal Study

The Michigan State University-University of Michigan (MSU-UM) Longitudinal Study is a high-risk design study tracking a heterogeneous group of over 300 families primarily in the mid-Michigan area. The high-risk subgroup in the study includes families with alcoholic fathers, while the contrast subgroup includes families from the same neighborhoods as the high-risk families, but the parents in the contrast families were free of alcoholism and other drug dependence at the time

of recruitment. Results from the MSU-UM Longitudinal Study support the existence of subtypes of alcoholism (Fitzgerald, Zucker, & Yang, 1995; Ichiyama, Zucker, Fitzgerald, & Bingham, 1996; Zucker, Ellis, Bingham, & Fitzgerald, 1996; Zucker, Ellis, Fitzgerald, Bingham, & Sanford, 1996). This research has focused mainly on the distinction between Zucker's subtypes of antisocial alcoholism and nonantisocial alcoholism. In the MSU-UM Study, subtypes were delineated on the basis of the presence or absence of a sustained developmental history of antisocial behavior during childhood and adulthood.

Findings from the MSU-UM Longitudinal Study show that antisocial alcoholic men have denser family histories of alcoholism, significantly higher levels of nonalcoholic psychopathology (Zucker, Ellis, Fitzgerald, Bingham, & Sanford, 1996), lower socioeconomic status (Fitzgerald & Zucker, 1995), and are at higher risk for marital transitions (Loukas, Bingham, Fitzgerald, & Zucker, 1997). Recently, Caplan (1996) applied Zucker's typology to the wives of the men participating in the MSU-UM Longitudinal Study; on the basis of family histories, demographic characteristics, and comorbid psychopathology, Caplan was able to differentiate three groups of female alcoholics: antisocial alcoholics, negative affect alcoholics, and primary alcoholics.

In addition, other findings from the MSU-UM Longitudinal Study have shown that risk levels vary for children as a function of parental alcoholism subtype. Children from families in which the father exhibits antisocial alcoholism are at increased risk for a number of behavioral difficulties in early childhood. Puttler,

Zucker, Fitzgerald, and Bingham (under review) found that daughters of antisocial alcoholics had lower intelligence scores and more social problems than daughters of nonantisocial alcoholics or controls during early and middle childhood. During the preschool years, sons of antisocial alcoholics were at increased risk for internalizing behavior problems, characteristics such as restlessness and a short attention span, and risky temperament when compared to sons of nonantisocial alcoholics or sons of control fathers (Zucker, Ellis, Bingham, & Fitzgerald, 1996). In addition, the children from antisocial alcoholic families were more likely to have externalizing behavior problems than were children from nonantisocial alcoholic families, who in turn were more likely to have externalizing behavior problems than were children from control families (Fitzgerald, Sullivan, Ham, Zucker, Bruckel, & Schneider, 1993). Furthermore, there was continuity in behavior problems from early childhood to middle childhood, in that children from antisocial alcoholic families were more likely to have both externalizing and internalizing behavior problems between the ages of six and nine years as well (Bingham, Zucker, & Fitzgerald, under review; Zucker, Ellis, Bingham, & Fitzgerald, 1996). Thus, for the children with the highest risk load in the study, there was continuity in parent-rated child behavior problems across the first two waves of the study. It is therefore likely that this continuity in child behavior problems will be apparent in settings outside of the children's homes, for example in the school setting.

Academic Functioning of COAs

There have been several studies conducted over the past three decades in which academic functioning of COAs has been examined. COAs were long thought to be at risk for developing school difficulties (Chafetz, Blane, & Hill, 1971). Some of the earlier studies were driven by the notion that COAs were likely to exhibit certain combinations of personality traits. For example, in an early study by Aronson and Gilbert (1963), teacher ratings of personality traits of preadolescent sons of alcoholics were contrasted with their ratings of classmates who did not have an alcoholic father. Teachers were more likely to rate the sons of alcoholic fathers as "emotionally immature," "impulsive," and "moody and depressed."

Other studies focused on the academic achievement of COAs. However, many of these studies were plagued with methodological shortcomings, including failure to control for socioeconomic status and inadequate measures of parental drinking status. In addition, some of these studies included a wide age range of COAs. Comorbid parental psychopathology was also not considered in the majority of the studies; this is important because the presence or absence of parental antisocial personality disorder comorbid with parental alcoholism could clearly influence the psychological adjustment of the COAs in the studies.

The studies of academic functioning of COAs conducted to date are summarized in Table 1. Earlier studies on academic functioning suggested that both male and female COAs were at risk for a number of school-related problems including academic underachievement, and that these problems were most apparent

during the adolescent period. However, findings of other studies were variable depending on the age and gender of the COAs that were included in the samples.

Several studies included wide age ranges of COAs. In one early study of academic performance of COAs, Chafetz, Blane, and Hill (1971) compared psychiatric clinic case records of male and female COAs and children of nonalcoholics between the ages of 2 and 19, although it is noted that the sample was drawn mainly from lower middle class residents of an urban community. They found a significantly higher incidence of school problems such as poor school work among COAs, which was especially pronounced during the adolescent period. However, it is not possible to attribute this finding solely to parental alcoholism because the alcoholic and control families differed on a number of other variables, including marital stability and quality of relationship between parents.

In a study by Fine, Yudin, Holmes, and Heinemann (1976), male and female COAs between the ages of 8 and 18 were compared to controls; although information from school records was too unreliable to determine differences in academic functioning between the groups, it was found that COAs had significantly more behavior problems than controls, as rated by mothers on the Devereux Child Behavior Rating Scale or the Devereux Adolescent Behavior Rating Scale.

In addition, Wilson and Orford (1978) reported that in their small sample of eleven families in which one or both parents had alcoholism, several of the COAs under the age of 17 were underachieving in school. Similarly, Rimmer (1982) reported that COAs under the age of 17 had elevated rates of behavior problems and

discipline problems in school compared to children of depressed parents or controls. However, the conclusions that can be drawn from these two reports are limited by their reliance on clinical samples, small sample sizes, and lack of comparison control groups or statistical analyses.

Ervin, Little, Streissguth, and Beck (1984) examined intellectual functioning and academic achievement of male and female COAs ages six and over. On the basis of standardized IQ tests and Wide Range Achievement Test scores, they concluded that although intellectual and academic functioning were significantly lower for children of alcoholic fathers, COAs still scored within normal ranges. However, one shortcoming of this study is that alcoholism of the fathers of the COAs was assessed only through interviews with the mothers because many of the fathers were no longer living with their families, thus raising a question of the adequacy of the measure of paternal drinking status.

Similarly, Bennett, Wolin, and Reiss (1988) assessed 6-18 year old male and female COAs on a number of cognitive and behavioral measures, including the Peabody Individual Achievement Test. COAs were found to have significantly lower achievement scores for reading and arithmetic than controls, as well as lower cognitive abilities. As in the Ervin et al. study, however, scores of COAs remained within normal ranges. It is also important to note that in this study there were income and occupational status differences between the alcoholic and non-alcoholic groups; the degree to which these socioeconomic differences are a function of the alcoholism or are attributable to non-alcohol related differences was not addressed in

this study.

However, a more recent well-controlled study did not find increased school-related difficulties among younger COAs. Johnson and Rolf (1988) found that 6-18-year-old male and female COAs had Wide Range Achievement Test scores comparable to those of children of non-alcoholics. This finding differs from the findings of Ervin et al. (1984), although COAs did report lower self-perceptions of their cognitive competence in the Johnson and Rolf study. It should be noted that parents in the Johnson and Rolf study were recovering alcoholics, and also that the majority of them showed Type 1 alcoholism (according to Cloninger's typology), an alcoholic subtype that is not associated with comorbid antisociality. Therefore, the children in this study may have been at lower risk for psychosocial adjustment problems, based on the absence of comorbid parental psychopathology.

One other recent study failed to find increased achievement difficulties among COAs. Reich, Earls, Frankel, and Shayka (1993) compared COAs between the ages of 6 and 18 years to non-COAs on a number of indices of psychopathology, including standardized achievement scores on the Wide Range Achievement Test. Probands for the study were hospitalized alcoholics, convicted felons, and hospitalized medical controls. The only group difference that emerged was in the reading subtest scores, which indicated that children with one alcoholic parent had higher scores than either children with two alcoholic parents or children with no alcoholic parents, a finding the study authors describe as "counterintuitive." However, their data indicated that COAs exhibited significantly higher rates of

psychopathology, including oppositional and conduct disorders, and anxiety, although there were no differences in the rates of psychopathology between offspring of alcoholic versus antisocial parents.

Fewer studies have focused specifically on younger COAs. In a longitudinal study in which offspring of alcoholics were followed from birth to age 18, Werner (1986) reported that nearly one-third of 49 male and female COAs on the island of Kauai required long-term remedial education by the time they reached age 10. However, this finding is confounded by the low socioeconomic status of the sample. This study represented an attempt to determine the key factors that predicted successful adjustment in children from alcoholic families; Werner identified "at least average intelligence and adequate communication skills (in reading and writing)" and "achievement orientation" as potential protective factors against development of serious coping problems among COAs. However, it is difficult to determine whether these factors were true moderators due to the lack of a comparison control group.

Another study of younger COAs involved an attempt to determine whether COAs were more likely to be placed in special education classes. Stern, Kendall, and Eberhard (1991) administered the Children of Alcoholics Screening Test to children in regular and special education classes. The authors concluded that COAs were not overrepresented in elementary school special education classes, although the authors acknowledge that the sample was not randomly drawn; the majority of those families who declined to participate in the study may have been those with

parental alcoholism, thus allowing for sample bias. Because the findings of these studies are contradictory, it is difficult to draw a firm conclusion due to methodological weaknesses in each of these studies.

Several other studies focused on academic functioning of adolescent COAs. In an early study, Kammeier (1971) compared school records of male and female adolescent COAs attending a midwestern Catholic high school. Although COAs had higher absenteeism than controls, they were found to perform as well academically as did controls. Later, Hughes (1977) questioned adolescent male and female COAs and control adolescents about problems at school. COAs were significantly more likely to report being told by school teachers or guidance counselors that they were underachieving academically, although no grades or indices of academic achievement were reported in the study. Schuckit and Chiles (1978) found that adolescent COAs and sons of parents with antisocial personality disorder had the lowest grade point averages, the highest percentages of school suspension and expulsion, and the highest incidence of repeating a grade in school when they were compared to both adolescent sons of parents with affective disorders and adolescents from broken homes.

The results from some more recent studies of academic achievement of adolescent COAs indicate that although COAs exhibit more social or emotional maladjustment problems, these problems do not interfere with academic functioning. Jacob and Leonard (1986) reported that although 10-18 year old male and female COAs were rated as having more behavior problems by their parents, they did not

have increased teacher-reported behavior problems nor impaired academic functioning. Similarly, based on school records, Murphy, O'Farrell, Floyd, and Connors (1991) found that although adolescent daughters of alcoholics had higher absenteeism than did controls, adolescent male and female COAs were not compromised academically compared to controls, nor did they show increased conduct problems compared to controls.

Academic Functioning of Adolescent SOMAs

The one group of COAs that has consistently been found to experience school-related difficulties is adolescent SOMAs. Adolescent sons of alcoholics have been identified as having many academic difficulties, including impaired academic achievement. Tarter, Hegedus, Goldstein, Shelly, and Alterman (1984) found that adolescent SOMAs performed more poorly than matched controls on measures of attentional capacity from the Detroit Tests of Learning Aptitude (Auditory Word Span and Visual Attention Span for Objects subtests), in addition to the Reading Comprehension subtest of the Peabody Individual Achievement Test. In a follow-up study, Hegedus, Alterman, and Tarter (1984) found that delinquent adolescent SOMAs performed significantly more poorly than matched controls on the overall Peabody Individual Achievement Test (PIAT), as well as on the PIAT subtests of Reading Comprehension and General Information. Although both groups were of average intellectual ability, overall the sons of alcoholics scored approximately two years behind the control group on the PIAT total test score. The authors concluded that although family organization and emotional stability were associated with

academic achievement, the best predictors of educational achievement level were neuropsychological measures, including language processes, memory, and visuospatial and perceptual-motor capacity. More recently, Tarter, Jacob, and Laird (1993) also reported that although adolescent SOMAs performed more poorly on achievement tests than non-SOMAs, there were no differences between the groups on tests of attention, learning, or memory.

Knop, Teasdale, Schulsinger, and Goodwin (1985) reported that compared to matched controls, adolescent SOMAs had more disturbed school careers, greater frequency of repeating a grade in school, and more frequent referrals to a school psychologist for both behavioral and learning dysfunctions. In a 30-year follow-up of these subjects it is reported that the SOMAs were more likely to have alcohol dependence according to DSM-III-R criteria than were sons of non-alcoholics (Knop et al., 1993). These studies of academic functioning present a clear indication that adolescent SOMAs are at heightened risk for academic difficulties, including poor achievement.

Considered together, these studies of academic functioning suggest that both male and female COAs may experience more school-related problems, which may be especially pronounced among adolescent SOMAs. However, it is difficult to draw firm conclusions from this literature because many of these studies of academic achievement are confounded by methodological inadequacies. Contradictory findings in this literature may be related to sampling issues in that comorbidity and socioeconomic differences among different types of alcoholics were

not evaluated. In addition, Johnson and Jacob (1995) note that there is great variability in psychosocial functioning among the COA population, and also report that the predictors of psychosocial functioning differ for boys and girls. Many studies include a preponderance of female COAs and do not present results separately for males and females. Nevertheless, the majority of the studies on school functioning of COAs suggest that especially among SOMAs there is increased risk for school-related difficulties, including impaired academic achievement. The role of associated factors such as comorbid antisocial personality disorder and lower socioeconomic status is not clear.

Table 1
Studies of Academic Functioning of Children with and without Alcoholic Parents

Study	Description of Sample N, Sex, Age	Source/Measures	Key findings
Chafetz, Blane, & Hill (1971)	2 groups (ages 2-19): COAs: 60 boys, 40 girls (1 or 2 alcoholic parents identified in case records as "having an alcohol problem") non-COAs: 60 boys, 40 girls	Case records of the Child Psychiatric Clinic of the Massachusetts General Hospital 1959-1967	More school problems among COAs than controls, both lifetime and during adolescence; lower middle class sample
Kammeier (1971)	2 groups (mean age 15.52): COAs: 20 boys, 45 girls (63 fathers, 2 mothers, 1 both) alcohol problems determined by 2 school counselors non-COAs: 20 boys, 45 girls	School records, Iowa Tests of Educational Development, Lorge-Thorndike Intelligence Tests	No differences in intelligence test scores, no differences in any areas of the achievement tests, no differences in grade point average; more school absenteeism among COAs
Fine, Yudin, Holmes, & Heinemann (1976)	2 groups (ages 8-18): COAs: 21 boys, 18 girls (age 12.1) (parents in treatment for alcoholism) non-COAs: 21 boys, 18 girls (age 11.9)	School records; mothers completed the Devereux Child or Adolescent Behavior Rating Scale	Mothers rated COAs as having more behavior problems; school data incomplete; available data showed no differences in school absences, reading or arithmetic grades, behavior grades, or number of grades repeated

Table 1 (continued)
Studies of Academic Functioning of Children with and without Alcoholic Parents

Study	Description of Sample N, Sex, Age	Source/Measures	Key findings
Hughes (1977)	2 groups (ages 12-19, mean age 15.4): 25 adolescent COAs with 1 or 2 alcoholic parents 25 adolescent non-COAs	Questionnaire	COAs more often reported having been told by teachers or school guidance counselors that they were capable of better schoolwork
Schuckit & Chiles (1978)	4 groups of adolescent COAs: 48 had parents with affective disorder 140 SOMAs or children of antisocial parents 58 from broken homes 348 from intact families	Diagnostic interview upon admission to a psychiatric clinic or after arrest for an alcohol-related problem	COAs or children of antisocial parents had the highest level of alcohol, drug, and antisocial diagnoses; they had the lowest grade point averages and the highest percentages of suspension, expulsion, and repeating a grade in school
Wilson & Orford (1978)	29 children (ages 2-18) from 11 families with one parent in treatment for alcoholism	Interview with family members	Children "appeared to have underachieved at school" in a number of cases; reports of truancy, inability to concentrate on schoolwork

Table 1 (continued)
Studies of Academic Functioning of Children with and without Alcoholic Parents

Study	Description of Sample N, Sex, Age	Source/Measures	Key findings
Rimmer (1982)	3 groups: 181 COAs (average age 9.2 years) 56 children of depressed parents (average age 8.4 years) 131 controls (8.4 years)	Structured interview	COAs more often played hooky, had discipline problems at school, and were expelled or suspended from school than children of depressed parents or controls; however, there were not more learning problems reported among COAs
Ervin, Little, Streissguth, & Beck (1984)	2 groups (ages 6 and over): 41 children raised by alcoholic fathers (mothers were interviewed about the drinking history of the father; fathers were diagnosed according to National Council on Alcoholism criteria) 41 non-COAs	Wechsler Intelligence Scale for Children-Revised or Wechsler Adult Intelligence Scale; Wide Range Achievement Test	COAs had significantly lower Full Scale IQ scores, Verbal IQ scores, and Performance IQ scores than non-COAs; COAs also had lower Reading, Spelling, and Arithmetic scores on the WRAT
Tarter, Hegedus, Goldstein, Shelly, & Alterman (1984)	41 adolescent delinquents: 16 SOMAs (mean age 16.0 years) (fathers met DSMIII criteria for alcohol abuse or dependence) 25 non-SOMAs (mean age 16.0 years)	Detroit Tests of Learning Aptitude, Peabody Individual Achievement Test	SOMAs performed more poorly on measures of attentional capacity (auditory and visual attention span) and on the PIAT Reading Comprehension subtest

Table 1 (continued)
Studies of Academic Functioning of Children with and without Alcoholic Parents

Study	Description of Sample N, Sex, Age	Source/Measures	Key findings
Hegedus, Alterman, & Tarter (1984)	41 adolescent delinquents: 16 SOMAs (mean age 16.0 years) (fathers met DSMIII criteria for alcohol abuse or dependence) 25 non-SOMAs (mean age 16.0 years)	PIAT (Math, Reading Recognition, Reading Comprehension, Spelling, General Information)	SOMAs had lower grade level academic achievement on Reading Comprehension, General Information, and Total Test Score (approximately 2 years behind controls)
Knop, Teasdale, Schulsinger, & (1985)	2 groups (ages 19-20): 134 SOMAs (fathers had been treated for alcoholism at a clinic) 70 non-SOMAs	Teacher questionnaire and interview with a social worker	SOMAs attended more schools and more often repeated a grade; they were rated by teachers as more impulsive and restless, and as having lower verbal proficiency; SOMAs also had more referrals to a school psychologist
Jacob & Leonard (1986)	3 groups (ages 10-18): 100 COAs (56 boys, 44 girls) 91 children of depressed parents (36 boys, 55 girls) 105 controls (56 boys, 49 girls)	Teachers completed the Conners Teacher Rating Scale and the Myklebust Pupil Rating Scale (achievement)	No differences between COAs and non-COAs on any of the four Conners scales nor any of the four Myklebust Scales

Table 1 (continued)
Studies of Academic Functioning of Children with and without Alcoholic Parents

Study	Description of Sample N, Sex, Age	Source/Measures	Key findings
Werner (1986)	49 COAs (22 boys, 27 girls) (age 10): 38 with alcoholic father, 6 with alcoholic mother, 5 with two alcoholic parents living in "chronic poverty"	A panel (pediatrician, psychologist, and public health nurse) made recommendations for educational remediation or special class placement	Nearly one-third of these COAs COAs required remedial education of more than 6 months duration
Bennett, Wolin, & Reiss (1988)	2 groups (ages 6-18): 64 COAs 80 non-COAs "above-average incomes"	WISC-R or WAIS-R, PIAT, Conners Parent Symptom Rating Scale	Group differences in SES; COAs had lower WISC-R Full Scale IQ scores, also lower PIAT Reading, Spelling, and Arithmetic scores; COAs were rated by parents as having more learning problems, impulsive-hyperactive behavior, and psychosomatic symptoms
Johnson & Rolf (1988)	2 groups (ages 6-18): COAs: 26 boys, 24 girls (parents were recovering alcoholics, Type 1 or milieu-limited alcoholism) non-COAs: 28 boys, 20 girls "not SES disadvantaged"	WISC-R or WAIS WRAT	No group differences on any IQ scores nor on any WRAT scale scores

Table 1 (continued)
Studies of Academic Functioning of Children with and without Alcoholic Parents

Study	Description of Sample N, Sex, Age	Source/Measures	Key findings
Murphy, O'Farrell, Connors (1991)	2 groups: 39 COAs: boys (mean age 14.4) girls (mean age 13.7) (fathers were treated for alcoholism in a VA program) 33 non-COAs: boys (mean age 13.3) girls (mean age 14.3)	School records to determine GPA, attendance, and conduct grades	COAs were not compromised academically compared to non-COAs; COAs did not have more classroom behavior problems; female COAs had more school absenteeism than controls
Stern, Kendall, & Eberhard (1991)	3 groups: (grades 1-5) 19 emotionally disturbed students 20 learning disabled students 19 regular education students	Children of Alcoholics Screening Test	47% of ED students, 15% of LD students, and 20% of regular education students identified chemical dependency in the immediate family
Reich, Earls, Frankel, & Shayka (1993)	2 groups: (ages 6-18) 104 COAs (55 boys, 49 girls) with 1 or 2 alcoholic parents 51 non-COAs (29 boys, 22 girls)	WRAT-R	No differences on the WRAT-R Arithmetic or Spelling subtests; children with one alcoholic parent scored higher on the Reading subtest than children with two or no alcoholic parents in the family

Table 1 (continued)
Studies of Academic Functioning of Children with and without Alcoholic Parents

Study	Description of Sample N, Sex, Age	Source/Measures	Key findings
Tarter, Jacob, & Laird (1993)	2 groups: (ages 12-17) 33 SOMAs 48 non-SOMAs	Peabody Picture Vocabulary Test; PIAT	SOMAs had lower verbal intellectual ability; they scored significantly lower on the PIAT Reading Comprehension and Spelling subtests; however, there were no group differences on tests of attention, learning, or memory

Hypothetical Predictive Factors in Academic Functioning of COAs

While the many studies that indicate elevated risk for academic difficulties and underachievement among SOMAs clearly implicate parental alcoholism as a risk factor, the factors mediating the relationship between parental alcoholism and child school difficulties are not clear. The literature on academic achievement suggests that there could be a number of potential mediators between parental alcoholism and school failure. In addition to alcoholism, some other potentially important environmental predictors of academic functioning include comorbid parental psychopathology, parental intelligence, and family socioeconomic status. There are also several individual factors that may place a COA at risk for impaired academic functioning. For example, child behavior problems may increase a child's risk for academic underachievement (Hinshaw, 1992). In addition, others have suggested that child temperament or personality and cognitive dysfunction may be predictive of academic functioning among COAs (Sher, 1991).

There are numerous interacting environmental and individual factors in the determination of children's academic functioning (e.g., Walker, Greenwood, Hart, & Carta, 1994; Pungello, Kupersmidt, Burchinal, & Patterson, 1996). It is not clear how these environmental and individual factors interact to produce either positive or negative academic outcomes. Research concerning the roles of each of these risk factors will be reviewed.

Alcoholism and alcohol-related psychopathology. Alcoholism and alcohol-related psychopathology have been implicated as risk factors for COAs. Because

alcoholism frequently co-occurs with other psychopathological disorders, it is possible that such co-active disorders play a role in the adjustment of COAs (Johnson, Sher, & Rolf, 1991). Antisocial personality disorder is frequently comorbid with alcoholism, as is depression (Regier et al., 1990). Children of parents who exhibit alcoholism comorbid with antisocial personality disorder have been found to be at increased risk for negative outcomes compared to children of nonantisocial alcoholics. As previously mentioned, results from the MSU-UM Longitudinal Study show that children from families in which the father has antisocial alcoholism are at increased risk for a number of negative developmental outcomes, including internalizing and externalizing behavior problems, restlessness and short attention span, and deviations in temperament (Bingham, Zucker, & Fitzgerald, under review; Zucker, Ellis, Bingham, & Fitzgerald, 1996; Zucker, Ellis, & Fitzgerald, 1994).

Low socioeconomic status. Another risk factor for academic underachievement is low socioeconomic status, including an impoverished home environment (Hinshaw, 1987). Indeed, a meta-analysis of studies on socioeconomic status and academic achievement revealed that measures of socioeconomic status, including income, education, and occupation of head of household, are positively but weakly correlated with academic achievement of children (White, 1982). Thus, there is a pattern of lower academic achievement and early school failure among children from poorer families. In one recent study it was found that early socioeconomic status-related differences were related to poor early language

outcomes, and furthermore that poor early language development was related to lowered performance on language and reading-related achievement in elementary school (Walker et al., 1994). Delayed development in the context of the home later appeared as deficits in achievement in the context of the school. This study shows that aspects of the home environment are predictive of later academic outcomes. Again, this suggests that children of antisocial alcoholics, who are more likely to have lower socioeconomic status, should be at increased risk for academic underachievement. Previous findings from the MSU-UM Longitudinal Study support socioeconomic differences between alcohol subtype groups (Fitzgerald & Zucker, 1995).

There are many intra-individual factors that may place COAs at risk as well, including levels of cognitive functioning, behavioral characteristics, and temperament styles.

Cognitive ability in COAs. An area of impairment that has been identified among boys at risk for substance abuse/dependence is executive cognitive functioning (Giancola, Martin, Tarter, Pelham, & Moss, 1996; Giancola, Moss, Martin, Kirisci, & Tarter, 1996). Executive cognitive functioning has been defined as "the ability to maintain an appropriate problem-solving set for attainment of a future goal" (Pennington & Ozonoff, 1996). These authors state that executive functioning overlaps with domains such as attention, reasoning, and problem-solving, and may include inhibition, integration across space and time, planning, and working memory. In addition, deficits in executive cognitive functioning have been

implicated in a number of psychopathological disorders, including attention deficit hyperactivity disorder (Barkley, 1997; Benson, 1991; Reader, Harris, Schuerholz, & Denckla, 1994), conduct disorder (Moffitt, 1993a), antisocial personality disorder (Gorenstein, 1987), and the development of aggression (Giancola et al., 1996).

In particular, Moffitt (1993b) argues that neuropsychological risk for difficult temperament and behavior problems underlies a developmental pathway to life-course persistent antisocial behavior, based on the relation between poor verbal and executive functions and the development of antisocial behavior. Moffitt notes that anatomical structures and physiological processes within the nervous system may influence psychological characteristics such as temperament, behavioral development, cognitive abilities, or possibly all three of these areas. In fact, COAs have been characterized as having individual psychological characteristics such as behavioral problems, difficult temperaments, and deficits in cognitive functioning. Difficulties in any of these areas would constitute significant risk factors for academic underachievement among COAs (Sher, 1991).

Several studies have identified cognitive impairments among children of alcoholics, and especially among sons of alcoholics (for review see Pihl & Bruce, 1995). Some studies have identified deficits in general cognitive abilities when COAs are compared to children of controls (Bennett, Wolin, & Reiss, 1988; Ervin et al., 1984; Gabrielli & Mednick, 1982), but there have also been contradictory findings in which some studies have failed to find differences in cognitive functioning between COAs and non-COAs (Bates & Pandina, 1992; Johnson & Rolf,

1988). However, interpretation of these results is difficult because of the samples included in these studies. The Johnson and Rolf study included recovering Type 1 alcoholics, as well as a mixed-sex sample in which analyses were not conducted separately for boys and girls. The Bates and Pandina study included a mixed-sex sample from working- and middle-class backgrounds. Bates and Pandina suggest that cognitive dysfunction may be more related to comorbidity on the part of alcoholic family members than to alcoholism itself.

Studies have identified cognitive deficits among COAs in several areas, including verbal ability. Compared to children of controls, COAs are often reported to exhibit poorer verbal intelligence as well as deficits in more specific verbal abilities. Drejer, Theilgaard, Teasdale, Schulsinger, and Goodwin (1985) compared 18- to 19-year-old sons of alcoholics with sons of nonalcoholics on a battery of neuropsychological tests and found that sons of alcoholics performed more poorly on vocabulary tasks. Similarly, Tarter et al. (1984) found that sons of male alcoholics performed more poorly on neuropsychological assessments of language processing. Tarter, Jacob, and Bremer (1989a) also compared school-age sons of early onset alcoholics with sons of late onset alcoholics, sons of normal social drinking fathers, and sons of depressed fathers on a battery of neuropsychological measures. Sons of early onset alcoholics performed more poorly than sons of normal fathers on tests measuring attention and verbal intellectual capacity.

Deficits among COAs have also been identified in visuoperceptual and visuospatial ability (Hegedus et al., 1984; Schandler, Brannock, Cohen, Antick, &

Caine, 1988; Whipple, Parker, & Noble, 1988). Tarter, Jacob, and Bremer (1989b) found that sons of alcoholics demonstrated greater ataxia than sons of depressed or normal men, and also that sons of alcoholics performed more poorly on tests measuring visual scanning and attention, planning ability, and impulse control. The authors note that the tests that discriminated sons of alcoholics were related to the executive functions of planning and self-monitoring goal directed behavior.

In addition, Peterson, Finn, and Pihl (1992) administered a battery of neuropsychological tests to sons of male alcoholics and controls. They found that sons of male alcoholics performed more poorly on tasks associated with the organization of novel information. Similarly, in the Drejer et al. (1985) study, sons of male alcoholics were also reported to perform more poorly on tasks involving categorizing ability and organization and planning. The authors attribute the poor performance of the sons of alcoholics to reduced capacity for sustained goal-directed activity, impulsivity in problem solving behavior, and less ability to systematically use problem-solving strategies; in short, deficits in executive cognitive functioning.

Previous results from the MSU-UM Study suggest that cognitive deficits are identifiable among sons of alcoholics as early as preschool-age. Noll, Zucker, Fitzgerald, and Curtis (1992) found that male preschoolers with alcoholic fathers attained lower scores on overall developmental quotient, fine motor, and personal/social development. In further analyses, when quality of stimulation in the home environment was considered as a covariate, the only difference that remained was in personal/social development. The authors concluded that paternal alcohol

problems are related to children's cognitive development primarily if they affect the quality of intellectual stimulation in the home.

Behavioral Characteristics of COAs. Children with conduct problems are more likely to have parents who abuse alcohol or other substances (Frick, 1993). Both externalizing and internalizing behavior problems have been reported to occur at elevated rates among COAs.

The behavioral difficulties most commonly identified among school-age COAs are externalizing behavior problems, including hyperactivity, impulsivity, and conduct disorder (Knop, Teasdale, Schulsinger, & Goodwin, 1985; Reich et al., 1993). Hyperactivity occurs at a higher rate among children of alcoholics (Earls, Reich, Jung, & Cloninger, 1988), and children of biological alcoholic fathers, even when living in an adoptive home, are more likely to exhibit hyperactivity (Cantwell, 1972; Morrison & Stewart, 1973). Increased impulsivity has also been noted among COAs. Knop et al. (1985) reported that teachers were more likely to rate adolescent sons of alcoholics as impulsive and restless, as well as having poor emotional control and giving up easily.

Conduct disorder also reportedly occurs at elevated levels among COAs (Reich et al., 1993). Loeber, Green, Keenan, and Lahey (1995) found that parental substance abuse is one of the strongest predictors of child conduct disorder, in addition to low socioeconomic status and child oppositional behaviors. However, it should be noted that conduct disorder is also associated with parental antisocial personality disorder (Frick et al., 1992; Lahey et al., 1988), which, as previously

discussed, frequently occurs comorbidly with alcohol abuse and dependence. COAs are also reportedly at risk for a number of related conduct problems, such as lying, stealing, school truancy, and police contacts (for review see West & Prinz, 1987).

Increased incidence of internalizing behavior problems has also been reported among COAs. Reich et al. (1993) reported that male and female COAs had increased levels of anxiety, but not depressive symptoms nor depression. However, others have noted increased depressive symptoms among COAs (Roosa, Sandler, Beals, & Short, 1988). Rolf, Johnson, Israel, Baldwin, & Chandra (1988) reported that COAs between the ages of 6 and 18 experienced more depressive symptoms than did controls based on both self-ratings and maternal ratings on depression inventories. In addition, Rubio-Stipec et al. (1991) found that in a community sample, COAs were at increased risk for internalizing symptoms based on self-reports and ratings of parents and teachers.

Previous results from the MSU-UM Longitudinal Study suggest that COAs are at increased risk for developing both externalizing behavior problems, including impulsivity and hyperactivity, as well as internalizing behavior problems. Sons of alcoholics between the ages of three and six years showed increased impulsivity compared to sons of controls (Fitzgerald et al., 1993). In addition, risk has been found to vary according to the subtype of alcoholism exhibited by the father. Children of antisocial alcoholics were rated as having more externalizing behavior problems than were children of nonantisocial alcoholics, who in turn were rated as having more externalizing behavior problems than were children of controls.

Children of antisocial alcoholics were also rated by parents as being more hyperactive than were children of either nonantisocial alcoholics or controls (Zucker, Ellis, Bingham, & Fitzgerald, 1996). During the preschool period, children of antisocial alcoholics were also found to have increased risk for internalizing behavior problems as compared to children of nonantisocial alcoholics and controls (Ellis, Bingham, Zucker, & Fitzgerald, 1996). During middle childhood, children of antisocial alcoholics were also found to score more poorly on measures of impulsivity than children of nonantisocial alcoholics or controls (Poon, Ellis, Puttler, Zucker, & Fitzgerald, 1997).

To summarize, COAs evidence a number of externalizing behavior problems, and may be at heightened risk for developing some internalizing behavior problems. Externalizing behavior problems such as conduct disorder and attention deficit hyperactivity disorder have been identified as risk factors for alcoholism (Pihl, Peterson, & Finn, 1990), but research has shown that attention deficit hyperactivity disorder is a risk factor for alcoholism only because of its frequent co-occurrence with aggression or conduct disorder (Pihl & Peterson, 1991).

Temperament Styles of COAs. As identified by Thomas and Chess (1977), temperament refers to the stylistic component of behavior, or the "how" of an individual's behavior. There are currently several approaches to conceptualizing and measuring temperament that vary among theorists. However, most agree that temperament consists of relatively consistent, basic dispositions that are present early in life, but which are increasingly influenced by experience and context as

development proceeds (Goldsmith et al., 1987).

Thomas and Chess identified nine dimensions of temperament, including activity level, rhythmicity, social approach-withdrawal, adaptability to environmental change, stimulus threshold, response intensity, mood disposition, distractibility, and attention span-persistence. The number of temperament dimensions specified by other temperament theorists varies. For example, Buss and Plomin (1984) specify three traits (emotionality, activity, and sociability), while Rothbart specifies four dimensions (negative reactivity, positive reactivity, behavioral inhibition to novel or intense stimuli, and the capacity through effort to focus and shift attention) (Goldsmith et al., 1987).

Some researchers have suggested that specific temperamental characteristics may be identified among individuals at high risk for developing alcoholism, especially sons of male alcoholics (Tarter, Kabene, Escallier, Laird, & Jacob, 1990; Windle, 1991). The temperament characteristics likely to be reported in these individuals are those associated with difficult temperament. Difficult temperament is characterized by irregularity in biological functions, negative withdrawal responses to new stimuli, non-adaptability or slow adaptability to change, and intense mood expressions that are frequently negative (Thomas & Chess, 1984). Children with the difficult temperament pattern are more vulnerable to the development of behavior problems in early and middle childhood (Thomas & Chess, 1984).

Tarter (1988) reviewed evidence suggesting that certain behavioral traits were linked with alcoholism vulnerability. He concluded that a high activity level, a

tendency toward emotionality, and a high level of sociability (or "risky" temperament) were characteristic among individuals at heightened risk for alcoholism. While high levels of activity and emotionality (or reactivity) are consistent with characteristics of difficult temperament, it is, perhaps, counterintuitive that alcoholics and prealcoholics would be characterized as sociable, which would seem to be a positive or desirable quality. However, Tarter notes that what may appear at first to be sociable, gregarious behavior may actually represent a deficiency in behavioral inhibition among some individuals, i.e., disinhibition and impulsivity.

In fact, some researchers have noted behavioral undercontrol among COAs (Sher, Walitzer, Wood, & Brent, 1991), while others have noted emotionality and a tendency to experience negative affective states among COAs (Finn & Pihl, 1987). Tarter et al. (1990) reported that adolescent sons of alcoholics scored significantly higher than sons of nonalcoholics on the temperament dimension of behavioral activity level. In general, COAs are more likely to be rated as hyperactive, which reflects the linkage between temperament style and child behavior problems.

The occurrence of difficult temperament has been studied using subjects from the MSU-UM Longitudinal Study. The linkage between difficult temperament and child behavior problems was demonstrated in a study in which children who were rated in the clinical classification of behavior problems both during the preschool period and during middle childhood were significantly more likely to have difficult temperaments (Behling, Bingham, Fitzgerald, & Zucker, 1996). In addition, it has

been found that difficult temperament among SOMAs in the MSU-UM Study is predicted by mother's difficult temperament, father's difficult temperament, father's antisocial symptomatology, and the quality of stimulation in the home environment (Smith, Fitzgerald, Bingham, & Zucker, 1996). In other research from the MSU-UM Study, children rated by parents as having behavior problems in the clinical range were more likely to have difficult temperaments, and parents of these boys were more likely to have alcohol-related problems, antisociality, lower socioeconomic status levels, lower family incomes, and lower educational levels (Jansen, Fitzgerald, Ham, & Zucker, 1995).

Possible Pathways to Impaired Academic Functioning

The developmental pathway or pathways leading to school difficulties have not been clearly established for COAs. One possibility is that antecedent environmental variables are directly related to academic outcomes (See Figure 1). For COAs, some salient environmental factors may include parental alcoholism, alcoholism-related psychopathology, parental intelligence and family socioeconomic status. Theoretically all of these environmental variables, or antecedent parent functioning indicators, may exert direct effects on a child's academic functioning, as shown in Figure 1.

Another possibility is that intraindividual variables may exert direct effects on a child's academic functioning; for COAs, these factors may include behavior problems, temperament deviations, and deficits in levels of cognitive functioning, as measured during the preschool period (See Figure 2). If, as suggested by the

literature, COAs are characterized by behavior problems, difficult temperaments, and deficits in cognitive functioning, they are likely to have difficulty functioning in the school environment. It has been noted that childhood undercontrolled behavior, as indicated by behavior problems and difficult temperament style, can seriously disrupt a child's social relationships and academic performance (Henry, Caspi, Moffitt, & Silva, 1996). For example, cognitive functioning is predictive of academic achievement (Sattler, 1992), and both behavior problems and temperament have been found to be associated with school-related outcomes. Externalizing behavior problems, including hyperactivity (Frick et al., 1991), are related to academic underachievement. In fact, the strongest correlates of academic underachievement during childhood are inattention and aggression (Hinshaw, 1992). However, it is unclear to what extent these relationships are dependent upon the correlation between behavior problems and cognitive deficits (Rourke, 1988). Behavior problems are also related to problematic peer relationships, as well as peer rejection in the elementary years (Parker & Asher, 1987).

In addition, temperament style is associated with academic outcomes. Temperament is related to school achievement; higher activity level, greater distractibility, and less persistence are associated with lower levels of achievement (Martin, 1989). Temperament styles of low adaptability and high activity level are also related to school behavior problems (Keogh, 1989). The goodness of fit between a teacher's demands or expectations and a child's temperament style is related to teacher's judgments of a child's academic performance as well as the

child's actual academic performance (Lerner, Lerner, & Zabski, 1985). Finally, temperament, and especially emotionality, is related to the development of social skills and social competence (Eisenberg et al., 1993), as well as to social relationships with peers (Parker-Cohen & Bell, 1988) and teachers (Keogh & Burstein, 1988) in the school setting.

It is also possible that the effects of antecedent parent functioning indicators may be partially or completely mediated by child preschool factors (See Figure 3). In this case, the individual variables mediate the effects of environmental factors. The developmental pathway begins when a child is nested in a high risk context characterized by parental alcoholism, parental antisocial symptomatology, and low socioeconomic status. The pathway continues through early childhood as the child displays a difficult temperament style, deficits in cognitive functioning, and behavior problems. Finally, at school-age, the child experiences difficulties with achievement and difficulties in self-regulation of behavior, which results in school behavior problems and impaired peer relationships. This third model is the most likely representation of relationships between constructs, but it is also possible that environmental variables additionally have direct effects on school-related outcomes.

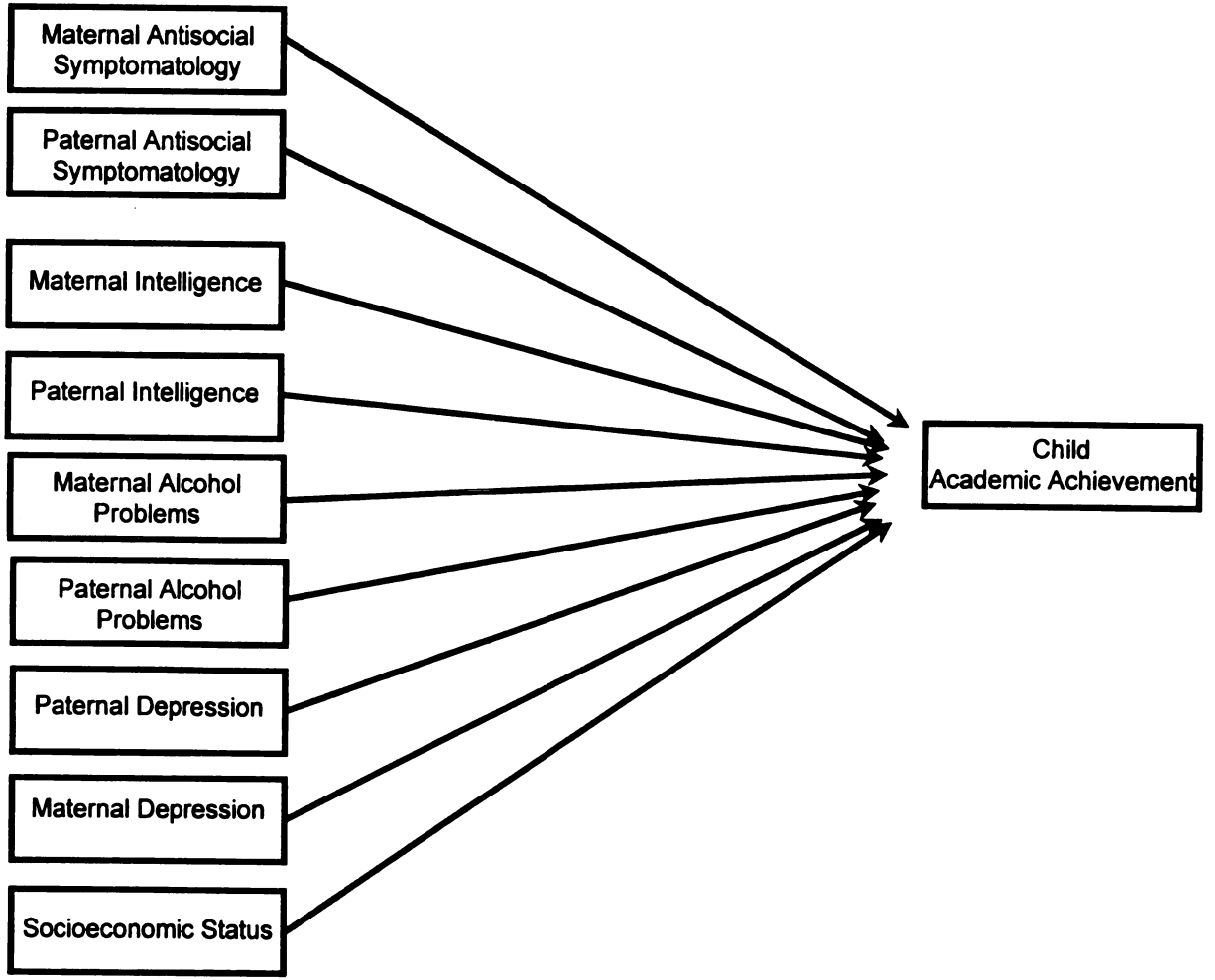

Figure 1. Antecedent Parent Functioning Variables Predicting School Achievement

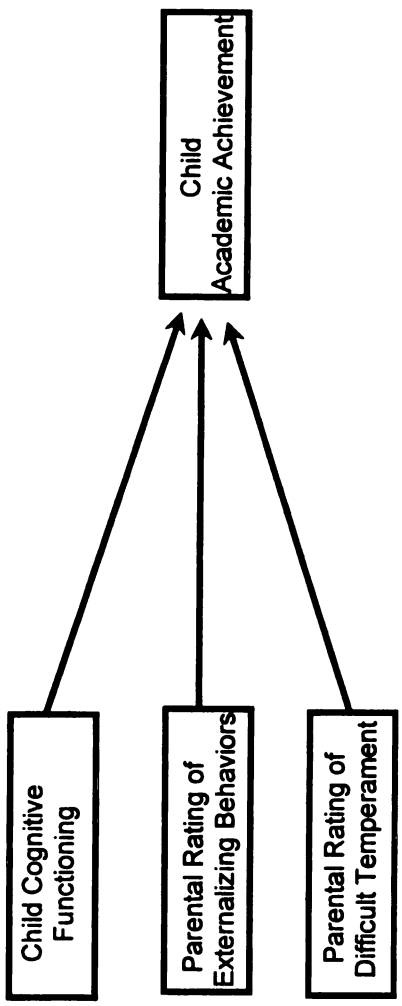

Figure 2. Early Childhood Variables Predicting School Achievement

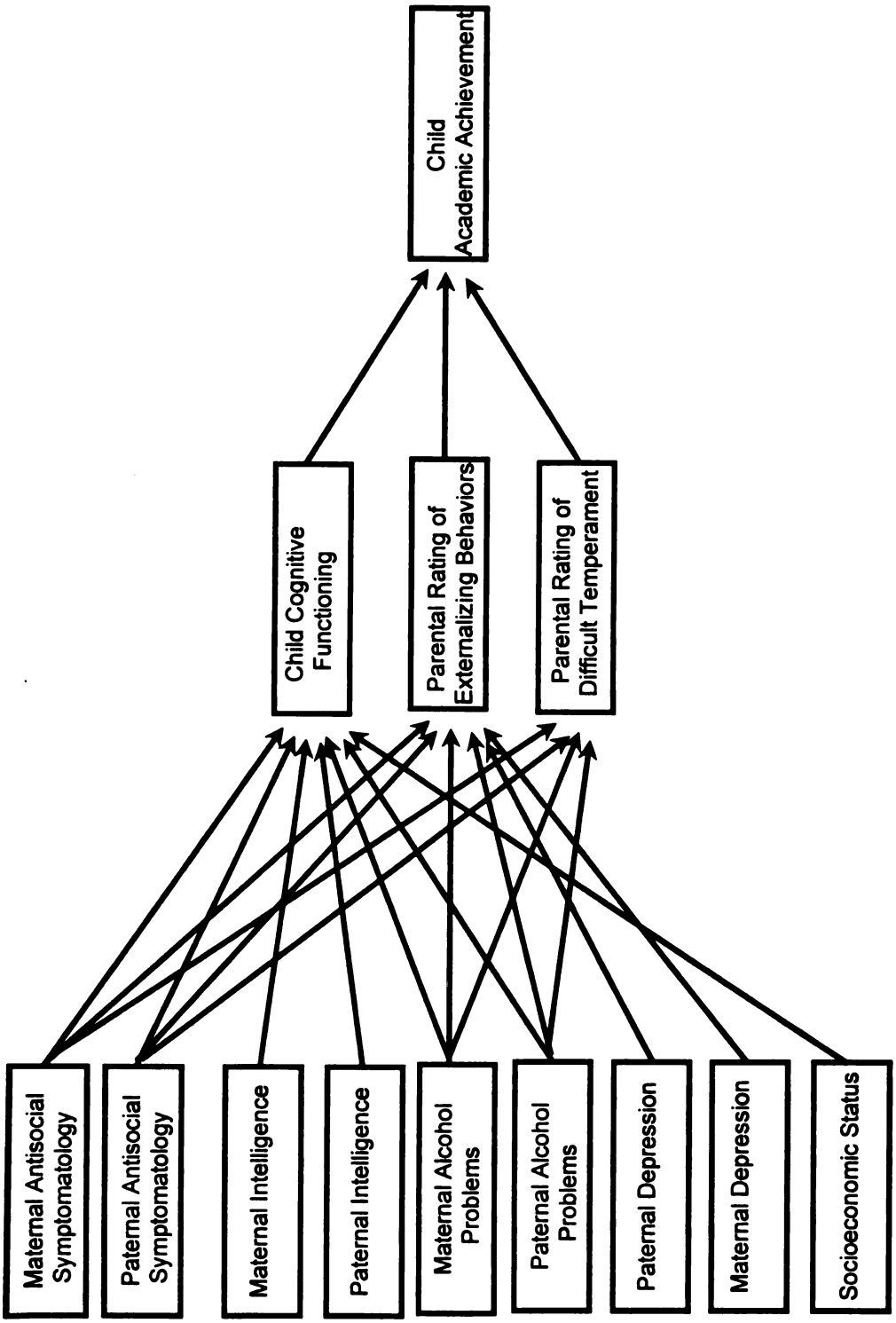

Figure 3. Early Childhood Variables Mediating Antecedent Family/Contextual Variables

Statement of the Problem

SOMAs are at increased risk for experiencing poor school achievement, and poor school achievement is a risk factor for the later development of alcoholism (Zucker & Gomberg, 1986). It is important to determine the developmental pathways leading to school problems and impaired academic achievement among SOMAs. It is also important to determine the developmental pathways leading to the development of alcoholism in adulthood. Finally, it is important to determine the coping factors leading to competent outcomes in the school context despite the difficulties associated with living in a household with an alcoholic parent (Masten & Coatsworth, 1995).

Although the greatest incidence of school problems among SOMAs is reported during the adolescent period, it has yet to be determined whether academic difficulties such as school behavior or learning difficulties are identifiable during the early school years. Based on the theoretical perspective that alcoholism is the culmination of a developmental disorder, and that risk for alcoholism is identifiable throughout the developmental period (Tarter & Vanyukov, 1994; Zucker, 1987), and also based on empirical findings from the MSU-UM Longitudinal Study that children in the most heavily risk-laden environments show continuity in maladaptive behaviors from the early childhood to middle childhood period, it is expected that these children will also show continuity in maladaptive behaviors from the context of the home to the context of the school.

Previous work from the MSU-UM Longitudinal Study has indicated that the

COAs in the study show increased behavior problems, lower levels of cognitive functioning, and are more likely to have difficult temperaments. The aim of the present study, therefore, is to examine school behavior and achievement of these SOMAs at elementary school-age to determine whether their earlier behavior problems are reflected in their school functioning. This study examines the functioning of children in the MSU-UM Longitudinal Study as they reach middle childhood (Wave 2 of the MSU-UM Study) and begin interacting in contexts outside of the home.

Teacher Ratings

Since the present study focuses upon school behavior, teacher ratings of children's functioning in the school context were used rather than parents' as the most appropriate indicator of functioning in this context. High agreement between parent and teacher ratings would not be anticipated across these two contexts, given their different demand characteristics, and in fact the extant literature indicates this is so. In studies comparing parent and teacher ratings, modest correlations have been reported between parent and teacher ratings of internalizing and externalizing behavior problems (Phares, Compas, & Howell, 1989). A meta-analysis of studies comparing reports of parents and teachers yielded a statistically significant overall correlation coefficient of 0.28. The authors noted that agreement was higher for ratings of children between the ages of 6 and 11 years, and also that agreement was higher for externalizing problems than for internalizing problems (Achenbach, McConaughy, & Howell, 1987).

Academic Functioning

In the present study, academic functioning is conceptualized as school behavior, academic achievement, social competence with peers, requirement of additional help in school, and other school-related variables. Sons of antisocial alcoholic, nonantisocial alcoholic, and non-alcoholic parents are compared to determine whether there are any differences in academic functioning. The areas examined include:

School behavior problems. Teacher ratings of school behavior are examined, including levels of externalizing (inattentive, nervous-overactive, and aggressive) and internalizing behaviors (anxious and social withdrawal), as well as unpopular, self destructive, obsessive-compulsive, and unpopular behaviors.

Academic achievement. Scores on a standardized achievement test are examined, including reading achievement, spelling achievement, and arithmetic achievement. In addition, teacher ratings of current school performance in academic subjects are examined.

Social competence. Teacher ratings of relations with peers in the school setting are compared to determine levels of social competence. The dimensions examined include teasing and bullying, sociability and leadership, and isolated and internalizing behaviors. Teacher ratings of peer popularity have been found to compare well with peer popularity ratings (Alexander & Entwisle, 1988), although little information exists on the psychometric properties of such measures (Parker & Asher, 1987).

Additional help at school. Parent reports of additional help at school, including counseling, tutoring, speech therapy, reading help, and other help are examined, as well as parent reports of medication regimens for hyperactivity.

Other school-related variables. Teacher reports of absences, tardies, and discipline problems are examined, as are teacher ratings of developmental levels, likeability, physical attractiveness, parent interest in the child's school performance, and estimates of the child's future academic performance.

Predictors of Academic Functioning

Several variables are tested as predictors of these indices of school functioning, including environmental variables (parental alcoholism, parental antisociality, parental depression, parental intelligence, and socioeconomic status) and individual variables (child cognitive functioning, child behavior problems, and child temperament). In addition, relationships between predictors are examined.

Compared to previous studies of academic achievement, a strength of the present study is the presence of three comparison groups. The distinction between antisocial alcoholism and non-antisocial alcoholism allows for examining the individual and combined effects of parental alcoholism and antisocial symptomatology. It is thought that parental alcoholism and parental antisociality will act as cumulative risk factors in adversely affecting child outcome: The greater the number of parental, familial, and individual risk factors, the greater the risk for poorer child developmental outcomes (Sameroff & Seifer, 1983), including difficulties in the educational setting.

Hypotheses

Hypothesis 1: Sons of antisocial alcoholics (AALs) will have more teacher-reported school behavior problems than will sons of nonantisocial alcoholics (NAALs) or control sons from nonalcoholic families.

Hypothesis 2: Sons of AALs will be rated by teachers as having lower levels of intellectual development than will sons of NAALs or control sons from nonalcoholic families.

Hypothesis 3: Sons of AALs will be rated by teachers as having lower levels of social development than will sons of NAALs or control sons from nonalcoholic families.

Hypothesis 4: Sons of AALs will have lower scores on measures of school achievement than will sons of NAALs or control sons from nonalcoholic families.

Hypothesis 5: Sons of AALs will be rated by teachers as behaving more aggressively in the school setting than will sons of NAALs or control sons from nonalcoholic families.

Hypothesis 6: Sons of AALs will have higher rates of absences, tardies, and discipline referrals than will sons of NAALs or control sons from nonalcoholic families.

Hypothesis 7: Child predictor variables (externalizing behavior problems, characteristics of difficult temperament, and deficits in cognitive functioning) will partially or fully mediate the relationship between parental predictor variables and these areas of academic functioning.

Method

Participants

There are 311 families participating in the ongoing Michigan State University-University of Michigan Longitudinal Study (Fitzgerald, Zucker, & Yang, 1995; Zucker & Fitzgerald, 1997). Participants for the present study included a subset of 236 of these families (91 control families, 112 families with a nonantisocial alcoholic father, and 33 families with an antisocial alcoholic father). Although 311 families were initially assessed at Wave 1, because of a lack of grant funds a subset of 68 of the families, who were designated in advance, were systematically excluded from assessment at Wave 2. Later availability of a larger funding base allowed the project to change that decision. In the meantime, these families were "unavailable by design," and the existing database involves 236 out of the potential 241 family Wave 2 pool.

The MSU-UM Study is a longitudinal project utilizing population-based recruitment strategies to access alcoholic men and their families and a contrast group of families with initially non-substance abusing parents. All families in the present study were Caucasian. The limited ethnic/racial composition was dictated by the fact that census data in the area where data collection took place indicated that other ethnic and racial groups would represent less than 10% of the sample. Given the extensive literature demonstrating a substantial relationship between patterns of alcohol involvement and ethnic/racial status and the fact that effective analyses for

such differences could not be undertaken with the proposed study sample size, it was decided to exclude such variation rather than have it contribute to error. Families were invited to participate in a long term study of family health and child development and all received some payment for participation.

At the time of recruitment, all alcoholic fathers were required to have a 3-0 to 5-11-year-old son with whom they were living and also to be residing with the child's mother. Although families were required to be intact at the time of initial contact, this recruitment procedure simply picked a point in the family's history that allowed all families to start data collection at the same "coupled" point. Thereafter, some parents continued to live together and some did not; a substantial rate of separation and/or marital dissolution was found at later waves of data collection. Thus, the sample is not atypical of alcoholic families, who are known for their high rates of divorce. Mothers' drinking status was assessed for alcoholic families, but maternal alcoholism was neither a requirement nor a basis for exclusion. In accordance with study exclusion criteria, no child manifested characteristics sufficient for a diagnosis of fetal alcohol syndrome.

Alcoholic families. Alcoholic families were recruited by way of father's drinking status. Alcoholic fathers were identified in one of two ways. The first group was recruited from the population of all convicted drunk drivers in a four county area of mid-Michigan. Thereafter, all males meeting the family recruitment criteria involving child age and coupling status who had a blood alcohol concentration of 0.15% (150 mg/100 ml) or higher when arrested, or a blood alcohol

concentration of 0.12% if a history of prior alcohol-related driving offenses existed, were asked for permission to have their names released for contact by study staff. Of those convicted, 79% agreed to have their names released, and of those, 92% agreed to participate. At initial contact, a positive alcoholism diagnoses was established using the Short Michigan Alcoholism Screening Test (SMAST; Selzer, 1975); this diagnosis was subsequently verified by way of the NIMH Diagnostic Interview Schedule-Version III (DIS; Robins, Helzer, Croughan, & Ratcliff, 1980). All of these men met a "definite" or "probable" criterion for alcoholism using the Feighner Diagnostic Criteria (Feighner, Robins, Winokur, Guze, et al., 1972), with 92% making a "definite" diagnosis. Later, DSM-III-R diagnoses were also established although this was not a basis for study inclusion (73% of the alcoholic men met either moderate or severe alcohol dependence criteria).

The second strategy involved recruiting alcoholic fathers out of the same neighborhoods where drunk driver alcoholic fathers resided. These families were accessed during neighborhood canvasses for nonalcoholic (control) families. Thus, they provided an ecologically comparable subset of high risk families drawn out of the same social stratum as the drunk drivers, but where the alcoholism was identified by way of community survey rather than by way of legal difficulty. These alcoholic fathers also met Feighner criteria for probable or definite alcoholism (85% made a definite diagnosis), had children and partners who met the same inclusion criteria as the drunk driving group, but had no drunk driving involved arrest record occurring during the lifetime of the 3- to 5-year-old target child.

Control families. In addition to alcoholic families, a group of community control families were recruited via door-to-door community survey techniques. These families were recruited out of the same neighborhoods as alcoholic families and were homogeneous with them for age of the target child (+/- 6 months). However, neither parent met Feighner criteria for alcoholism or for other drug abuse/dependence. In addition, efforts were made to match control families with alcoholic families on the basis of family socioeconomic status by recruiting controls from the same neighborhood in which the risk family lived. Canvassers initiated a door-to-door search a block away from the alcoholic family, staying within the same census tract, and screened for non-alcoholic families with a child of appropriate age. However, in some cases locating a neighborhood control proved impossible due to high levels of drug and/or alcohol abuse among potential control families living in neighborhoods where the alcoholic families resided. In such cases, the recruitment moved to an adjacent neighborhood and in some instances it was necessary to go even more broadly afield in order to locate another sociodemographically comparable community in which to continue the search. Of the families who met eligibility criteria as controls, 93% agreed to participate.

The present study was approved by the University Committee on Research Involving Human Subjects (UCRIHS IRB# 97-361) at Michigan State University and all families gave their informed consent to participate in the study.

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Data Collection

Data were collected by trained project staff who were blind to family risk status. Because of the large volume of data collected, a number of contacts with the family were necessary. Wave 1 and Wave 2 data collection took place across nine data collection sessions each, seven of which took place in the family home and two of which took place on a university campus. The visits involved approximately fifteen hours of contact time for each parent and seven hours of time for the target child. Contacts included questionnaire sessions, semi-structured interviews, and interactive tasks.

During the first Wave 2 data collection session, parents were asked to provide the name of the child's school, the child's grade, and the name of the child's teacher. Parents were also asked to sign a teacher release form authorizing the child's teacher to provide student information to the MSU-UM Study. This form was mailed to the target child's teacher along with (a) a letter of introduction with a brief explanation of the study, (b) three questionnaires to be completed by the teacher (the Achenbach Teacher Report Form, the Revised Class Play Questionnaire, and the School Performance Questionnaire), and (c) a check in the amount of $10.00 to compensate the teacher for completing the questionnaires.

Parent Measures

Socioeconomic Status

Information on family demographics came from a questionnaire assessing parental education, occupation, and family income. Socioeconomic status (SES) of each parent was calculated using the Duncan TSEI2 Socioeconomic Index (Stevens & Featherman, 1981), an occupationally-based measure of social prestige. In order to obtain a measure of SES which would best capture the environment of the target child, family SES was calculated using an average of the mother's and father's SES when both parents worked, and only the employed parent's score when only one parent worked. Special scores reflecting the lowest possible Duncan ratings were used for families in which neither parent was employed. The demographic questionnaire was completed by all mothers and fathers in the study.

Alcohol Problems

Lifetime Alcohol Problems Score (LAPS). The LAPS (Zucker, 1991) was used in order to determine parents' degree of alcohol-related difficulty over their life course. LAPS incorporates information on the primacy (onset), variety, and life invasiveness of drinking problems and is standardized separately for males and females. Information from which LAPS was coded was provided by the NIMH Diagnostic Interview Schedule, a drinking and drug history questionnaire (Zucker, Fitzgerald, & Noll, 1990), and the short form of the Michigan Alcoholism Screening Test (Selzer, 1971, 1975). The measure effectively distinguishes between alcoholics and nonalcoholics, is unrelated to current alcohol consumption in problem drinking

samples, and is correlated with a wide range of external measures of alcohol-related difficulty such as the blood alcohol concentration at arrest and treatment involvement (Zucker, 1991). The LAPS has also been found to discriminate among diagnosis of alcohol dependence, having been in treatment, level of other psychopathology, and measures of family disorganization (Zucker, Davies, Kincaid, Fitzgerald, & Reider, 1997). Higher scores indicate greater severity of lifetime alcohol problems. The LAPS score was calculated for all mothers and fathers in the study.

Antisocial Symptomatology

Antisocial Behavior Checklist (ASB). The ASB (Zucker & Noll, 1980) is a 46-item revision of an earlier antisocial behavior inventory used in the Rutgers Community Study (Zucker & Barron, 1973; Zucker & Fillmore, 1968) that has been modified so that items are also salient for adult antisocial activity. The ASB questionnaire measures the frequency of the parent's participation in a variety of aggressive and antisocial activities. Antisocial behavior is measured in both childhood (e.g., being suspended or expelled from school for fighting, lying to parents, running away from home for more than a day) and adulthood (e.g., defaulting on a debt, being fired for absenteeism, resisting arrest) domains. A series of reliability and validity studies with populations ranging from male and female college students to male and female jail inmates has shown that the instrument has adequate test-retest reliability (0.91 over four weeks) and internal consistency reliability (coefficient alpha=0.93); it also differentiates between individuals with

long histories of antisocial behavior (prisoners) versus individuals with minor offenses in district court versus university students and strongly discriminates those with antisocial personality disorder and those without. Higher scores indicate higher reported numbers of antisocial behaviors. All mothers and fathers in the study completed the ASB Checklist.

Antisocial Personality Disorder Diagnosis. Antisocial Personality Disorder (ASP) diagnoses were coded for all fathers in the study according to DSM-III-R criteria (American Psychiatric Association, 1987).

Parental Alcoholic Subtype

In order for children from alcoholic families to be identified as offspring of antisocial alcoholics or nonantisocial alcoholics, their fathers were classified as one or the other alcoholic subtype. Alcoholic fathers who met an ASP diagnosis were classified as antisocial alcoholics, while alcoholic fathers who did not meet an ASP diagnosis were classified as nonantisocial alcoholics. No control fathers in the present study met an ASP diagnosis. All together, 33 fathers were classified as antisocial alcoholics and 112 fathers were classified as nonantisocial alcoholics. Therefore, based on the father's alcoholic subtype, the sample in the present study includes 91 control families, 112 nonantisocial alcoholic families, and 33 antisocial alcoholic families.

Depression

Hamilton Rating Scale for Depression. The earliest version of the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960; 1967) was designed

for use with patients already diagnosed as suffering from depression and measures behavioral and somatic symptoms of depression. More recently, the HRSD has been used for patient selection and later assessment (Grundy, Lunnen, Lambert, Ashton, & Tovey, 1994). The HRSD was coded following administration of the NIMH Diagnostic Interview Schedule (DIS; Robins et al., 1981) by the clinician who conducted the interview. The score is based on both the subject's responses to interviewer questions during the DIS administration as well as the clinician's judgements. The rater made both a Current Depression rating and a Worst Ever rating of the level of the subject's depression. The Worst Ever episode was selected by the clinician on the basis of the period when the largest number of depressive symptoms were reported. Interrater reliabilities obtained on the MSU-UM Study were 0.78 for current depression and 0.80 for worst-ever depression, based on a sample of 16 individuals (Reider, 1991). Higher scores indicate higher levels of depression. All mothers and fathers in the study were rated on the HRSD.

Intelligence

Wechsler Adult Intelligence Scale-Revised. The Information and Digit Symbol subtests of the WAIS-R (Wechsler, 1981) were used to estimate Full Scale IQs for parents. The Information subtest, which assesses mental alertness and orientedness, verbal skills and general knowledge, is reliable and highly correlated with Full Scale IQ (r=0.83). The Digit Symbol subtest, which assesses motor persistence, attention, visual-motor coordination, and processing speed, has adequate reliability and is correlated with Full Scale IQ (r=0.61). Each WAIS-R subtest scale

is multiplied by a constant to obtain prorated Full Scale IQ estimates. Higher scores indicate higher levels of cognitive functioning. All mothers and fathers in the study were administered the two subtests from the WAIS-R.

Child Measures

Cognitive Functioning

Stanford-Binet Intelligence Scale. The Stanford-Binet Intelligence Scale (Terman & Merrill, 1973) consists of subtests designed to measure the overall level of intellectual functioning. The Stanford-Binet has been revised three times, with the third revision completed in 1960 and renormed in 1972 using a representative sample. In contrast to earlier versions, the third revision is incorporated into a single form (Form L-M) that measures intelligence in persons from age two through adulthood. An overall IQ is obtained by comparing the subject's mental age obtained from the Stanford-Binet with his or her chronological age. The Stanford-Binet has been shown to be highly reliable and stable. It predicts academic achievement for children of majority population groups as well as minority children (Munday & Rosenberg, 1979). This version of the instrument continues to be used on the study because it was used to assess the first subjects participating in the study. Higher scores indicate higher levels of cognitive functioning; the scale has a mean of 100 and a standard deviation of 16. Form L-M was administered to each child in the study during Wave 1 data collection.

Behavioral Functioning

Achenbach Child Behavior Checklist. The CBCL (Achenbach, 1991) was completed by each parent independently during Wave 1 data collection of the study. The CBCL provides an objective assessment of the child's social and emotional functioning. The instrument yields standardized scores on eight narrow-band subscales and two broad-band subscales concerning externalizing and internalizing psychopathology and social competence. Reliability coefficients for the CBCL range from 0.84 to 0.98 (Achenbach & Edelbrock, 1983). The total score for externalizing behavior problems was used, with higher scores indicating more behavioral problems. Both maternal and paternal ratings of externalizing behavior problems were calculated for each child in the study.

Temperament

Dimensions of Temperament Survey. The DOTS-Child (Windle & Lerner, 1986) was administered to each parent independently during Wave 1 data collection of the study. The DOTS-Child provides measures of five dimensions of temperament: activity level, attention span/distractibility, adaptability/approach-withdrawal, rhythmicity, and reactivity. Reliability coefficients obtained with samples of infants, preschoolers, school-age children, and young adults, on the five scales ranged from 0.31 to 0.96, with reactivity the only factor with a reliability consistently below 0.60 (Lerner, Belsky, & Windle, 1982; Lerner, Palermo, Spiro, & Nesselroade, 1982). Temperament ratings with the DOTS have been found to be related to better grades, positive self-esteem, and better peer relations in children

(Lerner & Lerner, 1983).

Composite scores were calculated for **difficult** temperament (higher scores indicate higher motor activity levels, lower levels of adaptability, poorer attention spans and higher levels of distractibility, greater reactivity in every day activities, and more arrhythmic eating and sleeping patterns). However, it should be noted that there are varying numbers of items within each subscale, and temperament scores were not standardized for each subscale. DOTS scales and items comprising each scale are shown in Appendix A. Difficult temperament scores were calculated separately for mothers and fathers for each child in the study.

Academic Functioning

Teacher's Report Form of the Achenbach Child Behavior Checklist (TRF). The TRF (Achenbach, 1991) is designed to obtain teachers' reports of their pupils' problems and adaptive functioning. In one portion of the instrument the teacher is asked to list the student's current school performance for six subjects on a 5-point scale from 1 (far below grade) to 5 (far above grade). The TRF yields standardized scores for adaptive functioning based on teacher responses to four single items: (1) How hard is he working? (2) How appropriately is he behaving? (3) How much is he learning? and (4) How happy is he? All four of these items are rated on a 7-point scale from 1 (much less compared to typical pupils of the same age) to 7 (much more compared to typical pupils of the same age). The TRF also yields two broad-band scales concerning externalizing and internalizing behavior problems, and eight narrow-band subscales (anxious, social withdrawal, unpopular,

self destructive, obsessive compulsive, inattentive, nervous overactive, and aggressive). The TRF scales are reliable, with coefficients ranging from 0.69 to 0.89. The TRF was completed by the child's teacher during Wave 2 data collection for each child in the study.

Wide Range Achievement Test Revised (WRAT-R). The WRAT-R (Jastak & Wilkinson, 1984) is designed to assess achievement of basic academic skills. The WRAT-R yields standardized scores for three subtests: reading, written spelling, and arithmetic computation (with a mean of 100 and a standard deviation of 15). The WRAT-R subtests are highly reliable, with respective reliability coefficients of 0.96, 0.97, and 0.94. Level 1 of the WRAT-R, designed for use with children between the ages of 5-0 and 11-11, was administered to each target child during Wave 2 data collection of the study. WRAT-R scores will be used as an index of school achievement, with higher scores reflecting greater academic achievement.

Revised Class Play Questionnaire. This 50-question instrument is an extended and revised version of the 30-item Revised Class Play (Masten, Morison, & Pellegrini, 1985) and provides a measure of children's social competence based on teacher ratings. Using a 5-point Likert scale, teachers rate a child on a number of social characteristics. The instrument consists of ten dimensions: leadership, has many friends, good sense of humor, picks on others, bossiness, teases others too much, gets into fights, is often left out, feelings get hurt easily, and unusually sad. The Revised Class Play Questionnaire was completed by teachers during Wave 2 data collection for each child in the study.

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Child's School Performance Questionnaire. This questionnaire asks teachers to provide information about school attendance and disciplinary problems. Absences, tardies and discipline problems were converted to rates and then standardized to reflect number of absences, tardies, or discipline problems per school year. This questionnaire also asks teachers to rate the child's level of competence relative to other children in six areas (emotional, physical, social, language and intellectual development, aggression, and activity level) on a 5-point scale from 1 (very much below average) to 5 (very much above average). Teachers are also asked to rate the child's likeability, attractiveness, and parent interest in the child's school performance on a 5-point Likert scale from 1 (not very) to 5 (extremely). Finally, teachers are asked to estimate the child's school performance in middle school based on their current school performance on a 6-point scale, reverse-scored so that it ranges from 1 (very much below average) to 6 (superior). The Child's School Performance Questionnaire was completed by teachers for each child in the study during Wave 2 data collection.

Child Health and Development History Questionnaire. The parent (mother or primary caregiver) served as the primary information source for information about the child's past and current development and health. A structured questionnaire format is used to elicit information from the parent; questionnaire items are structured and as specific as possible so as to allow the parent to more reliably answer historical questions. The questionnaire focuses on the following areas: Pregnancy, birth of the child, growth and development, child's health, social

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development, family background information, and school history. In the present study, the following questions from the questionnaire were used: (a) Has your child ever been in counseling? (b) Has your child ever been tutored? (c) Has your child ever had speech therapy? (d) Has your child ever had reading help? (e) Has your child ever had any other type of help? and (f) Has your child ever been on a medication program for hyperactivity for a period of time, such as Ritalin or other medication? All of these items are scored as yes/no.

Missing Data

The original data set consisted of 236 families (both parents and male target child from each family) from the study. Percentages of missing data were calculated for each variable for each of the three groups (antisocial alcoholics, nonantisocial alcoholics, and controls). In some cases only a few individual items were missing from an instrument for an individual in the sample, but in other cases entire instruments were missing for individuals in the sample.

In cases in which only a few items were missing, scores were prorated based on the number of items that were available. This procedure was used to determine seven scores for difficult temperament using data from the Dimensions of Temperament Survey (3.0% of the total scores), and to determine 36 externalizing behavior problem scale scores using data from the Teacher Report Form (1.9% of the total scores). The percentages of missing data are shown for each risk group and for each variable in Table 2.

Bias analyses were conducted to determine whether those individuals who were missing greater proportions of data differed on any of the variables from those who were missing smaller proportions of data or who had complete data sets. This was accomplished by calculating the number of missing variables for each parent and child in the sample, and then correlating the number of missing variables with scores on each of the variables (see Table 3). It was found that those parents who were missing greater numbers of variables from the data set had higher scores on depression and lower scores on socioeconomic status; children who were missing greater numbers of variables from the data set had lower scores on some school adaptive functioning variables, higher scores on some behavior problem scales, more unexcused school absences, and lower teacher-rated activity levels. Data estimation and verification of data estimation procedures are shown in Appendix B.

Table 2
Percentage of Missing Data For Each Variable By Risk Group

Variable	Controls (n=91)	Nonantisocial-Alcoholic (n=112)	Antisocial-Alcoholic (n=33)	Total Sample (n=236)
Family/Contextual Variables:				
Lifetime Alcohol Problems Score - Mothers	0	0	0	0
Lifetime Alcohol Problems Score - Fathers	0	1	0	0.4
Antisocial Behavior Checklist - Mothers	0	0	0	0
Antisocial Behavior Checklist - Fathers	0	0	0	0
Wechsler Adult Intelligence Scale - Mothers	10	10	18	11
Wechsler Adult Intelligence Scale - Fathers	9	13	18	12
Hamilton Rating Scale for Depression - Mothers	1	2	0	2
Hamilton Rating Scale for Depression - Fathers	3	2	0	2
Socioeconomic Status	0	0	0	0
Wave 1 Child Variables:				
Stanford-Binet Intelligence Scale	2	3	12	4
Achenbach Child Behavior Checklist	2	2	6	3
Dimensions of Temperament Survey	1	0.4	3	0.8
Wide Range Achievement Test-Revised:				
Reading Achievement	10	11	18	11
Spelling Achievement	11	11	21	12
Arithmetic Achievement	10	11	18	11

Table 2 (continued)
Percentage of Missing Data For Each Variable By Risk Group

Variable	Controls (n=91)	Nonantisocial-Alcoholic (n=112)	Antisocial-Alcoholic (n=33)	Total Sample (n=236)
Achenbach Teacher Report Form: [a]				
Working Hard	19	27	21	23
Behaving Appropriately	19	27	21	23
Learning	19	28	21	23
Happy	19	27	21	23
Anxious	19	28	21	23
Social Withdrawal	19	28	21	23
Unpopular	20	29	24	23
Self Destructive	22	29	21	23
Obsessive-Compulsive	22	29	24	23
Inattentive	22	29	24	23
Nervous-Overactive	20	29	24	23
Aggressive	21	32	24	23
Revised Class Play Questionnaire:	34	44	55	42

Table 2 (continued)
Percentage of Missing Data For Each Variable By Risk Group

Variable	Controls (n=91)	Nonantisocial-Alcoholic (n=112)	Antisocial-Alcoholic (n=33)	Total Sample (n=236)
School Performance Questionnaire:				
Number of Excused Absences	24	34	21	28
Number of Unexcused Absences	33	49	52	43
Number of Tardies	26	38	30	33
Number of Discipline Referrals	18	26	21	22
Emotional Development	16	23	18	20
Physical Development	16	22	15	19
Social Development	15	22	15	19
Language Development	15	22	15	19
Intellectual Development	15	22	15	19
Aggressiveness	15	22	15	19
Activity Level	15	22	15	19
Likeability	15	22	15	19
Physical Attractiveness	15	22	15	19
Parent Interest in School	15	22	15	19
Predicted Future Performance	18	23	18	20

Table 2 (continued)
Percentage of Missing Data For Each Variable By Risk Group

Variable	Controls (n=91)	Nonantisocial-Alcoholic (n=112)	Antisocial-Alcoholic (n=33)	Total Sample (n=236)
Child Health Questionnaire:				
Counseling	22	27	45	28
Tutoring	22	27	45	28
Speech	22	27	45	28
Reading Help	23	28	45	28
Other Help	22	27	45	28
Medication for Hyperactivity	22	26	45	27

[a] **Teacher ratings of academic performance were obtained from a separate instrument rather than from the Achenbach Teacher Report Form**

Table 3
Bias Analyses for Each Variable Correlated With the Number if Missing Variables Per Individual

Variable	Correlation with Number of Missing Variables
Family/Contextual Variables:	
Lifetime Alcohol Problems Score	.08
Antisocial Behavior Checklist	.09
Wechsler Adult Intelligence Scale	-.08
Hamilton Rating Scale for Depression	.14*
Socioeconomic Status	-.12*
Wave 1 Child Variables:	
Stanford-Binet Intelligence Scale	-.09
Achenbach Child Behavior Checklist	.09
Dimensions of Temperament Survey	-.00
Wide Range Achievement Test-Revised:	
Reading Achievement	-.02
Spelling Achievement	.01
Arithmetic Achievement	-.04
Achenbach Teacher Report Form:	
Working Hard	-.11*
Behaving Appropriately	-.06
Learning	-.17*
Happy	-.11*
Anxious	.03
Social Withdrawal	.14*
Unpopular	.05
Self Destructive	.13*
Obsessive-Compulsive	.17*
Inattentive	.17*
Nervous-Overactive	.09
Aggressive	.04

*$p \leq .05$

Table 3 (continued)
Bias Analyses for Each Variable Correlated With the Number if Missing Variables Per Individual

Variable	Correlation with Number of Missing Variables
<u>School Performance Questionnaire:</u>	
Number of Excused Absences	.10
Number of Unexcused Absences	.15*
Number of Tardies	-.00
Number of Discipline Referrals	-.00
Emotional Development	-.05
Physical Development	.00
Social Development	-.04
Language Development	-.06
Intellectual Development	-.06
Aggressiveness	-.02
Activity Level	-.14*
Likeability	.00
Physical Attractiveness	.02
Parent Interest in School	-.01
Predicted Future Performance	.06
<u>Child Health Questionnaire:</u>	
Counseling	-.08
Tutoring	.02
Speech	-.01
Reading Help	-.00
Other Help	-.04
Medication for Hyperactivity	-.08

*$p \leq .05$

Results

Statistical Analysis

First, the Revised Class Play Questionnaire was factor analyzed because it is an extension and revision of an earlier questionnaire and it was necessary to determine the factor structure of this revised instrument. Next, because there were a large number of school outcome variables, these variables were factor analyzed to reduce the total number of school variables. A total of six factors resulted, and factor scores were calculated for each target child on each of these factors.

Comparisons of background variables for the three risk groups (AALs, NAALs, and controls) were examined using multivariate analysis of variance (MANOVA). One MANOVA compared the three groups on familial and contextual variables and one MANOVA compared the children from the three groups on Wave 1 child variables. When the multivariate analysis produced a significant result, post-hoc mean comparisons (Student-Newman-Keuls Tests) were conducted to determine which specific variables differed among the three groups.

Comparisons of academic functioning for the three risk groups were also examined using MANOVA; factor scores were used for these comparisons. Again, when MANOVA produced a significant result, Student-Newman-Keuls post-hoc tests were conducted to determine which specific variables differed. In addition, cross-tabulations were used to compare the percentages of boys in each risk group who were rated by teachers in the clinical range of school behavior problems.

Finally, manifest variable multivariate multiple regression was used to test several models of familial/contextual and individual factors relating to children's school outcomes. Multivariate multiple regression allows for the prediction of multiple outcomes simultaneously.

Data Reduction: Principal Components Analyses

Principal Components Analysis of the Revised Class Play Questionnaire

The Revised Class Play Questionnaire used in the present study consists of 50 items (Fitzgerald & Zucker, 1993; Noll & Fitzgerald, 1988); this instrument is an extension and revision of an earlier 30-item instrument developed at the University of Minnesota (Masten, Morison, & Pellegrini, 1985). While the original instrument was a descriptive matching technique of peer assessment, the revised instrument was completed by teachers to gain teacher's perceptions of children's peer reputations. In the first revision of this instrument, teachers were asked to nominate children from their classroom for roles in a play; they were allowed to nominate the same child for more than one role, but only one child per role (Noll & Fitzgerald, 1988). However, to provide more information about the particular target child in the MSU-UM Study, the instrument was revised such that teachers were asked to rate the likelihood that the target child would be selected to play each of 50 roles (Fitzgerald & Zucker, 1993). Although Masten et al. (1985) provided a three-factor structure of the Revised Class Play, it was necessary to factor analyze the revised instrument used in this study because no such analysis has been conducted to date.

First, exploratory principal components analysis was conducted in which the 50 items were subjected to a maximum likelihood extraction with varimax rotation. A three-factor solution accounted for 52.8 percent of the variance. The first factor accounted for 28.4 percent of the variance, the second factor for 17.2 percent, and the third factor for 7.1 percent. Next, this three-factor solution was submitted to confirmatory factor analysis using LISREL 8 (Jöreskog & Sörbom, 1993). The model fit the data adequately; although the chi-square value was significant (X^2(199df)=277.88, p=0.0), the goodness of fit index was 0.90 and the root mean square error of approximation was 0.041. A three-group stacked model was attempted but failed because there were more parameters than cases available in one of the groups (there were only 33 cases in the AAL group). The LISREL command file for the three-group model appears in Appendix C.

The resulting three scales of the Revised Class Play Questionnaire were labeled **Teasing-Bullying, Sociability-Leadership**, and **Isolated-Internalizing.** The items comprising each scale and factor loadings for each item are shown in Table 4. Internal consistencies of the three scales were acceptable, with coefficient alpha values of 0.85 or greater. Scores were calculated for each child in the study on each of these three dimensions.

Table 4
Confirmatory Factor Analysis of Revised Class Play Items: Factor Loadings for Three-Factor Solution (n=236)

Factor	Factor Loading	Alpha
I: Teasing-Bullying		.91
A person who is too bossy	.80	
Somebody who teases other children too much	.79	
A person who interrupts when other children are speaking	.79	
Somebody who picks on other kids	.70	
A person who gets into fights a lot	.70	
Someone who shows off a lot	.68	
A person who loses their temper easily	.67	
Somebody who gets into trouble a lot	.65	
A person who has trouble sitting still	.50	
II: Sociability-Leadership		.86
A person who is a good leader	.88	
A person who everyone listens to	.79	
A person with good ideas for things to do	.76	
A person who is usually independent	.74	
Someone who always knows the answer in class	.72	
Someone who is very good looking	.45	
Somebody who is always taking care of others	.23	
III: Isolated-Internalizing		.85
A person who gets "walked on" by others	.94	
Someone who is often left out	.85	
Someone who can't get others to listen	.67	
Someone who is usually sad	.59	
Someone who would rather play alone than with others	.54	
Someone who is usually worried	.45	
A person who is tired a lot	.47	

Principal Components Analysis of All School Variables

In total, there were 36 school variables from the Wide Range Achievement Test-Revised, the Achenbach Teacher Report Form, the Revised Class Play Questionnaire, the School Performance Questionnaire, and the Child Health and Development History Questionnaire. These variables were factor analyzed in order to reduce the total number of school variables and increase their reliability. Principal components analysis was conducted using SPSS in which the 36 variables were subjected to a maximum likelihood extraction with varimax rotation. Based on the results of a scree plot as well as the number of factors with eigenvalues greater than 1.00, a six-factor solution was specified. This six-factor solution accounted for 48.7 percent of the variance. An oblique rotation was also attempted with the six-factor solution, but did not appreciably increase the percentage of variance.

All six factors and the items that comprise them are shown in Table 5. The first factor, **School Behavior Problems**, accounted for 24.2 percent of the variance. Variables that loaded on this factor were related to both internalizing and externalizing school behaviors, as well as emotional development. The second factor, **Intellectual Development**, accounted for 8.7 percent of the variance. Variables that loaded on this factor were related to intellectual and language development, working and learning well in school, and positive expectancies for future school performance.

The third factor, **Social Development**, accounted for 6.0 percent of the variance. Variables that loaded on this factor were related to positive social

relationships, including leadership abilities, likeability, physical attractiveness, physical development, and inclusion in peer groups. The fourth factor, **School Achievement**, accounted for 4.0 percent of the variance. These variables included all three achievement scales from the Wide Range Achievement Test-Revised, as well as requirement of speech and tutoring help in school.

The fifth factor, **Aggression**, accounted for 3.4 percent of the variance. The variables that loaded on this factor were teacher ratings of aggression, activity level, teasing or bullying others, and behaving poorly in school. The sixth factor, **School Maladjustment**, accounted for 2.5 percent of the variance. This factor included variables such as number of discipline referrals, number of tardies, number of excused and unexcused absences, and requirement of additional help in school.

Internal consistencies for these six factors were variable, with coefficient alphas ranging from 0.20 to 0.83. Factor scores were calculated for each child in the study on each of these six factors; the six factor scores were then compared for the three groups, and were also used as the school outcome variables in all models.

Table 5
Factor Loadings for Six-Factor Solution (Varimax Rotation) (n=236)

Factor	Factor 1	2	3	4	5	6
I: School Behavior Problems						
Externalizing Behavior Problems Scale (TRF)	**.76**	-.24	-.23	-.09	.41	.07
Unpopular Narrow Band Scale (TRF)	**.74**	-.04	-.35	-.12	.17	.01
Internalizing Behavior Problems Scale (TRF)	**.74**	.04	-.10	-.07	-.38	-.06
Obsessive-Compulsive Narrow Band Scale (TRF)	**.72**	-.10	-.14	-.00	.05	.13
Self Destructive Narrow Band Scale (TRF)	**.70**	-.06	-.16	-.01	.03	.35
How Happy Student Is (Single item from TRF)	**-.56**	.39	.25	.02	.03	-.15
Emotional Development (Single item from SPQ)	**-.49**	.37	.49	.08	.05	-.07
II: Intellectual Development						
How Much Learning (Single item from TRF)	-.36	**.79**	.18	.18	-.03	-.01
Intellectual Development (Single item from SPQ)	-.00	**.72**	.26	.40	.05	.02
Language Development (Single item from SPQ)	.04	**.67**	.31	.28	.14	-.02
How Hard Working (Single item from TRF)	-.51	**.60**	.14	.05	-.15	-.08
Estimated Future School Performance (Single item from SPQ)	-.14	**.48**	.25	.32	.12	-.09
Parent Interest in Child's School Performance (SPQ)	-.04	**.36**	.31	.17	-.03	-.24
Reading Help in School (Yes/No item from CHDHQ)	.02	**-.35**	-.11	-.28	.05	-.02

Table 5 (continued)
Factor Loadings for Six-Factor Solution (Varimax Rotation) (n=236)

Factor	Factor 1	2	3	4	5	6
III: Social Development						
Social Development (Single item from SPQ)	-.38	.31	**.66**	.05	.03	-.08
Child's Physical Attractiveness (Single item from SPQ)	-.05	.22	**.58**	-.03	.00	-.27
Sociability-Leadership Scale (RCPQ)	-.11	.37	**.57**	.12	.01	-.04
Child's Likeability (Single item from SPQ)	-.29	.21	**.56**	-.00	-.16	-.17
Isolated-Internalizing Scale (RCPQ)	.36	.01	**-.52**	-.07	-.21	-.17
Physical Development (Single item from SPQ)	-.14	.29	**.51**	-.06	.19	-.14
Counseling in School (Yes/No item from CHDHQ)	.09	-.07	**-.18**	-.16	.13	.07
Medication for Hyperactivity (Yes/No item from CHDHQ)	.04	-.02	**-.17**	-.08	.13	.05
IV: School Achievement						
Spelling Achievement (WRAT-R)	.02	.14	-.03	**.88**	.03	-.07
Reading Achievement (WRAT-R)	.09	.22	.08	**.84**	-.01	-.05
Arithmetic Achievement (WRAT-R)	-.13	.22	.06	**.56**	-.00	-.19
Speech Therapy in School (Yes/No item from CHDHQ)	.15	-.05	.02	**-.22**	.02	-.07
Tutoring Help in School (Yes/No item from CHDHQ)	-.12	-.17	-.13	**-.21**	.11	-.04

Table 5 (continued)
Factor Loadings for Six-Factor Solution (Varimax Rotation) (n=236)

Factor	Factor 1	2	3	4	5	6
V: Aggression						
Aggression (Single item from SPQ)	.04	.05	.12	-.00	**.73**	.07
Activity Level (Single item from SPQ)	-.09	.15	.17	-.04	**.65**	-.19
Teasing-Bullying Scale (RCPQ)	.28	-.12	-.30	-.09	**.60**	-.13
How Well Student is Behaving (Single item from TRF)	-.49	.40	.28	-.04	**-.50**	-.11
VI: School Maladjustment						
Number of Discipline Referrals (Single item from SPQ)	.33	.08	-.08	.04	.21	**.68**
Number of Tardies (Single item from SPQ)	.06	-.01	-.11	.02	.00	**.52**
Help in School (Yes/No item from CHDHQ)	.02	-.05	-.06	-.05	-.11	**.32**
Number of Unexcused Absences (Single item from SPQ)	-.19	-.03	-.07	-.06	-.02	**.22**
Number of Excused Absences (Single item from SPQ)	.10	-.03	.09	-.09	-.17	**.19**
Coefficient Alpha:	**.55**	**.83**	**.56**	**.69**	**.40**	**.20**

WRAT-R = Wide Range Achievement Test-Revised
TRF = Achenbach Teacher Report Form
RCPQ = Revised Class Play Questionnaire
SPQ = School Performance Questionnaire
CHDHQ = Child Health and Development History Questionnaire

Familial/Contextual Variables and Early Childhood Child Variables

Two MANOVAs were conducted; one MANOVA compared the three risk groups (AALs, NAALs, and controls) on all family background and demographic characteristics, and the other MANOVA compared the three risk groups on Wave 1 child variables. Results of these MANOVAs are shown in Tables 6 and 7, while Table 8 provides a summary of all significant group differences.

Family/Contextual Variables

There were overall group differences on several of the family/contextual variables [Multivariate $F(918,450)=16.83$, $p \leq .05$]. Table 6 summarizes group differences with respect to family and contextual variables.

Fathers. There were group differences in all areas examined: alcohol problems, antisocial behavior, levels of intelligence, levels of depression, and socioeconomic status. AAL fathers had significantly higher levels of alcohol problems and antisocial behavior than NAAL fathers and control fathers, and NAAL fathers had significantly higher levels of alcohol problems and antisocial behavior than control fathers. AAL fathers had significantly lower intelligence scores than NAAL fathers and control fathers, and NAAL fathers had significantly lower intelligence scores than control fathers. Both AAL fathers and NAAL fathers had significantly higher levels of depression than control fathers, and AAL families had significantly lower levels of socioeconomic status than control families or NAAL families.

Mothers. There were group differences in alcohol problems, antisocial behavior, and levels of intelligence. Mothers in NAAL and AAL families had significantly higher levels of alcohol problems than mothers in control families. Mothers in AAL families had significantly higher levels of antisocial behavior than mothers in NAAL families and control families, and mothers in NAAL families had significantly higher levels of antisocial behavior than mothers in control families. Mothers in AAL families had significantly lower intelligence scores than mothers in NAAL families and control families, and mothers in NAAL families had significantly lower intelligence scores than mothers in control families. However, there were no group differences in levels of maternal depression.

Early Childhood Variables

Table 7 summarizes differences among the three groups with respect to child intelligence and parental ratings of child externalizing behavior problems and difficult temperament. MANOVA revealed significant group differences [Multivariate $F(10,458)=3.05$, $p \leq .05$]. Sons of AALs had lower IQ scores than both sons of NAALs and sons of controls. In addition, when fathers' ratings were compared, sons of AALs had significantly higher levels of behavior problems than both sons of NAALs and sons of controls, and sons of NAALs had significantly higher levels of behavior problems than sons of controls. However, there were no differences in behavior problems when mothers' ratings were compared.

These findings differ slightly from previous findings from the MSU-UM Study. Other studies have reported group differences in children's behavior

problems as well as difficult temperament. However, in the present study, the three groups were divided differently than in previous studies. In some previous studies, the groups were divided based solely on the presence or absence of paternal alcoholism; in other previous studies, the groups were divided based on paternal alcoholism as well as a cutoff score for fathers on the Antisocial Behavior Checklist. In the present study, the groups were divided based on paternal alcoholism and a diagnosis of antisocial personality disorder for fathers.

In addition, temperament has been conceptualized and calculated differently in previous studies. For example, Loukas (1997) reported group differences in risky temperament (high activity, high reactivity, and high sociability) as opposed to difficult temperament (high activity, high reactivity, low sociability, low attention span, low rhythmicity). In addition, Ellis et al. (under review) reported group differences in risky temperament (high activity, high reactivity, and high sociability) with scores on the three scales standardized (i.e., converted to z-scores) and summed. In the present study, there were no differences in mothers' nor fathers' ratings of children's early childhood difficult temperament.

Table 6
Differences Between AALs, NAALs, and Controls in Family/Contextual Variables Including Means and Standard Deviations

Variable	Antisocial Alcoholic (n=33) M (SD)	Nonantisocial-Alcoholic (n=112) M (SD)	Controls (n=91) M (SD)	F
Family/Contextual Variables:	[Multivariate F(18,450)=16.83, p≤.05]			
Fathers:				
Lifetime Alcohol Problems Score	11.36 (1.87)	10.36 (1.77)	7.43 (1.59)	98.80*
Antisocial Symptomatology	31.61 (13.01)	16.97 (8.13)	10.77 (6.60)	73.62*
Intelligence (WAIS-R)	93.01 (13.86)	102.67 (12.54)	108.65 (14.98)	16.27*
Depression (Hamilton Rating Scale)	20.03 (8.32)	18.17 (7.77)	13.48 (5.40)	15.67*
Mothers:				
Lifetime Alcohol Problems Score	10.47 (2.22)	10.54 (2.22)	9.07 (1.34)	15.84*
Antisocial Symptomatology	15.76 (7.42)	11.08 (7.66)	8.03 (5.10)	16.49*
Intelligence (WAIS-R)	88.69 (12.21)	95.15 (14.64)	102.16 (14.21)	12.67*
Depression (Hamilton Rating Scale)	20.15 (7.49)	19.96 (9.31)	17.60 (8.25)	2.14
Family Socioeconomic Status	260.86 (72.50)	335.88 (125.01)	367.49 (132.50)	9.23*

* p≤.05

Table 7
Differences Between AALs, NAALs, and Controls in Early Childhood Variables Including Means and Standard Deviations

Variable	Antisocial Alcoholic (n=33) M (SD)	Nonantisocial-Alcoholic (n=112) M (SD)	Controls (n=91) M (SD)	F
Early Childhood Variables:	[Multivariate F(10,458)=3.05, p≤.05]			
Stanford-Binet Intelligence Score	99.07 (14.95)	104.75 (13.48)	107.95 (13.33)	5.24*
Externalizing Behaviors (Father)	15.12 (8.61)	12.19 (5.93)	9.69 (5.72)	9.86*
Difficult Temperament (Father)	16.59 (4.38)	16.97 (5.10)	15.76 (5.62)	1.37
Externalizing Behaviors (Mother)	13.93 (6.16)	12.65 (6.80)	11.14 (5.71)	2.81
Difficult Temperament (Mother)	15.72 (4.31)	15.38 (5.47)	15.03 (5.33)	0.24

* p≤.05

Table 8
Summary of Significant Group Differences in Family/Contextual Variables and Early Childhood Variables

Family/Contextual Variables:		
Fathers:	**Lifetime Alcohol Problems Score**	**AALs > NAALs & Controls; NAALs > Controls**
	Antisocial Symptomatology	**AALs > NAALs & Controls; NAALs > Controls**
	Intelligence (WAIS-R)	**AALs < NAALs & Controls; NAALs < Controls**
	Depression (Hamilton Rating Scale)	**AALs & NAALs > Controls**
Mothers:	**Lifetime Alcohol Problems Score**	**AALs & NAALs > Controls**
	Antisocial Symptomatology	**AALs > NAALs & Controls; NAALs > Controls**
	Intelligence (WAIS-R)	**AALs < NAALs & Controls; NAALs < Controls**
	Depression (Hamilton Rating Scale)	**No differences**
	Family Socioeconomic Status	**AALs < NAALs & Controls**
Early Childhood Child Variables:		
	Stanford-Binet Intelligence Score	**AALs < NAALs & Controls**
	Externalizing Behaviors (Father)	**AALs > NAALs & Controls; NAALs > Controls**
	Difficult Temperament (Father)	**No differences**
	Externalizing Behaviors (Mother)	**No differences**
	Difficult Temperament (Mother)	**No differences**

Academic Functioning

A one-way MANOVA was conducted to compare the sons of AALs, NAALs, and controls on the six academic factors derived from the factor analysis. Results of the MANOVA are shown in Table 9; significant group differences are summarized in Table 10. Overall, considering all six areas of academic functioning, there were significant differences between the three groups [Multivariate $F(12,456)=4.93$, $p \leq .05$]. Univariate tests revealed that four of the six school outcome factors significantly discriminated the three groups.

School Behavior Problems

Hypothesis 1 was supported; sons of AALs had more teacher-reported school behavior problems than sons of NAALs or controls.

Intellectual Development

Hypothesis 2 was also supported; sons of AALs were rated by teachers as having lower levels of intellectual development than were sons of NAALs or controls. However, post-hoc tests indicated that sons of NAALs were also rated as having lower levels of intellectual development than were controls.

Social Development

Hypothesis 3 was also supported; sons of AALs were rated by teachers as having lower levels of social development than were sons of NAALs or controls.

School Achievement

Hypothesis 4 was also supported; sons of AALs had lower scores on

measures of school achievement than did sons of controls. However, post-hoc tests indicated that sons of NAALs also had lower scores on measures of school achievement than controls.

Aggression

Hypothesis 5 was not supported; sons of AALs were not rated by teachers as behaving more aggressively in the school setting than were sons of NAALs or controls.

School Maladjustment

Hypothesis 6 was also not supported; sons of AALs did not have higher rates of absences, tardies, and discipline referrals than sons of NAALs or controls.

Table 9
Differences Between AALs, NAALs, and Controls in Academic Functioning Factor Scores

Factor	Antisocial-Alcoholic (n=33) M (SD)	Nonantisocial-Alcoholic (n=112) M (SD)	Controls (n=91) M (SD)	F
		[Multivariate F(12,456)=4.93, p≤.05]		
School Behavior Problems	0.75 (1.28)	-0.13 (0.68)	-0.11 (0.98)	13.48*
Intellectual Development	-0.71 (0.92)	-0.03 (0.93)	0.30 (0.85)	15.35*
Social Development	-0.37 (0.68)	0.04 (0.92)	0.08 (0.96)	3.31*
School Achievement	-0.28 (1.02)	-0.11 (0.94)	0.24 (0.96)	5.03*
Aggression	0.02 (0.82)	0.00 (0.84)	-0.01 (0.94)	0.02
School Maladjustment	0.06 (0.94)	-0.00 (0.80)	-0.02 (1.11)	0.08

* p≤.05

Table 10
Summary of Significant Group Differences in Academic Functioning Factor Scores

Factor:	
School Behavior Problems:	AALs > NAALs & Controls
Intellectual Development:	AALs < NAALs & Controls; NAALs < Controls
Social Development:	AALs < NAALs & Controls
School Achievement:	AALs & NAALs < Controls
Aggression:	No differences
School Maladjustment:	No differences

Clinical Range of School Behavior Problems

Cross-tabulations were calculated to compare the number of children from each group that were rated by teachers as having behavior problem scores in the clinical range. A total behavior problem score exceeding 60 (T-score of 64) is considered to fall in the clinical range (Achenbach, 1991). Table 11 shows the frequencies and percentages of boys in each group rated in the clinical range.

Sons of AALs were significantly more likely than sons of NAALs (X^2 (1 df, $\underline{n}$=145)=6.54, $p \leq .05$), and were also significantly more likely than sons of controls (X^2 (1 df, $\underline{n}$=124)=5.51, $p \leq .05$) to be rated in the clinical range of behavior problems. Odds ratios revealed that sons of AALs were 4.04 times more likely than sons of NAALs to be rated in the clinical range, and 3.81 times more likely than sons of controls to be rated in the clinical range. Overall, 21.2% of sons of AALs were rated in the clinical range compared to 6.3% of sons of NAALs and 6.5% of sons of controls. Histograms showing the total number of teacher-reported school behavior problems for boys in each of the three groups are shown in Appendix D.

Table 11
Frequency and Percentage of Boys in Each Group Scoring in the Clinical Range of School Behavior Problems On the Achenbach Teacher Report Form

	Group		
	Antisocial Alcoholic (n=33)	Nonantisocial-Alcoholic (n=112)	Controls (n=91)
Clinical Range:			
No	26 (78.8%)	105 (93.8%)	85 (93.4%)
Yes	7 (21.2%) [a,b]	7 (6.2%) [a]	6 (6.6%) [b]

[a,b] Percentages labeled with the same superscript differ from one another at the $p \leq .05$ level of significance

Predictors of Academic Functioning

Predictors of academic functioning were tested using manifest variable multivariate multiple regression. The models that were tested include (a) a model of antecedent family and contextual variables predicting school outcomes, (b) a model of early childhood child variables predicting school outcomes, (c) a model in which effects of antecedent family and contextual variables predict early childhood variables, which in turn predict school outcomes, and (d) an alternative model in which maternal and paternal intelligence and antisocial symptomatology precede other parental variables.

The adequacy of fit for all models was determined by considering the following indices: the chi-square statistic, the Goodness of Fit index (GFI), the Comparative Fit Index (CFI), the Standardized Root Mean Square Residual (SRMR), and the Root Mean Square Error of Approximation (RMSEA). In general, a well-fitting model would be expected to have a nonsignificant chi-square value, a GFI and CFI of 0.90 or larger, an SRMR of 0.099 or smaller, and an RMSEA of 0.05 or smaller. Models were analyzed separately for control families and for alcoholic families; it was necessary to group AAL families with NAAL families for these analyses because there was an insufficient sample size in the AAL group ($\underline{n}$=33) to adequately test the more complex models. In all models, significant paths are shown in solid lines. All family/contextual and child predictor variables were measured at Wave 1 and the outcome variables are the six factors of academic functioning at Wave 2. Correlations between all variables in the models are shown in Table 12.

Table 12
Correlations Between All Variables in Models (n=236)

Variables	1	2	3	4	5	6	7	8	9	10
1. Maternal Antisocial Symptomatology	---									
2. Paternal Antisocial Symptomatology	.34*	---								
3. Maternal Intelligence	-.32*	-.36*	---							
4. Paternal Intelligence	-.27*	-.24*	.41*	---						
5. Maternal Lifetime Alcohol Problems	.52*	.19*	-.09	-.15*	---					
6. Paternal Lifetime Alcohol Problems	.33*	.57*	-.27*	-.15*	.30*	---				
7. Maternal Depression	.33*	.11	-.11	.04	.22*	.16*	---			
8. Paternal Depression	.19*	.37*	-.26*	-.07	.19*	.42*	.36*	---		
9. Socioeconomic Status	-.35*	-.33*	.50*	.45*	-.13*	-.18*	-.21*	-.16*	---	
10. Cognitive Functioning (Stanford-Binet)	-.15*	-.22*	.28*	.31*	-.04	-.10	-.12	-.14*	.28*	---
11. Externalizing Behavior Problems (Father)	.18*	.31*	-.14*	-.18*	.25*	.28*	.05	.15*	-.15*	-.14*
12. Externalizing Behavior Problems (Mother)	.45*	.21*	-.13*	-.12	.26*	.13*	.23*	.14*	-.13	-.16*
13. Difficult Temperament (Father)	.11	.06	-.09	-.19*	.05	.12	-.02	.06	-.12	-.14*
14. Difficult Temperament (Mother)	.21*	.06	-.21*	-.17*	.11	.03	.10	-.02	-.22*	-.24*
15. School Behavior Problems	.15*	.31*	-.12	-.15*	.04	.12	.17*	.10	-.24*	-.24*
16. Intellectual Development	-.19*	-.33*	.35*	.29*	-.12*	-.21*	-.13*	-.17*	.29*	.47*
17. Social Development	-.11	-.24*	.14*	.08	-.02	-.09	-.16*	-.13*	.26*	.33*
18. School Achievement	-.13*	-.07	.21*	.22*	-.08	-.08	-.13*	-.10	.20*	.38*
19. Aggression	.06	-.01	.02	-.02	.08	-.02	-.05	.10	.02	-.02
20. School Maladjustment	-.00	.13*	.05	-.05	.01	.07	.06	.06	-.05	-.05

Table 12 (continued)
Correlations Between All Variables in Models (n=236)

Variables	11	12	13	14	15	16	17	18	19	20
1. Maternal Antisocial Symptomatology										
2. Paternal Antisocial Symptomatology										
3. Maternal Intelligence										
4. Paternal Intelligence										
5. Maternal Lifetime Alcohol Problems										
6. Paternal Lifetime Alcohol Problems										
7. Maternal Depression										
8. Paternal Depression										
9. Socioeconomic Status										
10. Cognitive Functioning (Stanford-Binet)										
11. Externalizing Behavior Problems (Father)	---									
12. Externalizing Behavior Problems (Mother)	.30*	---								
13. Difficult Temperament (Father)	.40*	.18*	---							
14. Difficult Temperament (Mother)	.03	.27*	.34*	---						
15. School Behavior Problems	.14*	.23*	-.02	.08	---					
16. Intellectual Development	-.12	-.15*	-.08	-.18*	-.38*	---				
17. Social Development	-.10	-.17*	-.08	-.17*	-.60*	.56*	---			
18. School Achievement	-.07	-.08	-.06	-.07	-.08	.43*	.10	---		
19. Aggression	.03	.06	-.04	-.06	.23*	.00	-.02	-.00	---	
20. School Maladjustment	.19*	.03	.03	.02	.50*	-.07	-.26*	-.03	.22*	---

* $p \leq .05$, did not adjust for experimentwise alpha

Antecedent Family and Contextual Variables

Effects of antecedent family and contextual variables on children's academic achievement at Wave 2 were examined. Figure 4 shows relationships between these variables for alcoholic families, and Figure 5 shows relationships between these variables for control families.

Alcoholic families. As shown in Figure 4, in the model for alcoholic families, higher levels of paternal antisocial symptomatology predicted three school outcomes: higher levels of school behavior problems, lower intellectual development, and lower social development. Higher levels of maternal intelligence predicted two school outcomes: higher intellectual development and higher school achievement, while higher levels of paternal intelligence predicted lower levels of school behavior problems. Higher levels of socioeconomic status also predicted higher social development in children. This model had a nonsignificant chi-square value [$X^2(47,\underline{n}=91)=40.12$, $p=0.75$], a GFI of 0.97, a CFI of 1.00, an SRMR of 0.046, and an RMSEA of less than 0.001, indicating the model fit the data well.

Control families. As shown in Figure 5, in the model for control families, there were only two significant paths. Higher levels of paternal alcohol problems predicted lower intellectual development in children, while higher maternal intelligence predicted higher intellectual development. This model had a nonsignificant chi-square value [$X^2(52,\underline{n}=91)=41.71$, $p=0.85$], a GFI of 0.95, a CFI of 1.00, an SRMR of 0.076, and an RMSEA of less than 0.001, again indicating a good fit to the data.

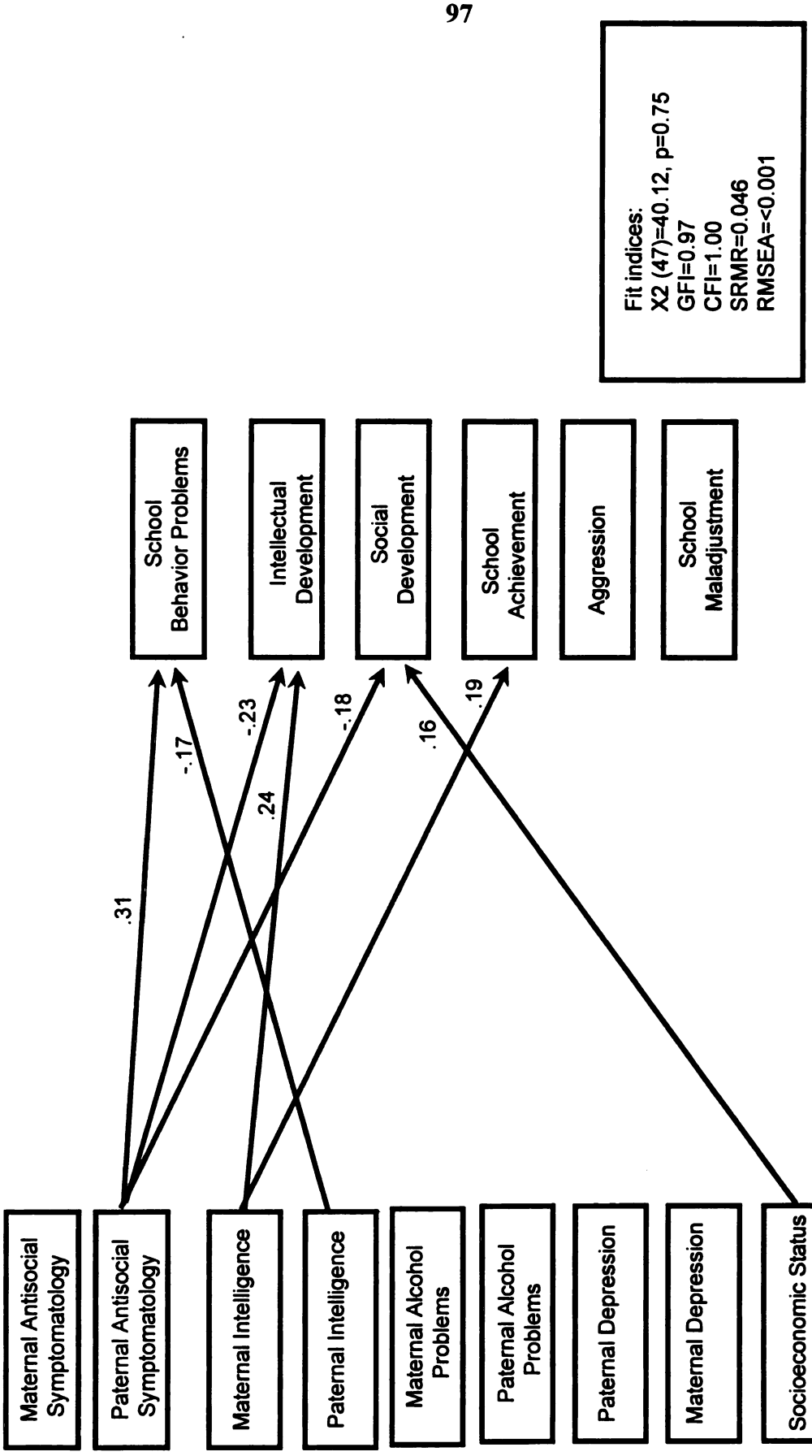

Figure 4. Relationships between all family/contextual variables and school variables for alcoholic families

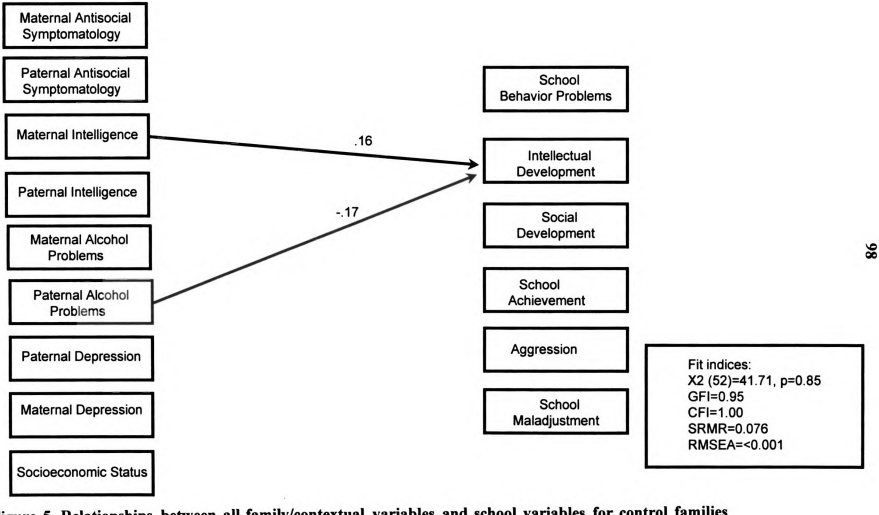

Figure 5. Relationships between all family/contextual variables and school variables for control families

Early Childhood Child Variables

Because previous work has shown that fathers' and mothers' ratings of their children's behavior problems and temperament styles may differ (Bingham, Fitzgerald, & Zucker, under review; Fitzgerald, Zucker, Maguin, & Reider, 1994; Loukas, Piejak, Mun, Bingham, Fitzgerald, & Zucker, 1997), all subsequent models were analyzed separately using fathers' ratings of children's externalizing behavior problems and difficult temperament, and then using mothers' ratings of children's externalizing behavior problems and difficult temperament. Effects of Wave 1 child variables on children's academic functioning at Wave 2 were examined for alcoholic families (See Figures 6 and 7) and for control families (See Figures 8 and 9).

Alcoholic families. As shown in Figure 6, when **fathers' ratings** of externalizing behavior problems and difficult temperament were included, higher early childhood cognitive functioning predicted four school outcomes: fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. Children's difficult temperament in early childhood also predicted lower levels of social development at school age. This model had a nonsignificant chi-square value [$X^2(13,\underline{n}=145)=13.06$, $p=0.44$], a GFI of 0.98, a CFI of 1.00, an SRMR of 0.040, and an RMSEA of 0.0058, indicating that the model fit the data well.

As shown in Figure 7, when **mothers' ratings** of externalizing behavior problems and difficult temperament were included, higher early childhood cognitive functioning predicted the same four school outcomes as in the fathers' model (fewer

school behavior problems, higher intellectual development, higher social development, and higher school achievement). In addition, higher levels of externalizing behavior problems in early childhood predicted higher levels of school behavior problems. This model also had a nonsignificant chi-square value [$X^2(13,\underline{n}=145)=8.78$, $p=0.79$], a GFI of 0.99, a CFI of 1.00, an SRMR of 0.037, and an RMSEA of less than 0.001, again indicating a good fit to the data.

Control families. The models for control families were similar to those of alcoholic families, except that the only variable that was related to children's school outcomes was cognitive functioning. This result is consistent with the extensive literature linking cognitive functioning to academic functioning (Hinshaw, 1992; Sattler, 1992). As shown in Figure 8, when **fathers' ratings** of externalizing behavior problems and difficult temperament were included, higher early childhood cognitive functioning predicted the same four school outcomes: fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. This model had a nonsignificant chi-square value [$X^2(14,\underline{n}=91)=6.33$, $p=0.96$], a GFI of 0.98, a CFI of 1.00, an SRMR of 0.040, and an RMSEA of 0.0, indicating that the model fit the data well.

As shown in Figure 9, when **mothers' ratings** of externalizing behavior problems and difficult temperament were included, again, higher early childhood cognitive functioning predicted the same four school outcomes as in the fathers' model: fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. This model also had a

nonsignificant chi-square value [$X^2(14,\underline{n}=91)=9.32$, $p=0.81$], a GFI of 0.98, a CFI of 1.00, an SRMR of 0.055, and an RMSEA of less than 0.001, again indicating a good fit to the data.

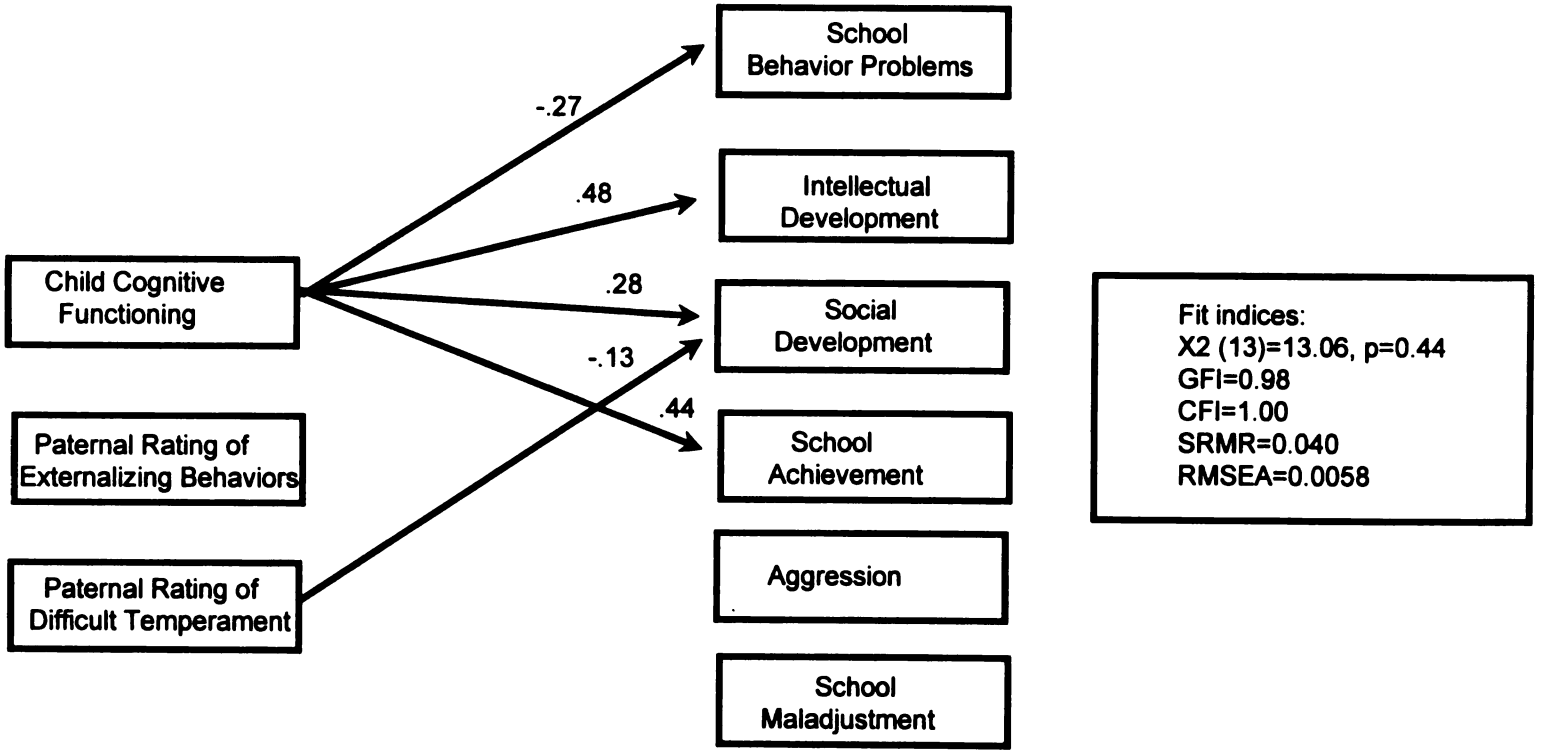

Figure 6. Relationships between early childhood variables and school variables for alcoholic families with fathers' ratings of externalizing behavior problems and difficult temperament

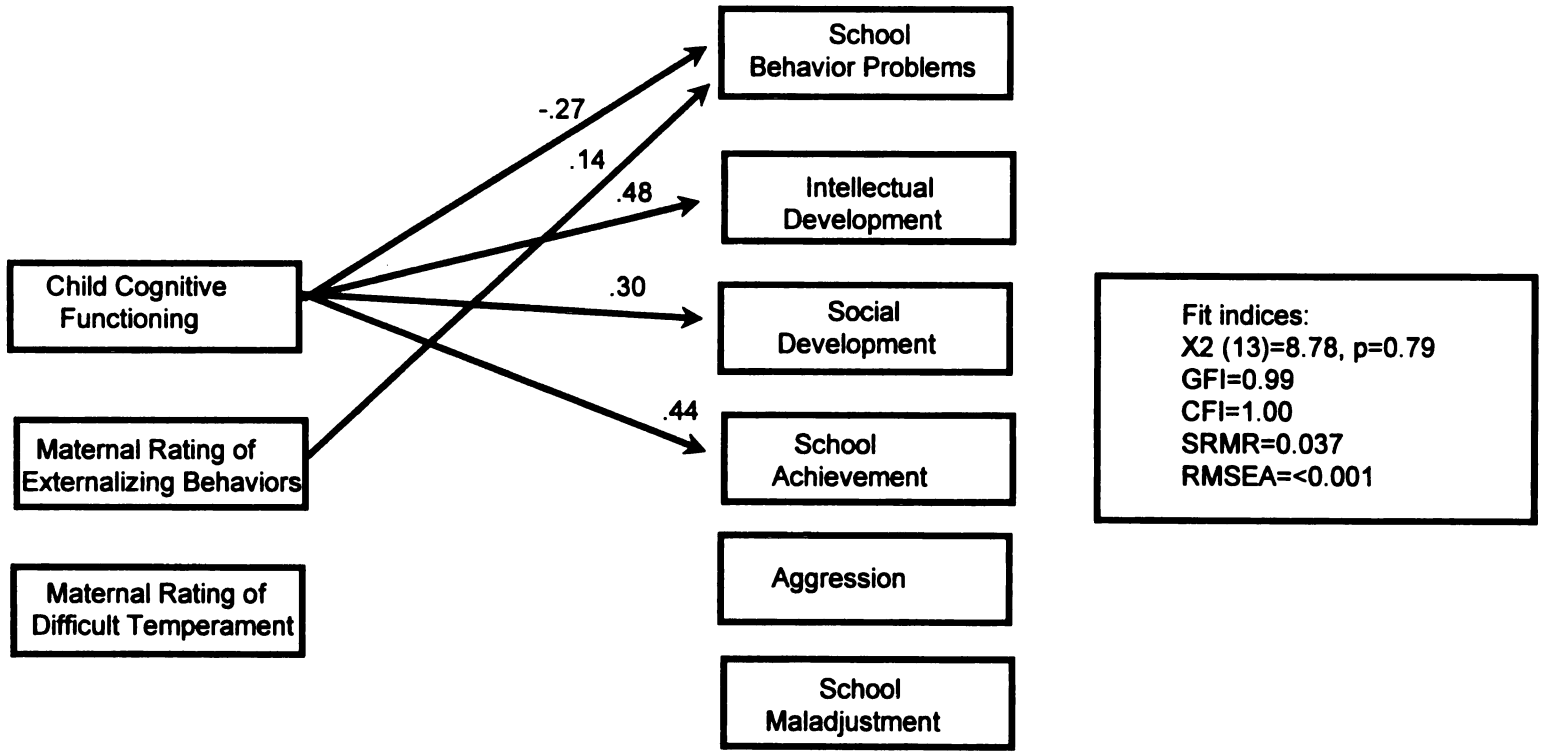

Figure 7. Relationships between early childhood variables and school variables for alcoholic families with mothers' ratings of externalizing behavior problems and difficult temperament

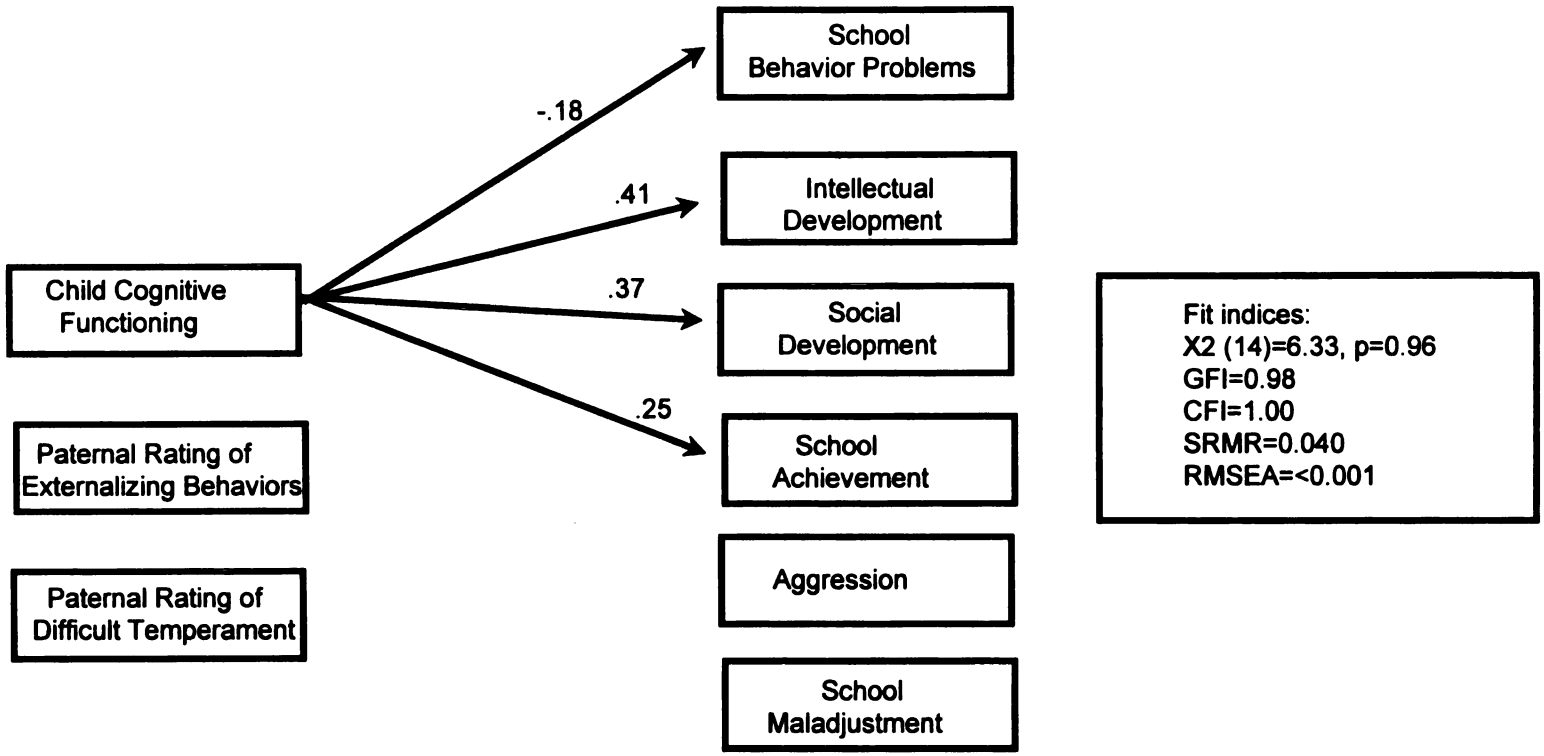

Figure 8. Relationships between early childhood variables and school variables for control families with fathers' ratings of externalizing behavior problems and difficult temperament

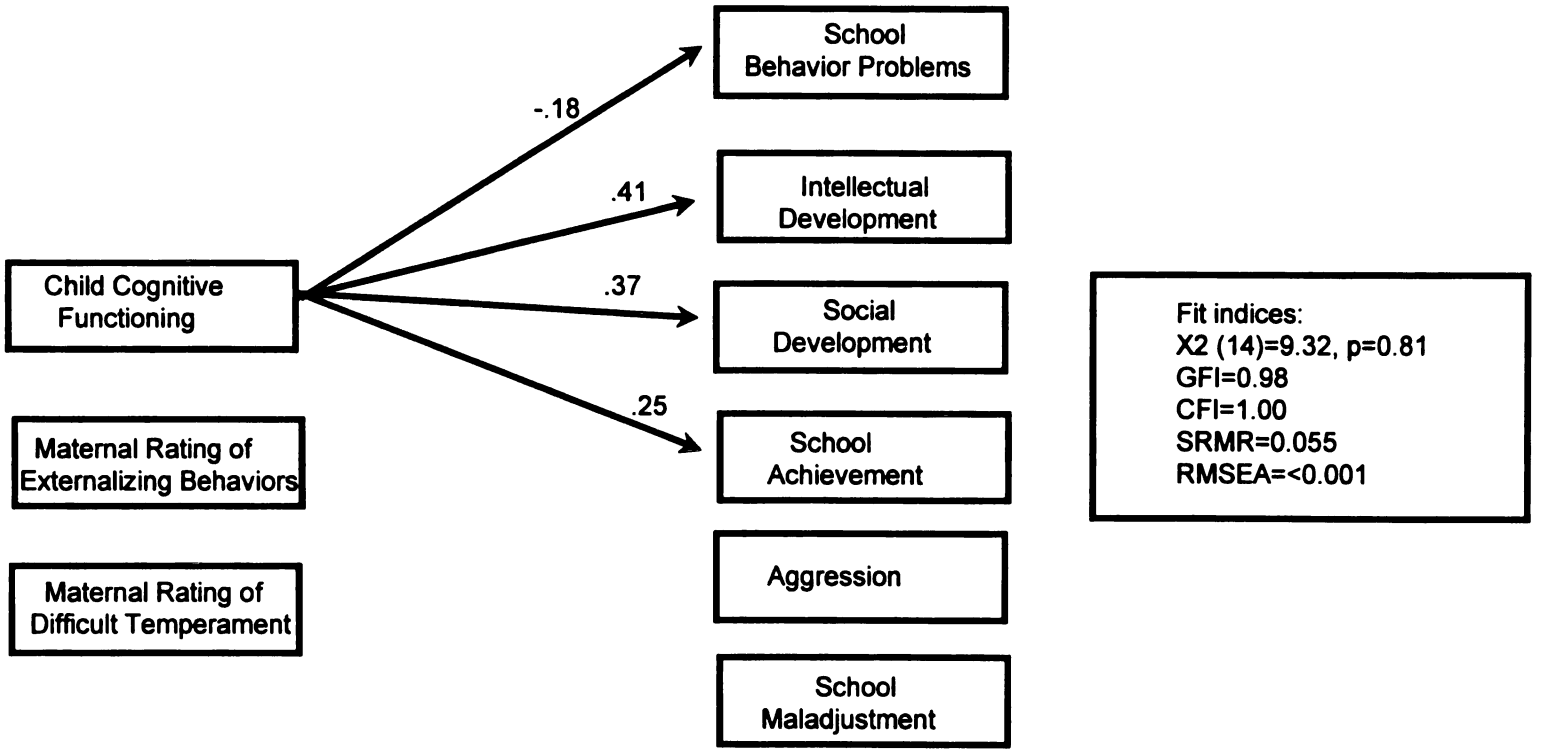

Figure 9. Relationships between early childhood variables and school variables for control families with mothers' ratings of externalizing behavior problems and difficult temperament

Early Childhood Child Variables Mediating Family/Contextual Variables

Figures 10 and 11 show the relationships between family/contextual variables and early childhood child variables in predicting children's academic achievement for alcoholic families, while Figures 12 and 13 show the relationships between these variables for control families.

Alcoholic families. As shown in Figure 10, when **fathers' ratings** of externalizing behavior problems and difficult temperament were included, higher levels of maternal alcohol problems predicted higher paternal ratings of externalizing behavior problems. Higher levels of paternal antisocial symptomatology also predicted higher levels of externalizing behavior problems, as well as higher levels of school behavior problems. Higher levels of maternal intelligence predicted higher child intelligence and also were directly related to higher levels of intellectual development. Higher levels of paternal intelligence also predicted higher child intelligence. Higher child intelligence, in turn, predicted the same four school outcomes as in earlier models: fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. This model had a nonsignificant chi-square value [$X^2(98,\underline{n}=145)=95.80$, $p=0.54$], a GFI of 0.94, a CFI of 1.00, an SRMR of 0.061, and an RMSEA of less than 0.001, indicating that the model fit the data well.

As shown in Figure 11, when **mothers' ratings** of externalizing behavior problems and difficult temperament were included, the model looks very similar to the model for fathers. However, whereas maternal antisocial symptomatology was

not predictive of any outcomes in the model for fathers, in this model it predicted maternal ratings of both externalizing behavior problems and difficult temperament in early childhood. All other significant paths were the same as those in the model for fathers: Higher levels of paternal antisocial symptomatology predicted higher levels of externalizing behavior problems, as well as more school behavior problems for children. Higher levels of maternal intelligence predicted higher child intelligence and higher levels of intellectual development in school. Higher levels of paternal intelligence also predicted higher child intelligence. Higher child intelligence, in turn, predicted the four school outcomes of fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. This model had a nonsignificant chi-square value [$X^2(98,\underline{n}=145)=98.27$, $p=0.47$], a GFI of 0.94, a CFI of 1.00, an SRMR of 0.063, and an RMSEA of 0.0045, again indicating that the model fit the data well.

Control families. The models for control families included fewer significant paths than the models for alcoholic families. As shown in Figure 12, when **fathers' ratings** of externalizing behavior problems and difficult temperament were included, higher levels of paternal intelligence predicted higher child intelligence, which in turn predicted the four school outcomes of fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. Higher levels of maternal intelligence predicted higher intellectual development in children, and higher levels of paternal depression predicted higher paternal ratings of early childhood externalizing behavior problems. This model had a nonsignificant

chi-square value [$X^2(104,\underline{n}=91)=97.97$, $p=0.65$], a GFI of 0.90, a CFI of 1.00, an SRMR of 0.096, and an RMSEA of less than 0.001, indicating that the model fit the data adequately.

As shown in Figure 13, when **mothers' ratings** of externalizing behavior problems and difficult temperament were included, as in the model for fathers, higher levels of maternal intelligence predicted higher intellectual development in children. However, higher levels of paternal alcohol problems predicted lower intellectual development in children. Higher levels of maternal antisocial symptomatology predicted higher maternal ratings of externalizing behavior problems in early childhood. As in all of the mediated models, child intelligence predicted the four school outcomes of fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. This model also had a nonsignificant chi-square value [$X^2(103,\underline{n}=91)=105.20$, $p=0.42$], a GFI of 0.90, a CFI of 0.99, an SRMR of 0.10, and an RMSEA of 0.016, again indicating an adequate fit to the data.

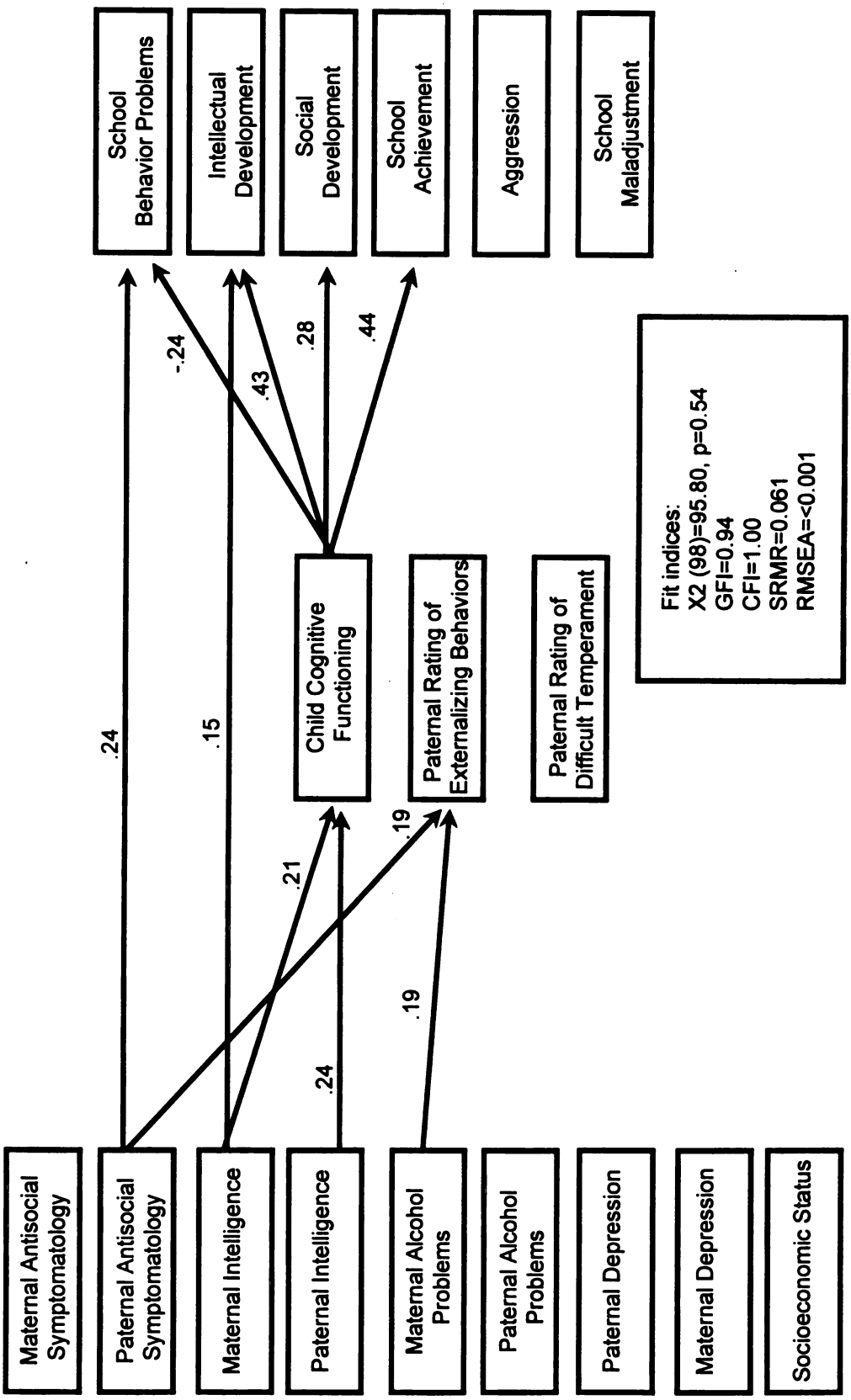

Figure 10. Relationships between family/contextual variables, early childhood variables, and school variables for alcoholic families with fathers' ratings of externalizing behavior problems and difficult temperament

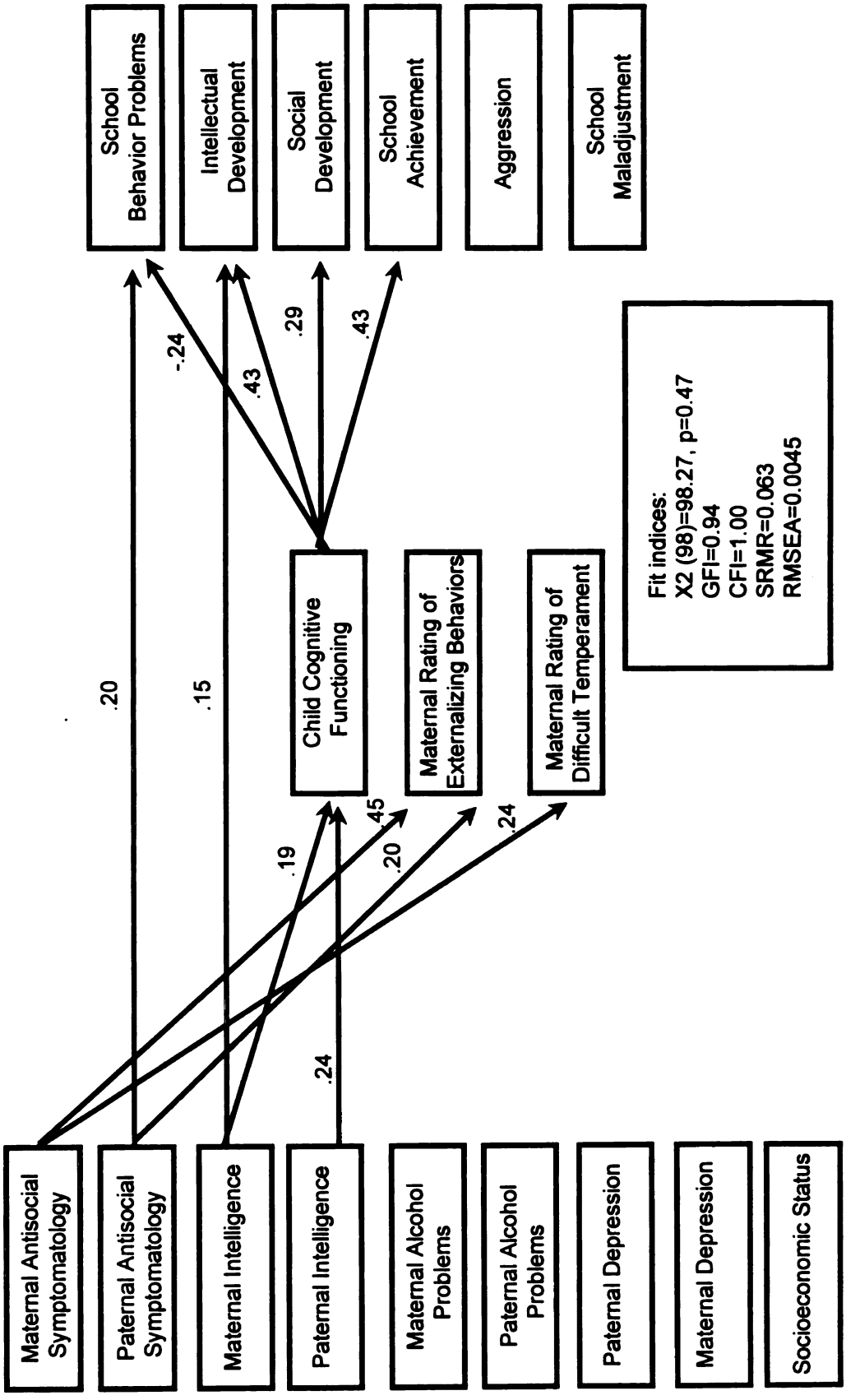

Figure 11. Relationships between family/contextual variables, early childhood variables, and school variables for alcoholic families with mothers' ratings of externalizing behavior problems and difficult temperament

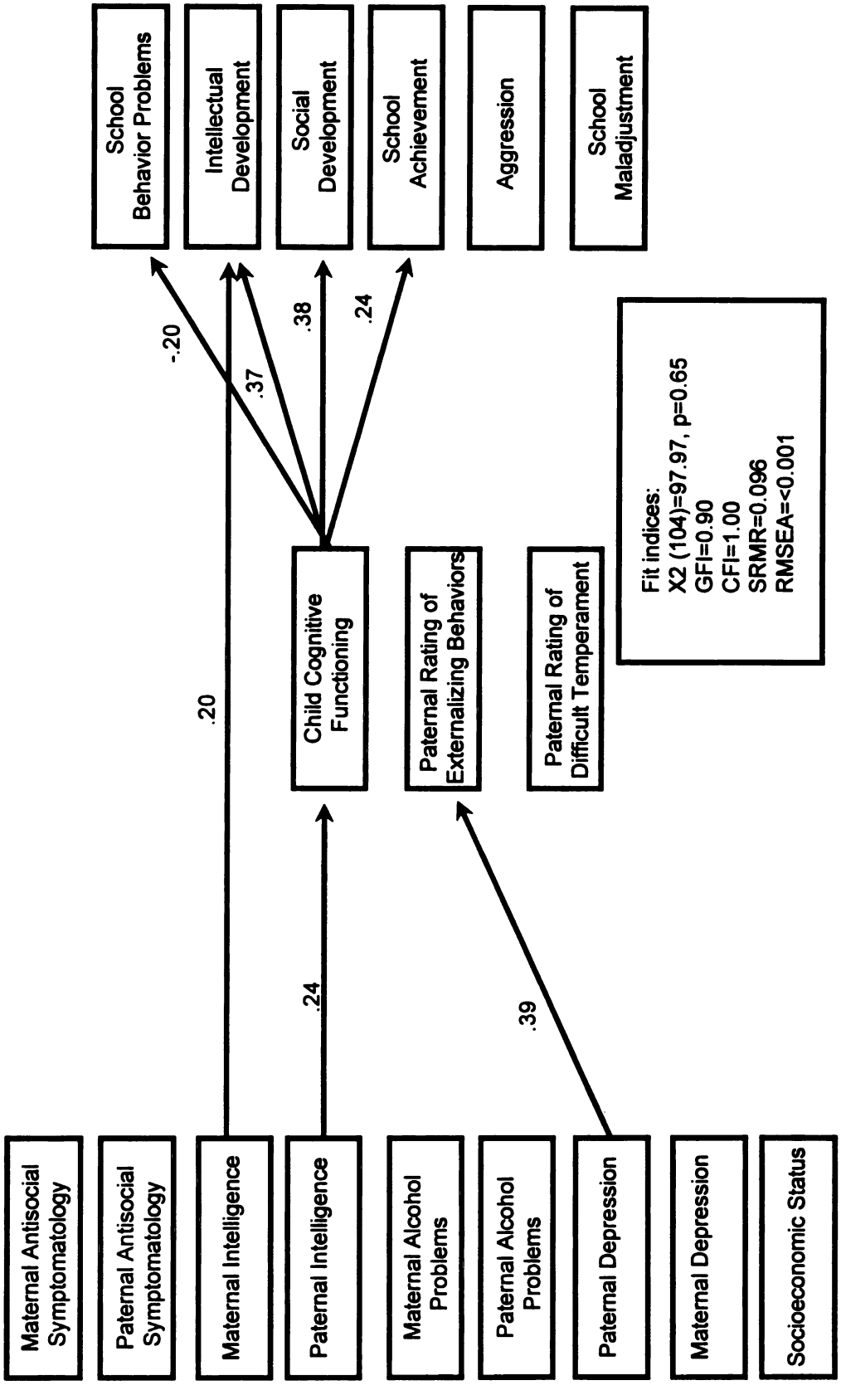

Figure 12. Relationships between family/contextual variables, early childhood variables, and school variables for control families with fathers' ratings of externalizing behavior problems and difficult temperament

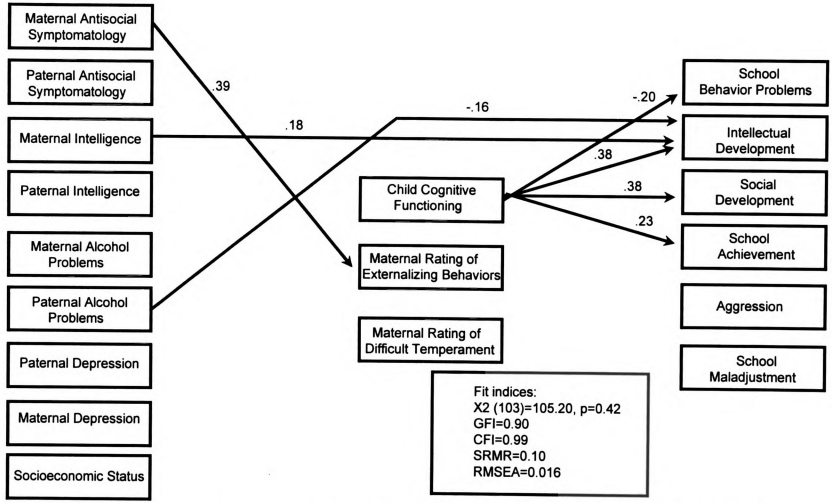

Figure 13. Relationships between family/contextual variables, early childhood variables, and school variables for control families with mothers' ratings of externalizing behavior problems and difficult temperament

An Alternative Mediated Model

An alternative mediated model was analyzed in which the variables of parental antisocial symptomatology and intelligence precede the other parental and contextual variables. This model was attempted because the variables of antisocial symptomatology and intelligence are expected to precede the other parental variables from a developmental perspective, and are expected to remain fairly stable over time. Figures 14 and 15 show this alternative model for alcoholic families, and Figures 16 and 17 shown this model for control families.

Alcoholic families. As shown in Figure 14, when **fathers' ratings** of externalizing behavior problems and difficult temperament were included, both maternal and paternal antisocial symptomatology predicted several other variables: Higher levels of maternal antisocial symptomatology predicted more maternal alcohol problems and higher levels of maternal depression, while higher levels of paternal antisocial symptomatology predicted more paternal alcohol problems, higher levels of paternal depression, higher paternal ratings of externalizing behavior problems, and the two school outcome variables of more school behavior problems and lower intellectual development. Higher levels of maternal alcohol problems also predicted higher paternal ratings of externalizing behavior problems in early childhood.

Higher levels of maternal intelligence and higher levels of paternal intelligence predicted higher family socioeconomic status, and higher socioeconomic status predicted higher child intelligence in early childhood. Higher child

intelligence, in turn, predicted the four school outcome variables of fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. Higher paternal ratings of difficult temperament in early childhood also predicted lower social development in school. This model fit the data well, as evidenced by the nonsignificant chi-square value [$X^2(120,\underline{n}=145)=139.88$, $p=0.10$], the GFI of 0.91, the CFI of 0.96, the SRMR of 0.072, and the RMSEA of 0.034.

As shown in Figure 15, when **mothers' ratings** of externalizing behavior problems and difficult temperament were included, the model was similar to that for fathers. As in the model for fathers, higher levels of maternal antisocial symptomatology predicted more maternal alcohol problems and higher levels of maternal depression; however, maternal antisocial symptomatology also predicted higher maternal ratings of both externalizing behavior problems and difficult temperament in early childhood. Higher levels of paternal antisocial symptomatology predicted more paternal alcohol problems, higher levels of paternal depression, and more behavior problems for children in school.

As in the model for fathers, higher levels of maternal and paternal intelligence predicted higher family socioeconomic status, which predicted higher child intelligence in early childhood. Higher child intelligence, in turn, predicted the four school outcome variables of fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. Higher levels of maternal intelligence also showed a direct relationship with children's

intellectual development in school. This model had a nonsignificant chi-square value [$X^2(121, n=145)=144.98$, $p=0.068$], a GFI of 0.91, a CFI of 0.96, an SRMR of 0.075, and an RMSEA of 0.038, indicating that the model fit the data well.

Control families. As shown in Figure 16, when **fathers' ratings** of externalizing behavior problems and difficult temperament were included, as in the models for alcoholic families, maternal and paternal antisocial symptomatology were related to the same outcomes: Higher levels of maternal antisocial symptomatology predicted more maternal alcohol problems and higher levels of maternal depression, and higher levels of paternal antisocial symptomatology predicted more paternal alcohol problems and higher levels of paternal depression. Higher levels of paternal depression predicted higher paternal ratings of children's externalizing behavior problems.

Higher levels of maternal and paternal intelligence predicted higher levels of family socioeconomic status, and higher socioeconomic status predicted higher child intelligence in early childhood. Higher child intelligence, in turn, predicted the four school outcome variables of fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. However, this model did not fit the data very well. Although the chi-square value was nonsignificant [$X^2(126, n=91)=128.29$, $p=0.43$], the GFI was 0.86, the CFI was 0.99, the SRMR was 0.10, and the RMSEA was 0.015.

As shown in Figure 17, when **mothers' ratings** of externalizing behavior problems and difficult temperament were included, as in the other models, higher

levels of maternal antisocial symptomatology predicted more maternal alcohol problems and higher levels of maternal depression, while higher levels of paternal antisocial symptomatology predicted more paternal alcohol problems and higher levels of paternal depression. Maternal antisocial symptomatology also predicted higher maternal ratings of externalizing behavior problems in early childhood.

Higher levels of maternal and paternal intelligence predicted higher family socioeconomic status. In addition, higher levels of maternal intelligence also predicted the school outcome of higher intellectual development in children, and higher levels of paternal intelligence also predicted lower maternal ratings of difficult temperament in early childhood.

Higher socioeconomic status predicted higher child intelligence in early childhood, and once again, higher child intelligence predicted the four school outcome variables of fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement. Although this model had a nonsignificant chi-square value [$X^2(127,\underline{n}=91)=147.62$, $p=0.10$], the GFI was only 0.85. The CFI was 0.93, the SRMR was 0.11, and the RMSEA was 0.043.

Therefore, considering all of the mediated models, Hypothesis 7 received only partial support. Children's early childhood cognitive functioning mediated the relationships between maternal and paternal intelligence and children's academic functioning. In the more complex mediated models, children's cognitive functioning mediated the relationship between socioeconomic status and children's academic

functioning. However, neither early childhood externalizing behavior problems nor difficult temperament mediated relationships between parental/contextual variables and school outcome variables.

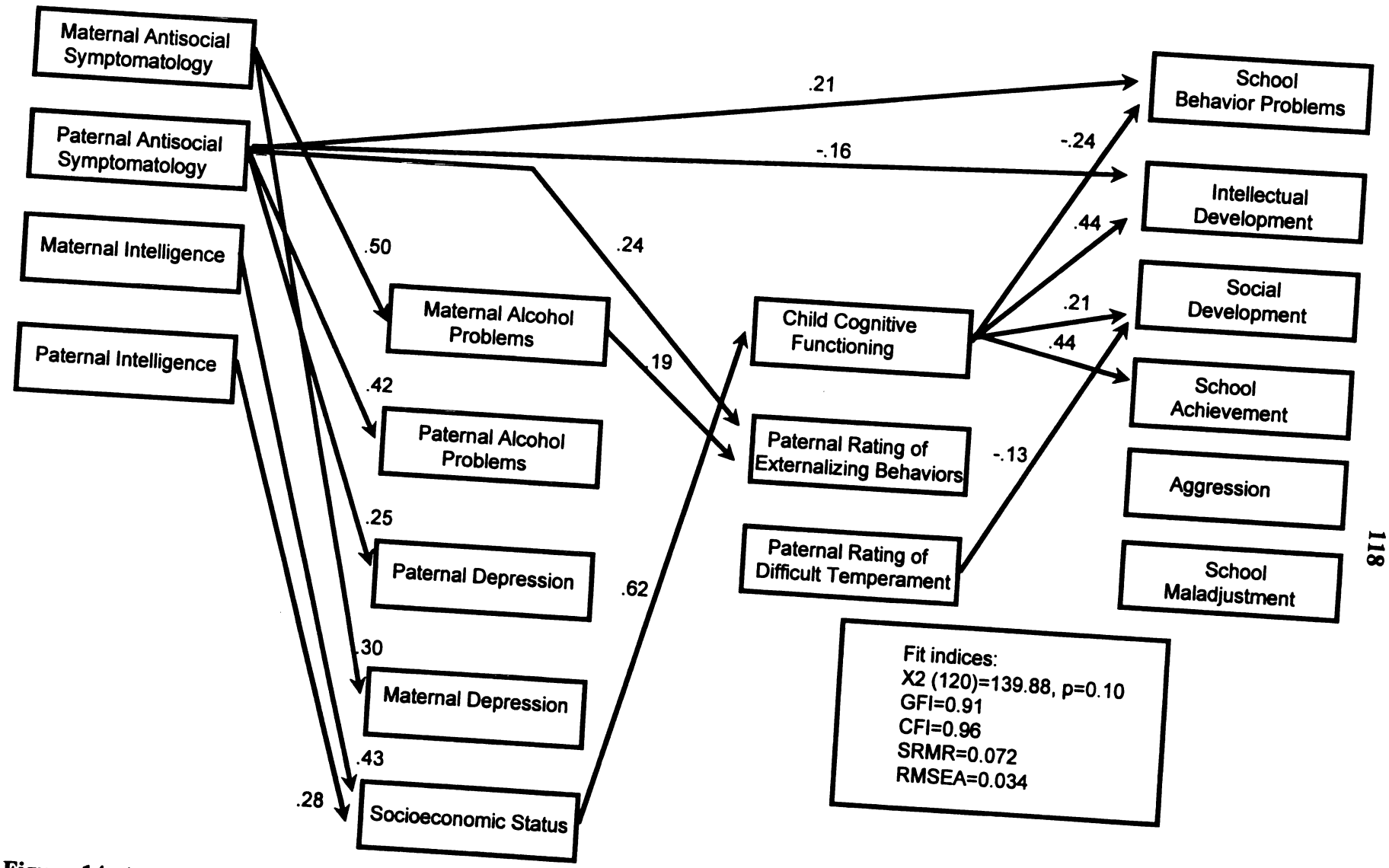

Figure 14. An alternative model for alcoholic families (with fathers' ratings)

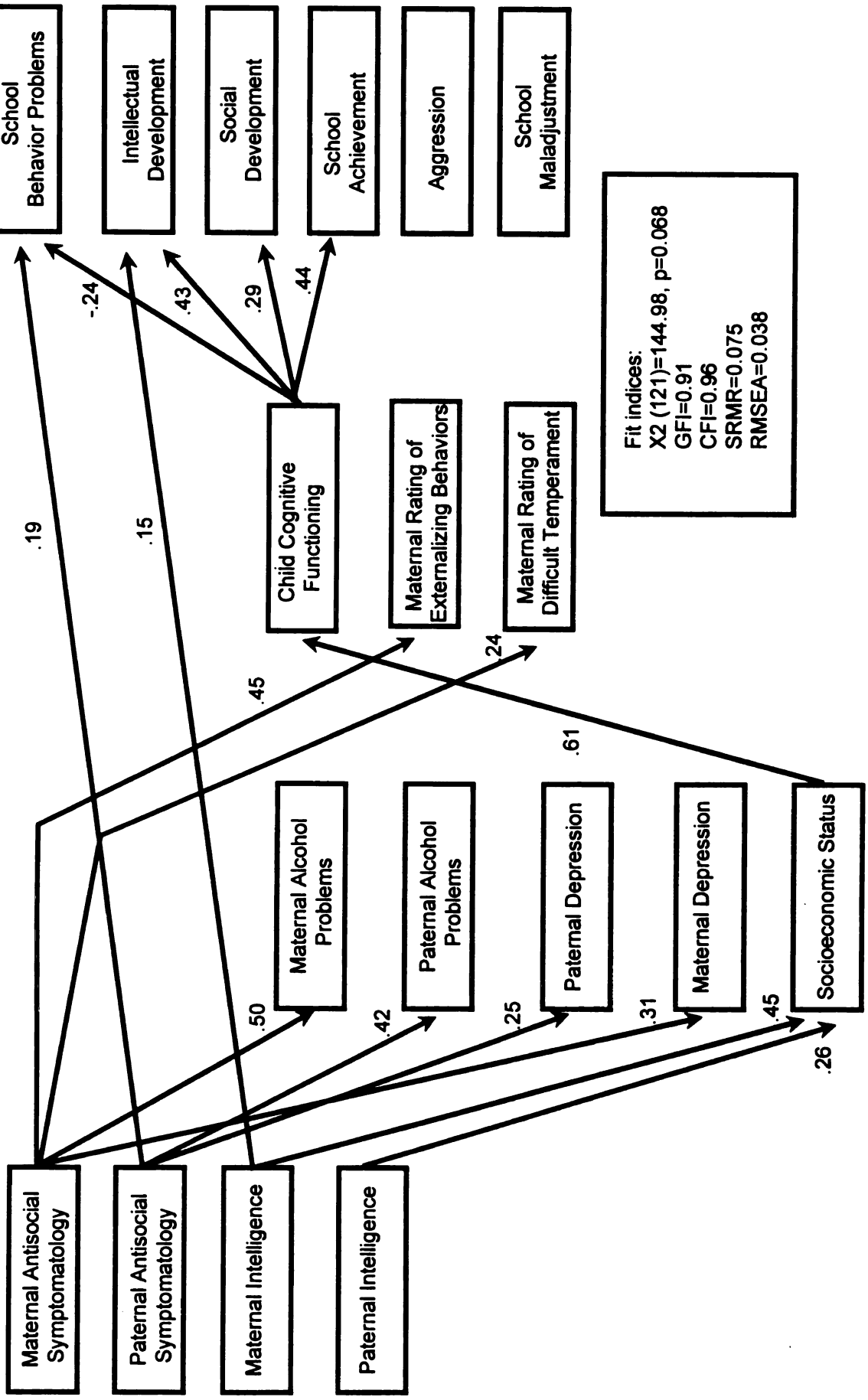

Figure 15. An alternative model for alcoholic families (with mothers' ratings)

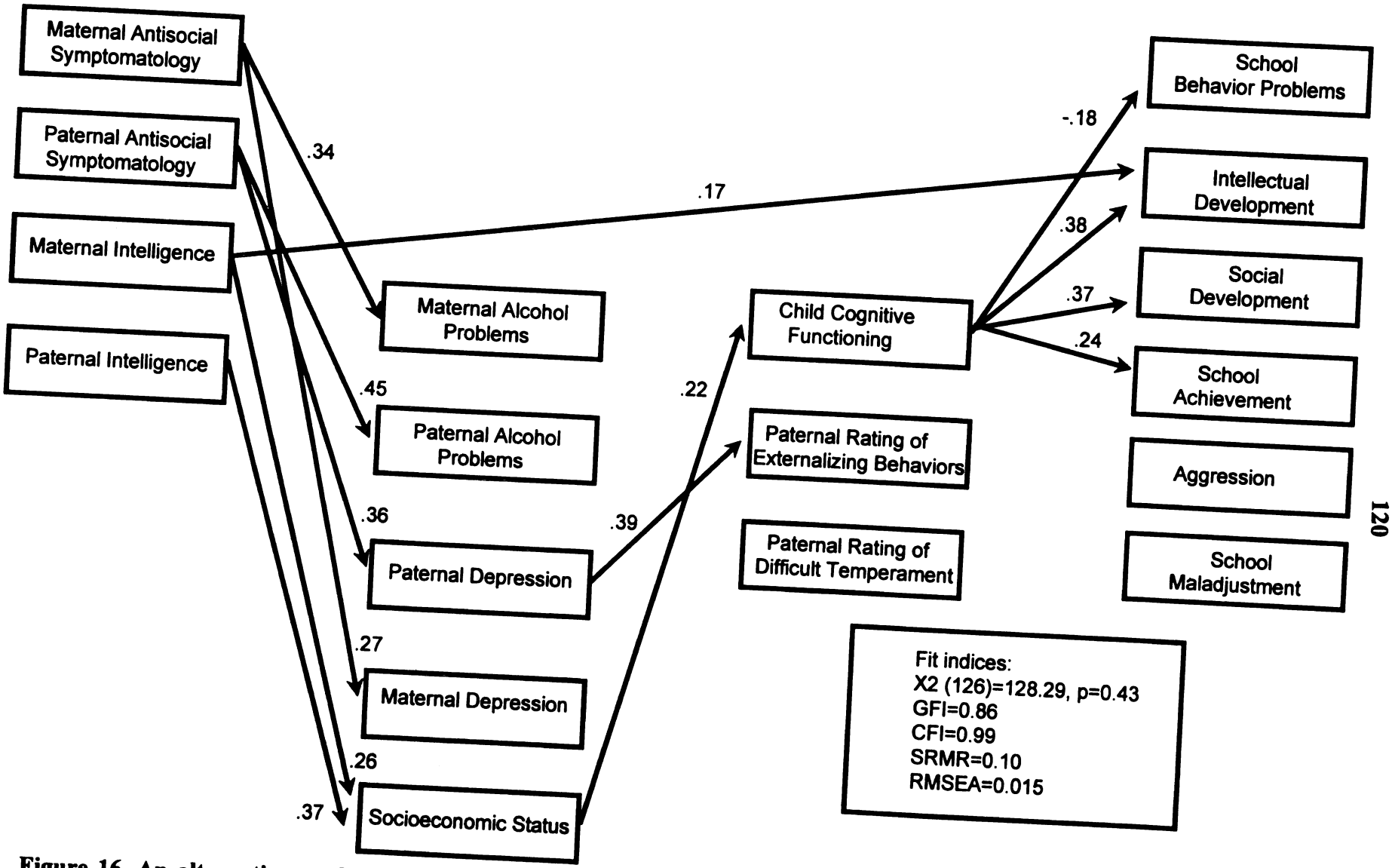

Figure 16. An alternative model for control families (with fathers' ratings)

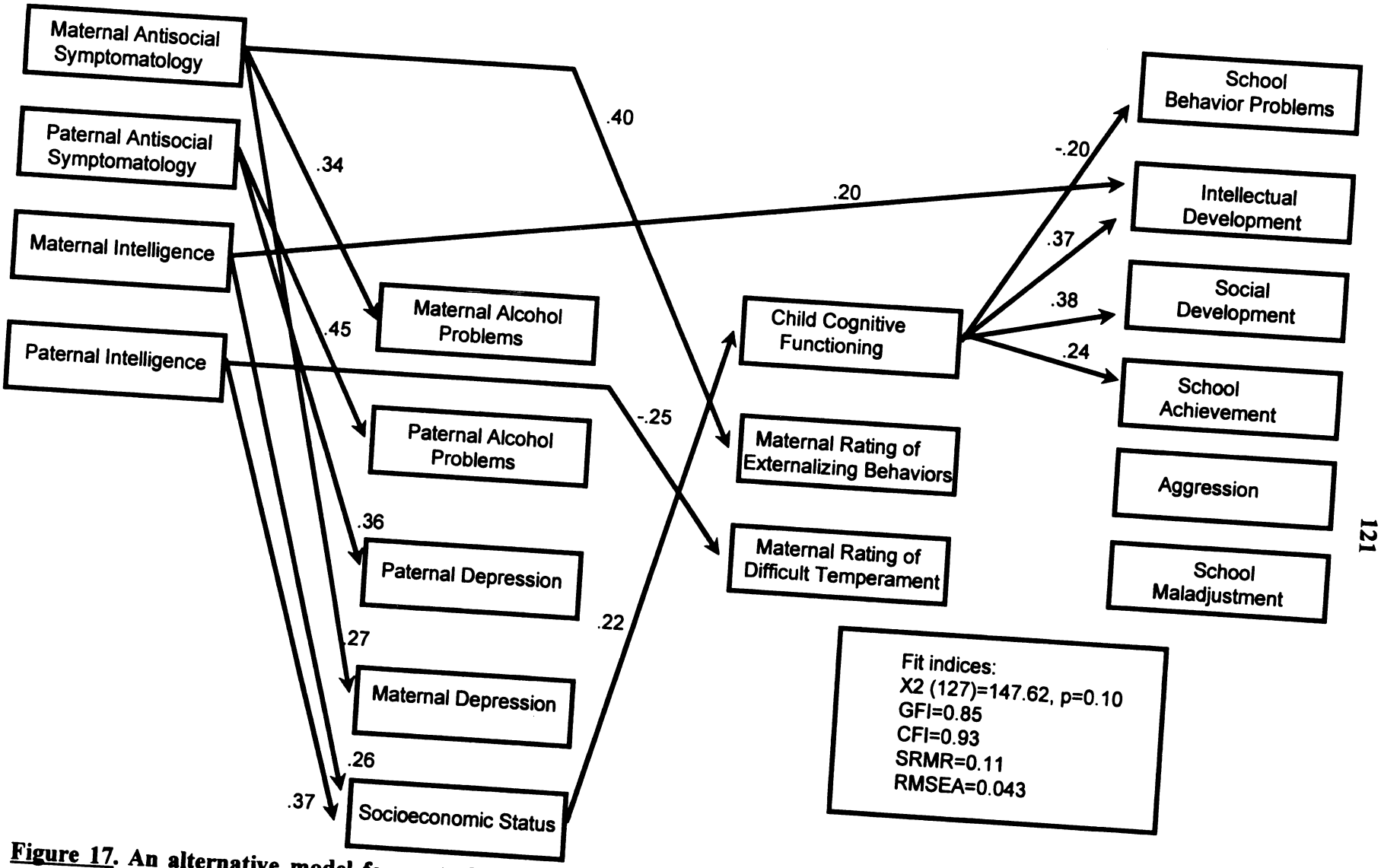

Figure 17. An alternative model for control families (with mothers' ratings)

Summary of Results

Differences in academic functioning. There were several group differences in academic functioning among sons of AALs, sons of NAALs, and control sons from nonalcoholic families. Sons of AALs performed more poorly than both sons of NAALs and sons of controls on several indices of academic functioning. They were found to have significantly more school behavior problems, lower levels of intellectual development, and lower levels of social development. Sons of AALs were also found to have significantly lower levels of school achievement than sons of controls (but not significantly lower than sons of NAALs).

In addition, sons of NAALs performed more poorly than sons of controls on some indices of academic functioning. They were found to have significantly lower levels of intellectual development and lower levels of school achievement. Sons of AALs were also significantly more likely than sons of NAALs or sons of controls to be rated by teachers in the clinical range of school behavior problems.

Predictors of academic functioning. Because the occurrence of parental alcoholism and antisociality was correlated with a host of other potential risk factors such as lower parental intelligence levels, higher depression levels, and lower levels of socioeconomic status, these factors were included in the models in order to delineate the relationships between these risk factors and children's academic functioning. Among family and contextual factors, paternal antisociality, parental intelligence, and socioeconomic status were related to children's school outcomes in the alcoholic families, while maternal intelligence and paternal alcoholism were

related to children's school outcomes in the control families.

Among early childhood factors, in the alcoholic families, cognitive functioning, early childhood difficult temperament (fathers' ratings), and externalizing behavior problems (mothers' ratings) were related to children's school outcomes. In the control families, only cognitive functioning was related to children's school outcomes.

In the more complex mediated models, in the alcoholic families, maternal intelligence, paternal antisocial symptomatology, and children's cognitive functioning were related to children's school outcomes; paternal alcohol problems were not related to any of the school outcome variables. In the control families, maternal intelligence, paternal alcohol problems, and children's cognitive functioning were related to children's school outcomes. Finally, in the most complex mediated models, in the alcoholic families, paternal antisocial symptomatology, maternal intelligence, paternal ratings of difficult temperament in early childhood, and children's cognitive functioning were related to school outcomes. In the control families, only maternal intelligence and children's cognitive functioning were related to children's school outcomes.

One pathway that was consistently significant across models was that from maternal and paternal intelligence, to family socioeconomic status, to children's cognitive functioning in early childhood, to the four school outcomes of behavior problems, intellectual development, social development, and school achievement. This linkage between parental intelligence and child intelligence is consistent with

longstanding findings (for review see Bouchard & McGue, 1981).

However, the school outcomes of aggression and school maladjustment were not predicted by any other variables in any of the models tested. It should be noted that there were certain limitations regarding these two final factors. These two factors had fairly low internal consistencies, and some of the items that comprised these factors had fairly low factor loadings. In addition, some of the items that comprise these factors could be interpreted differently by different teachers. For example, two single items that load on the aggression factor are "aggressiveness" and "activity level." These items could be interpreted differently depending on the context in which they are considered. A teacher may have rated a student as having a high activity level because he participates frequently in class or completes a great deal of schoolwork, rather than because he manifests hyperactive behavior in the classroom. Therefore, the failure to find group differences on these last two factors should be viewed with caution.

Discussion

Alcoholism represents a developmental disorder, and risk for alcoholism is identifiable throughout the course of an individual's development (Fitzgerald, Davies, & Zucker, in press; Tarter & Vanyukov, 1994). The etiology of alcoholism is dependent upon multiple interacting biological, psychological, and social risk factors; an alcoholism outcome becomes more probable as these risk factors aggregate and are sustained over time (Zucker, 1987; Zucker et al., 1994). The present study investigated the school-related developmental outcomes during middle childhood among SOMAs in the MSU-UM Longitudinal Study. This is the largest study to date that examines relationships between parental alcoholism and children's outcomes, and this study also includes the youngest sample of SOMAs to be studied to date. In addition, the MSU-UM Study is the only study that considers the heterogeneity of alcoholism.

The SOMAs in the MSU-UM Study are at high risk for the development of psychopathological symptoms during childhood and adolescence as well as the development of alcoholism in adulthood because their parents have elevated rates of alcoholism and alcoholism-related psychopathology (Knop et al., 1993; Rydelius, 1997). One difficulty for which SOMAs are at risk is school problems, especially during the adolescent period (Hegedus et al., 1984; Tarter et al., 1993). School problems, in turn, are a risk factor for the later development of alcoholism (Sher, 1991; Zucker & Gomberg, 1986). The age at which school problems become

apparent, and the causal factors involved in these problems, are less clear. The present study supports the notion that SOMAs are more likely to exhibit difficulty with behavioral and academic functioning in the school setting, and, moreover, that these problems are evident as early as the primary grades. Consistent with previous research (Sameroff & Seifer, 1983), the greater the number of parental, familial, and individual risk factors, the poorer were the outcomes for SOMAs.

Competence in Middle Childhood

One of the most significant changes that children experience during middle childhood is beginning school; many of the developmental challenges that children confront at this age are related to the educational setting. To the extent that a child demonstrates good adaptation in meeting these developmental challenges, the child is considered to demonstrate competence. Competence refers to effective performance in the environment, and results from complex interactions and transactions between a child and the environment (Masten & Coatsworth, 1995). Factor analytic studies suggest that competence in middle childhood consists of at least three dimensions, including academic achievement, conduct, and peer social success (Masten, Coatsworth, Neemann, Gest, Tellegen, & Garmezy, 1995).

The results of the present study show that sons of controls demonstrated competent outcomes in the areas of academic achievement, conduct, and peer social success, while sons of NAALs performed more poorly in the area of academic achievement, and sons of AALs performed more poorly in all three areas: academic achievement, conduct, and peer social success.

Academic achievement. Present results are similar to other findings in the literature. As in the studies by Tarter and colleagues (Tarter, Hegedus, Goldstein, Shelly, & Alterman, 1984; Hegedus, Alterman, & Tarter, 1984; Tarter, Jacob, & Laird, 1993), SOMAs scored significantly lower than sons of controls on measures of school achievement, although the mean performance of the SOMAs still fell within the average range. It should be noted that all of the studies cited considered alcoholism as a homogeneous disorder; there was no attempt to delineate alcoholism subtypes in the fathers of the SOMAs. Thus, the sons of alcoholics (both antisocial **and** nonantisocial alcoholics) had lower school achievement levels than sons of controls. In addition, teachers rated SOMAs lower on an index of intellectual development, which included variables related to academic engagement and learning in the academic setting.

Conduct. Consistent with the findings of Knop et al. (1985), **some** of the sons of alcoholics showed increased behavioral difficulties in the school setting; however, in the present study it was only the sons of AALs who showed such difficulties. In particular, sons of AALs were more likely than sons of NAALs or sons of controls to be rated in the clinical range of school behavior problems. Although there were differences in overall rates of behavior problems, there were no specific differences in rates of aggressive behavior in the school setting. The present study demonstrated that rates of school behavior problems were related to the subtype of parental alcoholism, thus supporting a linkage between parental antisocial behavior and behavior problems in their young children. In addition, rule-breaking

conduct shows strong continuity over time (Masten et al., 1995), which suggests that the sons of AALs are at risk for continued conduct problems as they progress through school.

Peer social success. No other studies have investigated peer relationships of SOMAs during the early elementary school period. Present findings show that only sons of AALs were rated lower by teachers on an index of social development, which included measures related to sociability and leadership with peers and isolated and internalizing behaviors in a social setting.

Therefore, academic functioning of the sons of NAALs presented a mixed picture. Although they were not found to exhibit the behavior problems and social developmental deficits characteristic of sons of AALs, they did experience difficulties similar to those of sons of AALs in the areas of learning and achievement. Considered together, these findings suggest negative consequences for SOMAs during middle childhood. In addition, some important differences emerge when the subtype of parental alcoholism is considered. SOMAs living with a father with both alcoholism and antisocial personality disorder were found to have the greatest risk for poor school-related outcomes in all areas, while SOMAs living with a father with only alcoholism were found to have greater risk only in the area of school achievement.

The Development of Competence

From a developmental perspective, the greater difficulties that the sons of AALs and sons of NAALs are experiencing in meeting the developmental demands

of middle childhood can be viewed as a consequence of difficulty in meeting earlier developmental demands. The development of competence occurs through transactions between an individual and an environment; both individual and contextual resources contribute to the development of competence. Competence in achieving earlier developmental tasks provides the foundation for successfully confronting later developmental tasks; thus, there are cascading effects in the maintenance or loss of competence over time (Masten & Coatsworth, 1998).

There are many important aspects in the process of developing and maintaining competence. For example, one important aspect in this process is children's perceived control. It is clear that children's beliefs about their own success affect their behavior (Skinner, 1990), and in particular, children's perceived control has been found to be an important determinant in children's engagement in school and school achievement (Skinner, Wellborn, & Connell, 1990). Some other important determinants of competent outcomes include good intellectual functioning and self-regulation skills.

Cognitive functioning. In the present study, higher cognitive functioning predicted fewer school behavior problems, higher intellectual development, higher social development, and higher school achievement during the early school years. Good intellectual functioning has been noted as an important individual characteristic of resilient children. Several studies have reported the protective effects of IQ in preventing negative developmental outcomes such as antisocial behavior or juvenile delinquency (Kandel, Mednick, Kirkegaard-Sorenson,

Hutchings, Knop, Rosenberg, & Schulsinger, 1988; White, Moffitt, & Silva, 1989). It seems likely that above average performance on intelligence tests requires a variety of information-processing skills; these information-processing skills may also be useful for coping with adversity. Masten and Coatsworth (1998) speculate that some of the reasons that children with higher intellectual functioning show more favorable outcomes may be that (a) they have better problem-solving or self-protecting skills, (b) they attract the interest and attention of teachers, or (c) perhaps they have better self-regulation skills that help them function at school and avoid behavior problems. Conversely, perhaps children with lower intellectual functioning find it difficult to negotiate novel or complex situations, disengage from school because of difficulties or failure with schoolwork, or fail to learn as much from their experiences.

As reviewed earlier, the extant literature on cognitive functioning of COAs, and particularly SOMAs, suggests cognitive impairments in a number of areas (for review see Pihl & Bruce, 1997). Pihl and Bruce argue that these deficits in cognitive functioning are related to the behavioral difficulties also characteristic of children of alcoholics. They suggest that patterns of cognitive deficits in information processing, classification, and planning contribute to inappropriate processing of information as well as limited response options and maladaptive responses, which in turn lead to the development of behavioral problems such as hyperactivity and impulsiveness. The relationship between earlier intellectual functioning and the development of behavior problems in the school setting is

confirmed in the present study. The sons of AALs showed the lowest levels of cognitive functioning during early childhood, and they were also found to have more school behavior problems, lower levels of intellectual development and school achievement, and lower levels of social development during middle childhood.

Self-regulation. The development of competence may also be influenced by the development of self-regulation. Self-regulation refers to the ability to control attention, emotion, and behavior (Pennington & Welsh, 1995); children learn these self-regulatory skills in the context of their relationships with adults. Difficulties in regulation in any of these areas, whether attentional, emotional, or behavioral, have been linked with poor outcomes in multiple domains. For example, the development of childhood psychopathologies such as aggressive conduct disorder and depression may be viewed as resulting from dysregulation of the emotion response systems (Garber & Dodge, 1991).

As evidence of difficulties with self-regulation, the sons of AALs were rated by their fathers as having more externalizing behavior problems during the early childhood period. The sons of AALs were also rated by teachers as having higher levels of school behavior problems during the early elementary years. Although the pathways between early childhood temperamental characteristics and behavior problems and academic functioning were not significant in the present study, a large body of literature suggests that these types of difficulties play an important role in children's academic, behavioral, and social functioning in the school setting (Eisenberg et al., 1997; Hinshaw, 1992; Martin, 1994).

Aggregation and Cumulation of Risk Factors

The risk structure of paternal alcoholism and antisociality, as assessed during Wave 1, continues to predict negative developmental outcomes for the children in families with one or both of these risk factors. However, it is important to note that differences in paternal alcoholism and paternal antisociality were not the sole differences among the three groups. There were differences in several other measures of parental psychopathology and family functioning, including maternal alcohol problems, maternal antisocial symptomatology, maternal and paternal intelligence, paternal depression levels, and family socioeconomic status. Families in which there are greater numbers of risk factors are more likely to provide a nesting environment that pressures children toward negative outcomes (Zucker, Fitzgerald, & Moses, 1994). It was, therefore, important to include all of these variables in the models to determine which of these were more strongly related to children's outcomes.

When entered in the models with other family, contextual, and child variables, maternal and paternal alcohol problems were not predictive of many other variables of interest. The only outcome predicted by paternal alcoholism was children's intellectual development in the school setting, and only among control families. Perhaps this reflects the father as having less involvement and less interaction with his son as a result of his involvement with alcohol. Maternal alcoholism predicted only fathers' ratings of children's externalizing behavior problems, and only among alcoholic families. However, paternal antisociality

predicted a number of other variables, including paternal alcoholism and paternal depression. In alcoholic families, paternal antisociality was related to the school outcomes of behavior problems, as well as intellectual development and social development. The models also indicated that maternal and paternal intelligence have important influences on family socioeconomic status and children's cognitive functioning. As mentioned, children's cognitive functioning was strongly predictive of academic outcomes in several areas.

The deleterious effects of the aggregation of parental risk factors are apparent. Sons of NAALs were intermediate in the risk structure; their developmental outcomes are less favorable than those of sons of controls, but not as compromised as those of sons of AALs. Although sons of NAALs had increased difficulties with externalizing behavior problems in the home setting during early childhood (Ellis, Bingham, Zucker, & Fitzgerald, under review), they were **not** rated by teachers as having elevated rates of behavioral difficulties in the school setting. Sons of NAALs have fewer contextual risk factors, and it is evident that their risk levels are decreased over time. Their behavioral difficulties appear to be context-specific in that they are not manifested in the school setting. Perhaps this is due to more effecive parenting and socialization practices by parents in this group.

The greatest continuity in maladaptive behavior and poor outcomes is seen among the boys in the highest risk group, the sons of AALs. Their negative developmental outcomes persist across time as well as across context. The sons of AALs had increased difficulties with externalizing and internalizing behavior

problems in the home setting during early childhood (Ellis et al., under review), and they were rated by teachers as having elevated rates of behavioral and social difficulties in school. In addition, they had lower levels of cognitive functioning during early childhood (Ellis et al., under review), and were also rated by teachers as having learning and achievement difficulties in school. Therefore, it is apparent that risk levels are increasing over time for these sons of AALs as they continue living in high-risk environments and also show poorer adaptation in school, thereby increasing their individual risk factors as well.

It is important to consider the density or aggregation of risk factors at a given point in time, as well as the degree to which these risk factors are sustained over time, thus resulting in cumulation of risk. Some research from the MSU-UM study suggests that recovery from exposure to risk is greatest for children with the greater number of risk factors, although the greater relative rate of recovery does not mean that these children show favorable outcomes; in fact, sons of AALs were still found to experience greater risk and behavioral problems than boys in the other groups (Bingham, Zucker, & Fitzgerald, under review). This is consistent with other research showing high stability in child behavior problems over time (Loukas, Fitzgerald, Bingham, & Zucker, under review). Present findings suggest that there is a greater aggregation of contextual and individual risk factors among the sons of AALs. From this perspective, the outcomes of sons of NAALs may be more probabilistic or varied, in that these children can build on earlier competence, as well as individual and contextual resources. However, the sons of AALs are restricted in

a risky rearing environment and they also have a dense set of risky individual behaviors (e.g., externalizing problem behavior, cognitive deficiency), thus favoring developmental continuity, provided that these risky environmental and individual risk factors are sustained over time (Fitzgerald, Davies, & Zucker, in press).

Implications for Developmental Pathways

Elevated rates of school behavior problems, as well as academic difficulties, place children at increased risk for a number of negative outcomes as they progress through school (Caspi & Moffitt, 1995). The presence of behavior problems early in the middle childhood period portends negative developmental outcomes for sons of AALs in a number of areas. Problems of self-regulation related to attention and impulsive behavior as well as antisocial behavior have been linked with problems in academic achievement (Hinshaw, 1992; Maguin & Loeber, 1996). Children with higher rates of conduct problems during the childhood period are more likely to experience achievement difficulties during adolescence (Hinshaw, 1992); conversely, children with poor academic achievement are at risk for developing antisocial behavior (Brier, 1995). In a review of externalizing behavior problems and academic underachievement, Hinshaw (1992) concluded that hyperactivity and inattention are correlates of underachievement during childhood, while antisocial behavior and delinquency are correlates of underachievement during adolescence. Children with higher rates of behavior problems and lower levels of academic performance are also more likely to drop out of school (Cairns, Cairns, & Neckerman, 1989).

Behavior problems (Vuchinich, Bank, & Patterson, 1992) and lower levels of cognitive functioning (Newcomb, Bukowski, & Pattee, 1993) have negative consequences for children's peer relationships as well. According to coercion theory (Patterson, 1986), inept parenting leads to antisocial behavior in boys, and conversely, antisocial behavior contributes to inept parenting. The importance of interactions between children and parents in the home setting is demonstrated by evidence that children's antisocial behavior within the family generalizes to behavior with peers and in schools (Dishion, 1990). Poor peer relations are also a risk factor for later psychopathology to the extent that a child is rejected by peers or exhibits aggressive behaviors (Parker & Asher, 1987).

Peer rejection and academic failure have been found to be important in adolescent involvement with antisocial peers; children may seek to associate with peers who experience similar problems with achievement related activities (Dishion, Patterson, Stoolmiller, & Skinner, 1991). Association with deviant peers, in turn, may increase the risk of substance use and abuse in adolescence (Elliott, Huizinga, & Ageton, 1985). Therefore, school failure early in the academic years may place SOMAs on a pathway toward increased affiliation with deviant peers and experimentation with alcohol or other substances (Sher, 1991).

Strengths and Limitations of the Study

One strength of the present study is the availability of data collected across time periods. This allows for empirical testing of models of complex pathways involved in the intergenterational transmission of alcoholism, pathways which

include both familial/contextual influences as well as children's intraindividual characteristics. An additional strength is the inclusion of two alcoholism subtypes in the high-risk sample. Because other studies have indicated that parental alcoholism and co-occurring parental psychopathology are differentially associated with symptomatology among COAs (e.g., Chassin, Rogosch, & Barrera, 1991), the separation of antisocial alcoholics and nonantisocial alcoholics in the present study allows for clearer delineation of determinants of risk for SOMAs.

One important limitation of the present study is the inclusion of only boys. While including only male children of a narrow age range provides more clear, interpretable results, one shortcoming is the lack of generalizability of these findings to female children. In fact, it has been suggested that developmental pathways may differ for male and female COAs (Johnson & Jacob, 1995). Recent findings concerning the sample of female COAs from the MSU-UM Study indicate that they may experience similar difficulties to those of male COAs in some areas. For example, female COAs have been noted to have lower levels of intellectual functioning, but not increased rates of behavior problems (Puttler et al., under review).

An additional limitation of the present study was the relatively small sample size in the AAL subgroup; the sample size was inadequate for analyzing predictive models separately for antisocial alcoholic families. Results showed that the factors that were related to children's academic outcomes were different for control families and alcoholic families. It would have been interesting to analyze the models

separately for the antisocial alcoholic group and the nonantisocial alcoholic group to determine whether developmental processes differed between these two groups as well.

A question not addressed in the present study is that of instability of drinking patterns over time (Zucker, Fitzgerald, & Moses, 1994), and the effects of recovery from alcoholism on child and family functioning. While those alcoholics with greater, more chronic levels of problematic drinking are likely to continue having alcohol problems over time, others may seek treatment for alcoholism or, alternatively, may be ordered by the court to refrain from drinking alcohol as a result of legal difficulties. Recent research from the MSU-UM Study suggests that daughters in recovering alcoholic homes function similarly to girls in nonalcoholic homes in terms of intellectual ability, school achievement, and behavior problems (Puttler et al., 1997). It is suggested that the cessation of paternal alcohol problems is associated with changes in the family environment that provide a more favorable developmental context for children. It is, therefore, important for future research to examine the consequences of parental shifts into and out of problem drinking classifications on children's adjustment. Another important question is whether the likelihood of recovery differs between the risk groups, in that AALs may be less likely to stop drinking than NAALs.

An interesting addition to the study would have been a teacher-completed measure of temperament, due to the linkages between temperamental characteristics and behavior problems in the school setting (Keogh, 1989). While children in the

highest risk group were rated as having more behavior problems, it would have been helpful to determine which specific aspects of their functioning are related to their problematic outcomes at school. Another interesting addition would have been peer sociometric ratings. Again, children in the highest risk group were rated by teachers as having poorer social development and poorer peer relations during the early elementary grades. The influence of peers can be expected to increase significantly as these children progress into late childhood and especially adolescence. Learning more about the children's peer relations, from the point of view of their peers, may be beneficial in determining those aspects of the social environment associated with risk.

Conclusions

The results of the present study indicate that greater numbers of risk factors in the home environment accumulate to produce poorer development outcomes for SOMAs in the school setting. The school outcomes for children in nonantisocial alcoholic families include lower levels of intellectual development and school achievement, while the school outcomes for children in antisocial alcoholic families include not only lower levels of intellectual development and school achievement, but also school behavior difficulties and lower levels of social development. The path models showed that parental antisociality, in particular, is related to children's academic functioning among alcoholic families. For both alcoholic and control families, parental intelligence and socioeconomic status were related to children's cognitive functioning, which showed associations with several domains of academic

functioning during the early school years.

While early risk factors were identifiable for SOMAs in the MSU-UM Study during the preschool period (Zucker & Fitzgerald, 1991), the present study shows the continued maladaptive development of SOMAs as they reach middle childhood and begin interacting in the school setting. Because competence in achievement, conduct, and peer relationships during the middle childhood period is significant for the course of competence throughout the developmental period (Masten et al., 1995), the SOMAs in the highest risk group who are also experiencing difficulties with adaptation to the demands of school are accumulating risk that will make future competent outcomes more unlikely. The behavior problems and academic difficulties experienced by boys in the risk groups may constitute intermediary aspects of the predictive structure that may ultimately culminate in the clinical disorder of alcoholism.

In summary, an alcoholism endpoint can be viewed as the result of a set of probabilistic processes, with risk increasing or decreasing as adversity and protective processes interact in altering or sustaining the course over developmental time. However, it is important to note that there are developmental pressures toward adaptation (Cicchetti, 1984; Gottlieb, 1991), and the most negative outcomes are likely to be those in which individual risk factors are paired with high-risk environments that are sustained over time. The differences in the density of the risk structure between AALs and NAALs may also have important implications for intervention and treatment efforts, in that AALs may require more comprehensive

intervention efforts (Maguin, Zucker, & Fitzgerald, 1994; Nye, Zucker, & Fitzgerald, under review). For both AALs and NAALs, it is necessary to focus prevention and intervention efforts on the larger family system, early in the developmental period, and to address the multiple contextual factors within which alcoholism is nested.

Appendices

Appendix A

Scales From the Dimensions of Temperament Survey

Activity

25. My child moves a great deal in his/her sleep.
30. My child moves a lot in bed.
33. My child doesn't move around much at all in his/her sleep. (Reverse)

Attention Span

3. Once my child is involved in a task, he/she can't be distracted away from it.
4. My child persists at a task until it's finished.
7. No matter what my child is doing, he/she can be distracted by something else. (Reverse)
9. My child stays with an activity for a long time.
10. If my child is doing one thing, something else occurring won't get him/her to stop.
11. My child does not do any one thing for a long period. (Reverse)
13. Things going on around my child can take him/her away from what he/she is doing. (Reverse)
15. Once my child takes something up, he/she stays with it.
18. My child doesn't keep at an activity when other things are going on around him/her. (Reverse)
21. If stopped from doing something, my child will always go back to it.
24. If watching something, my child will keep at it for a long period.

Adaptability

5. My child can make him/herself at home anywhere.
17. When a person comes towards my child, his/her first response is to move back. (Reverse)
19. On meeting a new person my child tends to move towards him or her.
23. It takes my child no time at all to get used to new people.
27. My child moves towards new situations.
31. It takes my child a long time to get used to new people. (Reverse)

Rhythmicity

2. My child wakes up at different times. (Reverse)
8. There is no set times when my child goes to sleep. (Reverse)
12. My child eats about the same amount for dinner whether he/she is home, visiting someone, or traveling.
26. My child seems to get sleepy just about the same time every night.
28. When my child is away from home, he/she still wakes up at the same time each morning.
29. My child eats about the same amount at breakfast from day to day.
32. My child eats about the same amount at supper from day to day.
34. My child's appetite seems to stay the same day after day.

Reactivity

1. My child can't sit still for long.
6. My child reacts intensely when hurt.
14. Sunlight bothers my child's eyes.
16. When my child has to be still, he/she gets very restless after a few minutes.
20. When my child reacts to something, his/her reaction is intense.
22. My child never seems to slow down.

Appendix B: Data Estimation

Data Estimation

In cases in which entire instruments were missing for individuals in the sample, data were estimated separately for each risk group (AALs, NAALs, and controls), and also separately for mothers and fathers in the sample. Data were estimated using a stepwise regression procedure, with other variables used as independent variables to write a regression equation for the variable with missing data serving as the dependent variable. In cases of dichotomous variables, data were estimated using a discriminant analysis procedure.

Occasionally regression analyses failed to provide estimated values because no significant predictors of the estimated value were found for a group, most likely due to low variance in the predictor variables. In these cases, group mean substitutions were used to replace the missing values. Group mean substitutions were made for four child IQ scores on the Stanford-Binet Intelligence Scale (1.7% of the total scores), and for one difficult temperament score on the Dimensions of Temperament Survey (0.2% of the total scores).

Verification of Data Estimation

To ensure that data estimation had not biased the sample, two-group measurement models were tested using LISREL 8 (Jöreskog & Sörbom, 1993). The first group consisted of the original data set with all missing data points. This group was compared to the second group which consisted of the original data set with all

missing data points filled in with estimated data.

Comparisons were made by subgroups of measures: (a) all family and contextual variables (Lifetime Alcohol Problems Scores, scores from the Antisocial Behavior Checklist, Wechsler Adult Intelligence Scale-Revised, Hamilton Rating Scale for Depression, and Socioeconomic Status), (b) Wave 1 child variables (IQ score from the Stanford-Binet Intelligence Scale, total externalizing behavior problems score from the Achenbach Child Behavior Checklist, and difficult temperament scores from the Dimensions of Temperament Survey), (c) achievement scores from the three subtests of the Wide Range Achievement Test-Revised, (d) scores from the adaptive functioning variables and behavior problem scales of the Achenbach Teacher Report Form, (e) all 50 items from the Revised Class Play Questionnaire broken down into groups of 10 variables at a time, (f) variables from the School Performance Questionnaire, and (g) variables from the Child Health and Developmental History Questionnaire.

Chi-square statistics and goodness of fit indices for each of these comparisons are shown in Table 4. In order for the estimated data to be considered equivalent to the original data, the chi-square value must be nonsignificant and the goodness of fit index must exceed 0.90. Results indicated acceptable fits for (a) the family and contextual variables, (b) for Wave 1 child variables, (c) for achievement variables, and (d) for all variables from the Achenbach Teacher Report Form. In these cases it was therefore concluded that the data estimation procedure did not significantly alter the structure of the data.

The structure of the estimated data for the Revised Class Play did not fit the structure of the original data well, as revealed by the significant chi-square value. However, a multivariate analysis of variance (MANOVA) revealed that the means for the original items and the estimated items were not statistically different from each other. It was therefore concluded that the structure of the original data was not significantly altered by the data estimation procedure.

In addition, it was not possible to derive goodness of fit indices for the comparison of the original and estimated data for the school performance variables nor the child health variables. This occurred because the differences between the original and estimated data were too minimal. However, in the case of the school performance variables the chi-square value is sufficiently small that the original and estimated data can be considered equivalent. In addition, a cophainetic correlation was computed in which the elements of the covariance matrices of the original and estimated data were correlated (Everitt, 1974). The cophainetic correlation was 0.999, providing additional evidence of the equivalence of the original and estimated data.

A cophainetic correlation was also computed to compare the original and estimated data for the set of school performance variables including absences, tardies, and discipline referrals. This correlation was 0.989, again indicating equivalence of the original and estimated data. Finally, a cophainetic correlation for the dichotomous child health variables was 0.993, again indicating equivalence of the original and estimated data. In addition, chi-square tests on proportions revealed

no significant differences between the original and estimated dichotomous child health variables (i.e., all chi-square values were less than 3.84): X^2 (1df)=0.07 for counseling, X^2 (1df)=0.07 for tutoring, X^2 (1df)=0.00 for speech, X^2 (1df)=0.04 for reading help, X^2 (1df)=0.09 for other help, and X^2 (1df)=0.26 for medication for hyperactivity. Therefore, it can be concluded that frequencies of affirmative and negative responses for each dichotomous variable were not altered by the data estimation procedure.

Table B1
Results of LISREL 8 Analyses: Chi-Square Values and Goodness of Fit Indices for Comparisons of Original and Estimated Data

Variable	X^2	Goodness of Fit Index
Familial/Contextual Variables	(15 df)=2.53 (p=1.00)	1.00
Early Childhood Child Variables	(10 df)=0.48 (p=1.00)	1.00
Wide Range Achievement Test Variables	(6 df)=4.71 (p=0.58)	1.00
Achenbach Teacher Report Form Variables	(78 df)=72.29 (p=0.66)	1.00
Revised Class Play Variables 1-10	(55 df)=248.64 (p=0.00)	0.94
Revised Class Play Variables 11-20	(55 df)=250.36 (p=0.00)	0.93
Revised Class Play Variables 21-30	(55 df)=250.71 (p=0.00)	0.93
Revised Class Play Variables 31-40	(55 df)=237.87 (p=0.00)	0.94
Revised Class Play Variables 41-50	(55 df)=252.32 (p=0.00)	0.93
School Performance Questionnaire Variables		
Absences/Tardies/Discipline Referrals	(6 df)=257.91 (p=0.00)	0.96
Developmental Levels	(44 df)=13.68 (p=1.00)	----
Child Health Questionnaire Variables	(15 df)=19.27 (p=0.20)	----

Appendix C

Command File for Three-Group Stacked Confirmatory Factor Analysis of the Revised Class Play Questionnaire

The following lines were read from file G:\DISSER\GRPFAC.LIS:

```
A CONFIRMATORY FACTOR ANALYSIS IN THREE GROUPS: AALS NAALS
CONTROLS

DA NG=3 NI=50 NO=33 MA=CM

LA
EPLAY1 EPLAY2 EPLAY3 EPLAY4 EPLAY5 EPLAY6 EPLAY7 EPLAY8
EPLAY9 EPLAY10 EPLAY11 EPLAY12 EPLAY13 EPLAY14 EPLAY15
EPLAY16 EPLAY17 EPLAY18 EPLAY19 EPLAY20 EPLAY21 EPLAY22
EPLAY23 EPLAY24 EPLAY25 EPLAY26 EPLAY27 EPLAY28 EPLAY29
EPLAY30 EPLAY31 EPLAY32 EPLAY33 EPLAY34 EPLAY35 EPLAY36
EPLAY37 EPLAY38 EPLAY39 EPLAY40 EPLAY41 EPLAY42 EPLAY43
EPLAY44 EPLAY45 EPLAY46 EPLAY47 EPLAY48 EPLAY49 EPLAY50

CM FU FI=G:\DISSER\AALCLAS.COV

SE
EPLAY27 EPLAY29 EPLAY2 EPLAY21 EPLAY44 EPLAY8 EPLAY6 EPLAY5
EPLAY34 EPLAY1 EPLAY12 EPLAY4 EPLAY38 EPLAY42 EPLAY33
EPLAY43 EPLAY22 EPLAY24 EPLAY49 EPLAY47 EPLAY17 EPLAY37
EPLAY3/

MO NX=23 NK=3 LX=FU,FR PH=ST,FR TD=SY,FI ME=GL

LK
AGGRESSIVE LEADER SENSITIVE

PA LX
1 0 0
1 0 0
1 0 0
1 0 0
1 0 0
1 0 0
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1 0 0
1 0 0
1 0 0
0 1 0
0 1 0
0 1 0
0 1 0
0 1 0
0 1 0
0 1 0
0 0 1
0 0 1
0 0 1
0 0 1
0 0 1
0 0 1
0 0 1

ST 1.0 LX 1 1 LX 10 2 LX 17 3

FR TD 1 1 TD 2 2 TD 3 3 TD 4 4 TD 5 5 TD 6 6 TD 7 7 TD 8 8 TD 9 9 TD 10 10
FR TD 11 11 TD 12 12 TD 13 13 TD 14 14 TD 15 15 TD 16 16 TD 17 17 TD 18 18
FR TD 19 19 TD 20 20 TD 21 21 TD 22 22

FR TD 8 5 TD 23 16 TD 9 6 TD 6 1 TD 8 3 TD 5 3 TD 23 7 TD 14 8 TD 15 7
FR TD 20 12 TD 22 15 TD 21 14 TD 13 2 TD 2 1 TD 21 11 TD 22 18 TD 21 6
FR TD 10 7 TD 23 4 TD 19 17 TD 23 19 TD 21 17 TD 20 16 TD 23 23 TD 14 9
FR TD 20 18 TD 23 18 TD 22 20 TD 4 2

PATH DIAGRAM

OU MR PT SE TV MI SC RS AD=OFF

DA NO=112 MA=CM

LA
EPLAY1 EPLAY2 EPLAY3 EPLAY4 EPLAY5 EPLAY6 EPLAY7 EPLAY8
EPLAY9 EPLAY10 EPLAY11 EPLAY12 EPLAY13 EPLAY14 EPLAY15
EPLAY16 EPLAY17 EPLAY18 EPLAY19 EPLAY20 EPLAY21 EPLAY22
EPLAY23 EPLAY24 EPLAY25 EPLAY26 EPLAY27 EPLAY28 EPLAY29
EPLAY30 EPLAY31 EPLAY32 EPLAY33 EPLAY34 EPLAY35 EPLAY36
EPLAY37 EPLAY38 EPLAY39 EPLAY40 EPLAY41 EPLAY42 EPLAY43

EPLAY44 EPLAY45 EPLAY46 EPLAY47 EPLAY48 EPLAY49 EPLAY50

CM FU FI=G:\DISSER\NAALCLAS.COV

SE
EPLAY27 EPLAY29 EPLAY2 EPLAY21 EPLAY44 EPLAY8 EPLAY6 EPLAY5
EPLAY34 EPLAY1 EPLAY12 EPLAY4 EPLAY38 EPLAY42 EPLAY33
EPLAY43 EPLAY22 EPLAY24 EPLAY49 EPLAY47 EPLAY17 EPLAY37
EPLAY3/

MO NX=23 NK=3 LX=FU,FR PH=ST,FR TD=SY,FI ME=GL

PATH DIAGRAM

OU

DA NO=91 MA=CM

LA
EPLAY1 EPLAY2 EPLAY3 EPLAY4 EPLAY5 EPLAY6 EPLAY7 EPLAY8
EPLAY9 EPLAY10 EPLAY11 EPLAY12 EPLAY13 EPLAY14 EPLAY15
EPLAY16 EPLAY17 EPLAY18 EPLAY19 EPLAY20 EPLAY21 EPLAY22
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EPLAY30 EPLAY31 EPLAY32 EPLAY33 EPLAY34 EPLAY35 EPLAY36
EPLAY37 EPLAY38 EPLAY39 EPLAY40 EPLAY41 EPLAY42 EPLAY43
EPLAY44 EPLAY45 EPLAY46 EPLAY47 EPLAY48 EPLAY49 EPLAY50

CM FU FI=G:\DISSER\TROLCLAS.COV

SE
EPLAY27 EPLAY29 EPLAY2 EPLAY21 EPLAY44 EPLAY8 EPLAY6 EPLAY5
EPLAY34 EPLAY1 EPLAY12 EPLAY4 EPLAY38 EPLAY42 EPLAY33
EPLAY43 EPLAY22 EPLAY24 EPLAY49 EPLAY47 EPLAY17 EPLAY37
EPLAY3/

MO NX=23 NK=3 LX=FU,FR PH=ST,FR TD=SY,FI ME=GL

PATH DIAGRAM

OU

W_A_R_N_I_N_G: Total sample size is smaller than the number of parameters.
Parameter estimates are unreliable.

Appendix D

Histograms of Total School Behavior Problems

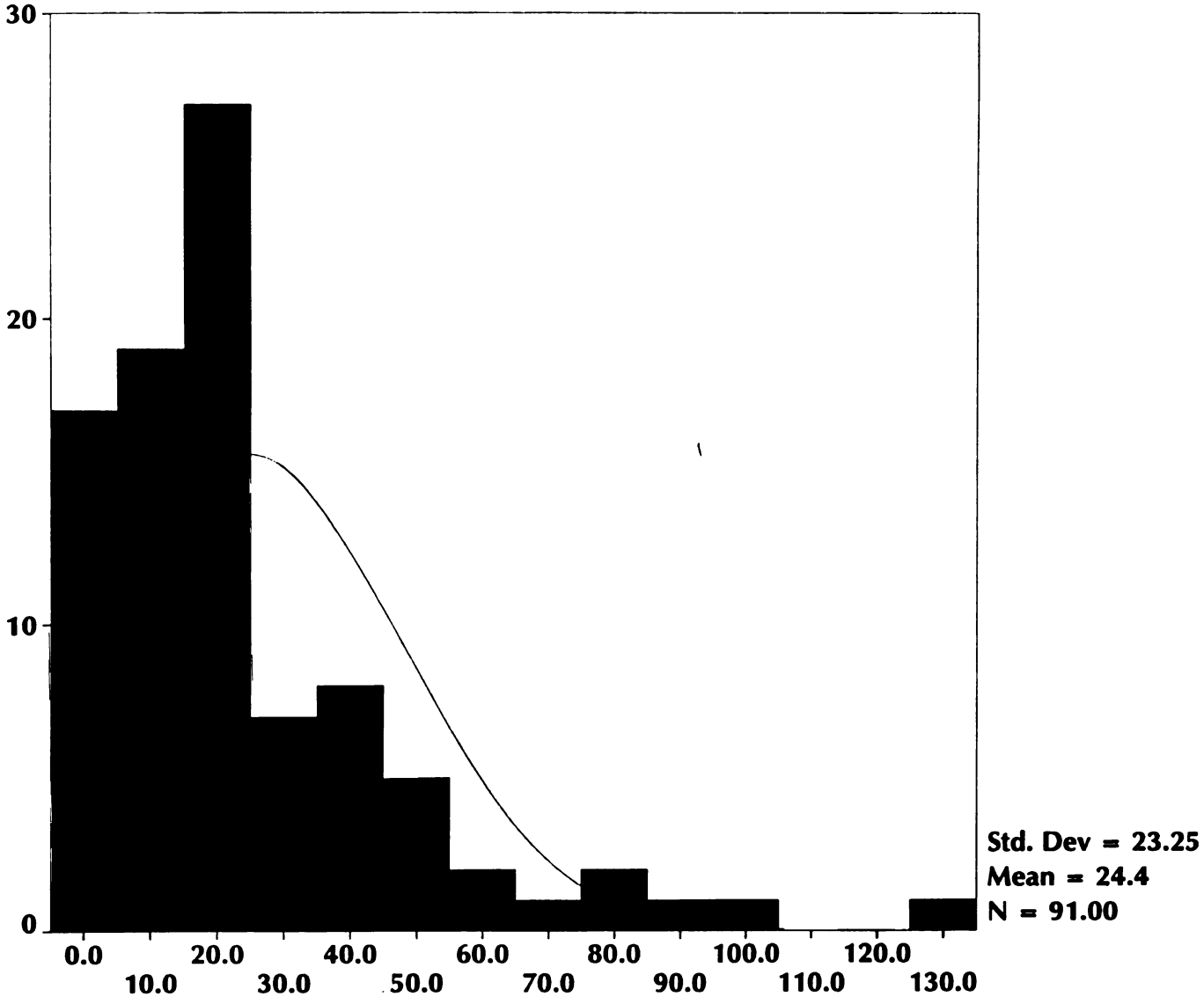

Figure D1. Total Teacher-Rated School Behavior Problems for Sons of AALs

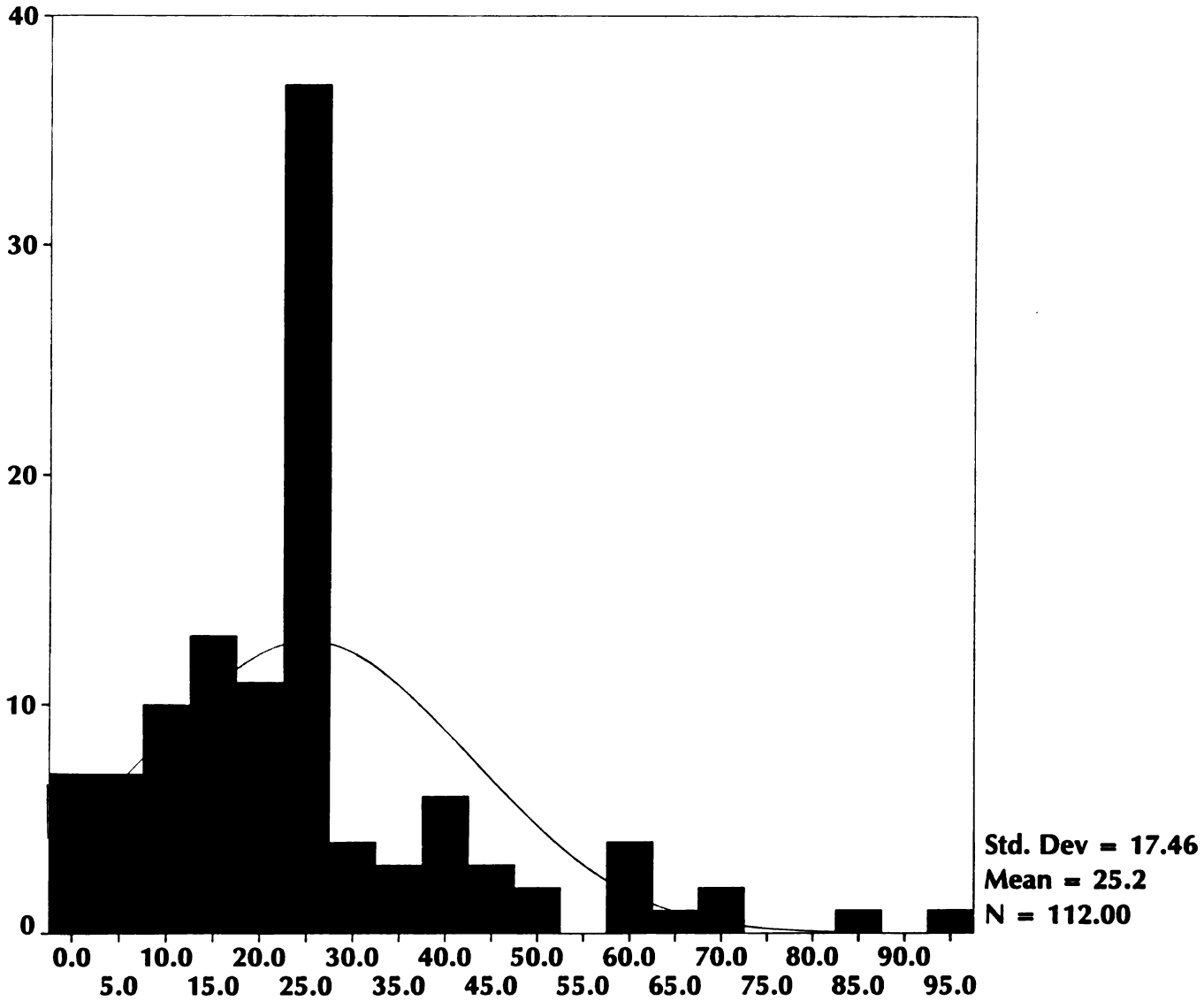

Figure D2. Total Teacher-Rated School Behavior Problems for Sons of NAALs

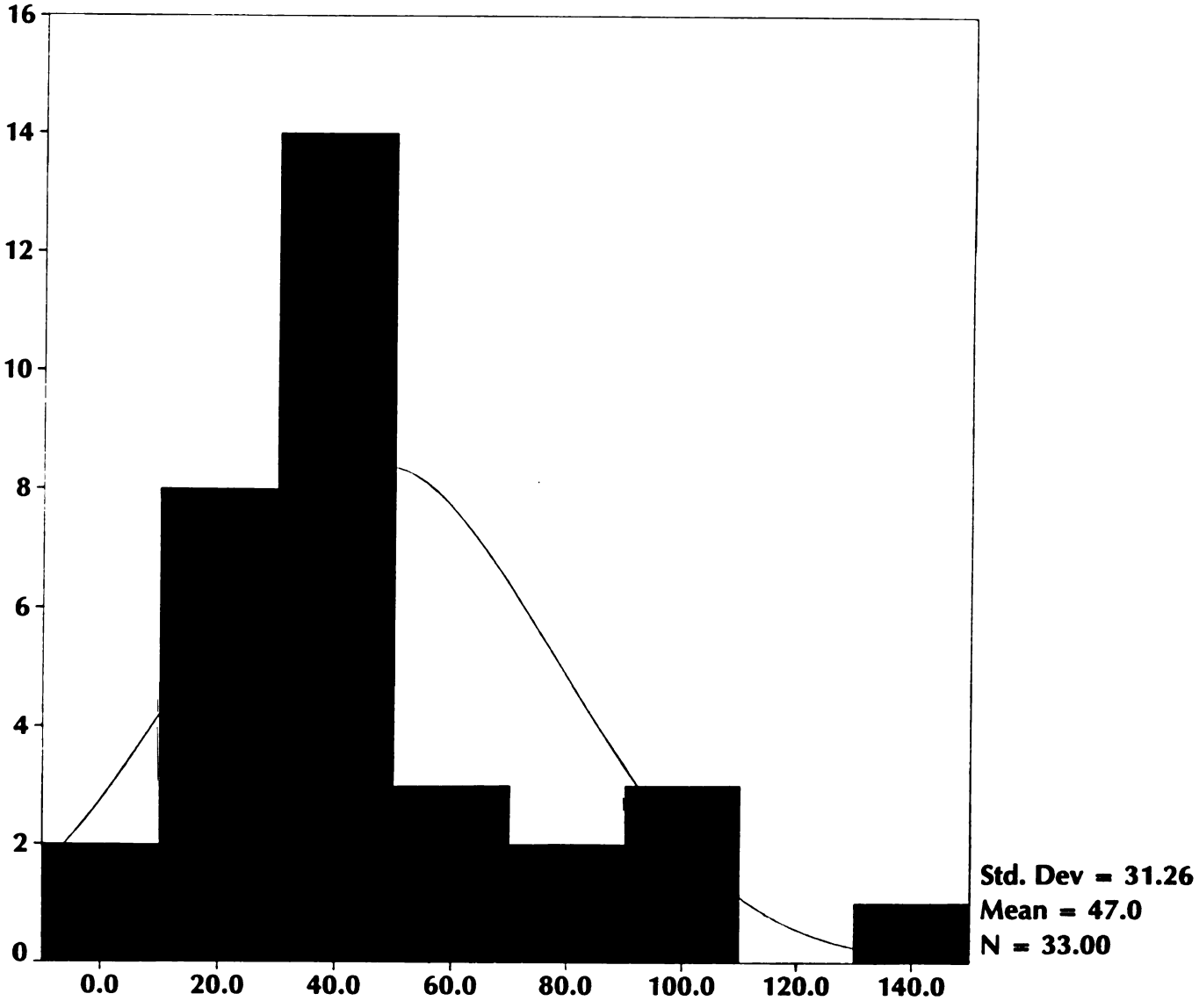

Figure D3. Total Teacher-Rated School Behavior Problems for Sons of Controls

Appendix E

Ages of Participants at Wave 1 and Wave 2

	Antisocial Alcoholic (n=33) M (SD)	Nonantisocial Alcoholic (n=112) M (SD)	Controls (n=91) M (SD)
Wave 1:			
Child's Age	4.2 (1.0)	4.3 (1.0)	4.2 (1.0)
Mother's Age	28.6 (4.4)	32.0 (4.2)	31.1 (3.9)
Father's Age	31.4 (5.7)	34.1 (5.1)	32.8 (4.5)
Wave 2:			
Child's Age	7.8 (1.0)	7.8 (1.0)	7.6 (1.0)
Mother's Age	32.3 (4.3)	35.2 (3.9)	34.5 (3.9)
Father's Age	35.3 (5.7)	37.3 (5.0)	36.1 (4.6)

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