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Multiple jeopardy: Risk and protective factors among addicted mothers' offspring

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Abstract

Objectives of this study were to ascertain risk and protective factors in the adjustment of 78 school-age and teenage offspring of opioid- and cocaine-abusing mothers. Using a multimethod, multiinformant approach, child outcomes were operationalized via lifetime psychiatric diagnoses and everyday social competence (each based on both mother and child reports), and dimensional assessments of symptoms (mother report). Risk/protective factors examined included the child sociodemographic attributes of gender, age, and ethnicity, aspects of maternal psychopathology, and both mother's and children's cognitive functioning. Results revealed that greater child maladjustment was linked with increasing age, Caucasian (as opposed to African American) ethnicity, severity of maternal psychiatric disturbance, higher maternal cognitive abilities (among African Americans) and lower child cognitive abilities (among Caucasians). Limitations of the study are discussed, as are implications of findings for future research.

The focus of this paper is on the psychosocial development of school-age and adolescent offspring of cocaine and opioid addicts, a group that has received little research attention so far. There has been much work with children in this age range whose parents have other types of psychiatric disorders, such as depression, alcoholism, and schizophrenia. Collectively, these studies have indicated multiple areas of psychosocial vulnerability (for reviews, see Cicchetti & Toth, 1995; Cummings & Davies, 1994; Nuechterlein, Phipps–Yonas, Driscoll, & Garnezy, 1990; West & Prinz, 1987).

The existing research on addicted mothers' offspring has been focused largely on infants and preschoolers, and findings with these young children indicate few major psychosocial deficits. Although there are some areas in which problems are manifested—such as attentional difficulties—there is little evidence for any global psychiatric or behavioral maladjustment (Hawley & Disney, 1992; Mayes & Bornstein, 1997).

By contrast, the little evidence that exists on older offspring of substance abusers indicates that they show considerable vulnerability for negative outcomes. Using the Child Behavior Checklist (CBCL; Achenbach, 1991), for example, deCubas and Field (1993) found that 6–13-year-old children of substance-abusing mothers scored higher on almost all problem scales as compared to matched controls. Similarly, Wilens, Biederman, Kiely, Bredin, and Spencer (1995a) documented higher levels of both internalizing and externalizing symptoms

among school age children of opioid abusers, as compared to children of normal controls. Additionally, more than half the sample of addicts' offspring had clinically elevated levels of symptomatology as indicated by CBCL *t* scores.

If older children of addicted mothers do in fact show serious vulnerability, a research task of obvious importance is the identification of risk and protective factors linked with the children's adaptation. This task forms the crux of this study. The major question addressed is, considering multiple aspects of maternal functioning and child attributes, what factors are related to the adjustment of cocaine- and opioid-abusing mothers' offspring?

Operationalization of Constructs

Our approach to operationalizing psychosocial functioning was based on multiple informants and multiple domains. Reports on the child's functioning were obtained from the children themselves, as well as their mothers. Domains assessed included maladjustment as indexed by both categorical (psychiatric diagnoses) and dimensional (symptom counts) measures, as well as levels of the child's adaptive behaviors in everyday life. Citing evidence that dimensional and categorical assessments can capture different aspects of child psychopathology, Ollendick and King (1994) have argued strongly for the use of both approaches in studying children. The value of looking at adaptive behaviors in everyday life is supported by evidence that high symptomatology does not necessarily imply low levels of socially competent behavior (Luthar, 1993).

Among the risk and protective indices examined, our primary focus was on aspects of the mother's psychosocial functioning. Drug-abusing mothers are single parents with few stable relationships with other adults; thus, they are often a potent socializing force for their children, perhaps more so than many other groups of parents (Levy & Rutter, 1992; Luthar & Walsh, 1995). From among the gamut of maternal attributes, we identified aspects of functioning that have been found to be particularly problematic among addicted women, with the reasoning that serious maternal disturbances would adversely affect minor children in their care as well. These variables included indices of overall psychopathology, aspects of personality, levels of sensation seeking, and cognitive abilities.

Addicted individuals typically have high levels of several comorbid psychiatric disturbances including depressive and anxiety diagnoses as well as antisocial personality disorder (Hesselbrock, Meyer, & Keener, 1985; Rounsaville et al., 1991; Rounsaville, Kosten, Weissman, & Kleber, 1986). For this inquiry we used two broad indices of overall disturbance, that is, the total number of lifetime psychiatric disorders comorbid with substance abuse, and whether the mother had ever attempted suicide. Use of the first of these was based in evidence that multiple comorbid psychiatric disorders typically presage relatively poor prognosis (e.g., Meyer, 1986; Shirley & Windle, 1994). Similarly, suicidal history has been commonly examined as an indicator of overall psychiatric impairment among drug-abusing women (e.g., Ross, Glaser, & Stiasny, 1988; Wallen, 1992).

Aside from examining their adjustment from a diagnostic standpoint, paralleling our strategy with children, we obtained dimensional assessments of both positive and negative affectivity among mothers. We also examined, more specifically, two personality dimensions likely to show disturbances among drug abusing women. One was sensation seeking, and the other (in a sense, the obverse) was behavioral inhibition. Sensation seeking has been found to be of considerable significance in the psychosocial adjustment of addicted individuals (Ball, Carroll, & Rounsaville, 1994); for child outcomes, there are substantial implications of having a mother who is habitually drawn to dangerous and unconventional behaviors.

Mothers' cognitive abilities were also examined given evidence of significant deficits in this regard among substance abusing women (Eliason & Skinstand, 1995; Haller, Knisely, Dawson, & Schnoll, 1993). Further, there have been reports among other disadvantaged groups that high maternal cognitive abilities are linked with relatively positive outcomes among offspring (Brooks-Gunn, Klebanov, & Duncan, 1996; Luster & McAdoo, 1994). Much of this research, however, has focused on maternal intelligence in relation to children's cognitive outcomes; there is currently little evidence on associations with psychiatric and psychosocial outcomes among children in high-risk circumstances.

In addition to maternal cognitive competence, children's cognitive abilities were also examined given findings that intelligence often moderates the effects of negative life circumstances on child adjustment (Luthar & Zigler, 1991). Finally, three other child attributes were examined as proxies for risk/protective influences: gender, age, and ethnicity. Whereas previous findings on gender and child psychopathology have been fairly consistent—with boys and girls being more vulnerable to externalizing and internalizing disorders respectively—the evidence on age and ethnicity has been less clear. To illustrate, in the literature on poverty and child adjustment, some studies have shown that the negative effects of life in poverty are cumulative with increasing age (Dodge, Pettit, & Bates, 1994; Eckenrode, Rowe, Laird, & Braithwaite, 1995), whereas others (Fitzpatrick, 1993) have found the reverse pattern to be true. McLoyd and Wilson (1990) found that younger adolescents reported more psychological distress than did older ones, possibly reflecting less mature coping strategies and psychological resources, and fewer social connections outside the context of the home.

Findings on ethnicity vis-à-vis child outcomes have been similarly equivocal. As Spencer and Dornbusch (1990) have argued, frequent findings of negative outcomes among minority children, more so than Caucasians, are typically interpreted based on ethnicity; however, they are in fact, often the products of social class differences. Consistent with this reasoning, it has been shown that when socioeconomic status is controlled for, differences associated with ethnicity become trivial in magnitude (Dodge et al., 1994). Further, some research has suggested that when ethnic differences are examined within disadvantaged samples, the direction of differences can be reversed, so that African American children and families fare better than their Caucasian counterparts (Baldwin et al., 1993; Peterson et al., 1994).

Summary

Based on the previously cited evidence, in this study we examined psychiatric and psychosocial outcomes among addicted mothers' offspring in relation to the following risk/protective indices: aspects of maternal psychiatric functioning and personality, cognitive abilities of mothers and their children, and the child sociodemographic attributes of gender, age, and ethnicity. Child outcomes were operationalized based on multiple indices including psychiatric diagnoses, levels of internalizing and externalizing symptomatology, and adaptive functioning in everyday life.

Methods

Overall design of study

This report derives from data collected within a family-genetic study of drug addicted individuals and their first-degree relatives. Deriving from Merikangas' family-genetic studies on alcoholism and anxiety disorders (Merikangas et al., 1995), overall objectives in this research were to examine patterns of transmission of major psychiatric disorders among families of adult substance abusers. The study involved extensive assessments of opioid and/or cocaine abusing probands, of their parents and siblings, and of their minor offspring.

This paper represents the first published report on the psychosocial status of this cohort of drug abusers' offspring.

Sample

Between 1990 and 1993, probands for this study were recruited from treatment facilities in New Haven that serve individuals who abuse cocaine and opioids, sampling the Yale Substance Abuse Treatment Unit's methadone and outpatient clinics as well as seven hospitals in the region. Participation was voluntary, and interested individuals were accepted in the study if they provided consent for interviewing at least one offspring between 7 and 17 years. Proband participants were paid \$50 for completing all assessments on themselves and \$20 for all assessments pertaining to their children. Children were paid \$20 for participating.

In all, we obtained data on a total of 137 children between the ages of 7 and 17 years, at least one of whose parents was in treatment for opioids or cocaine addiction. The overwhelming majority of these children ($n = 119$) were those whose mothers were addicted to drugs, as opposed to those whose biological fathers (but not mothers) were addicted ($n = 18$).

Given the central interest in effects of maternal dysfunction on children's psychopathology, the focus in this paper is limited to the 119 children whose mothers were drug abusers. Further, to guard against violation of statistical assumptions regarding independence of observations, a subsample of one child per mother was identified at the outset on which central analyses were conducted. The subset of 78 children included the oldest children for all mothers with more than one child. Oldest offspring were targeted to maximize the range of child psychiatric outcomes, given that the likelihood of observing lifetime psychiatric disorders among children increases with age.

Characteristics of sample—The histories of mothers in this sample reflected both multiplicity and severity of substance abuse problems. Whereas narcotics and cocaine respectively were the primary substances abused by 77% ($n = 60$) and 23% ($n = 18$) of the mothers, by far most of the mothers (90%) met criteria for abuse/dependence for more than one substance, and almost three-quarters (73%) met criteria for three or more substances. In addition to the end-stage drugs (Kandel, 1975) of heroin and cocaine, other substances abused were marijuana (67%), alcohol (60%), and sedatives (26%). Relatively high severity of substance use problems is also indicated by a mean age of onset of 19.3 years; 68% of the mothers in this sample had begun to abuse substances prior to 21 years of age.

The mothers and their children also represented a sociodemographically disadvantaged group. Forty-seven percent of the children were raised by their mothers alone, 39% lived in households with three or more minor children, and in 64% of instances the head of household was unemployed/on welfare or engaged in unskilled/semiskilled work. With regard to other demographic characteristics, 31% of mothers and 37% of offspring were of minority (African American) as opposed to Caucasian heritage. The mothers ranged in age between 24 and 47 years, with a mean of 35 ($SD = 5.0$). Offsprings' ages ranged between 7 and 17 years with a mean of 11.7 ($SD = 3.0$); 51% of the children were between 7 and 11 years of age and 49% were 12 or older. Forty-five percent of the children were boys.

In terms of living arrangements, mothers had sole or joint custody of almost all the children in this sample (95%, $n = 75$); of the three remaining children, one was in the custody of the father and two were with other adults. Further, almost all the children (94%, $n = 73$) were living with the mothers at the time of the interview. Of the five children who were not living

with their mothers, three reportedly saw their mothers at least several times every month and two visited with the mother several times a year.

Conversely, many of the children in this sample had limited contact with their biological fathers. Seventy-four percent ($n = 56$) of the children did *not* live with their fathers; of these, almost 40% ($n = 22$) had no contact whatever with their fathers, 27% ($n = 15$) saw their fathers a few times a year, and 34% ($n = 19$) visited at least several times a month.

Data collection strategy

Data collection for this study centered around interviews conducted with the addicted probands and their children, and when consent was provided, also with their spouses and their first degree relatives. Of the families involved in the overall study, direct interviews were conducted with all the children, 97% of the mothers (76 of 78), but only 37% of the fathers (39 of 105).

During their interviews, custodial proband parents, and the children themselves, each reported on the child's everyday social competence and psychiatric status (see "Measurement" section for details). Proband parents also reported on their own psychiatric history, as well as that of their spouses and first degree relatives. Interviews with participants were all conducted by master's level clinicians who had received extensive didactic and in vivo training in conducting the semistructured psychiatric interviews, as well as ongoing supervision. Interviewers who evaluated the children's functioning—in interviews with the children themselves or with the parents about the children—were blind to the psychiatric status of the parents, and were required to have had some prior clinical experience with children.

Measurement of central constructs

Child outcomes—*Children's psychiatric status* was determined based on the child version of the Schedule for Affective Disorders and Schizophrenia (SADS-L), the Kiddie-SADS (Chambers et al., 1985), that was modified to incorporate DSM-III-R diagnoses with the assistance of Dr. J. Puig-Antich (Merikangas et al., 1995). The K-SADS has been found to be a reliable and valid instrument for obtaining lifetime diagnoses on children (Chambers et al., 1985). In this study, the instrument was administered to the custodial parent as well as to the target child. Using these diagnostic data, as well as information on social competence (described later), and available data from family history reports, medical records, and teacher reports on Achenbach's Teacher Rating Form (Achenbach & Edelbrock, 1983), child psychiatrists arrived at "best estimate diagnoses" (Leckman et al., 1982).¹

For this study, child psychiatric outcomes were grouped in two broad categories, that is, Affective/Anxiety diagnoses including all depressive or anxiety disorders (see Table 1), and Disruptive behavior diagnoses (Conduct and Oppositional Defiant disorders). Attention Deficit Hyperactivity Disorder was excluded in view of ongoing controversy about the appropriateness of classifying this as a disruptive behavior disorder (Loeber & Keenan, 1994; Dishion, French, & Patterson, 1995).

As a cross-check on the reliability of the best estimate diagnoses, a subset of cases was independently and blindly rated by another clinician, and k coefficients were found to be .75 and 1.00 for Affective/Anxiety and Disruptive Behavior Disorders respectively.

¹Family history data, medical records, and teacher reports were obtained for 41%, 60%, and 29% of the sample, respectively.

Children's levels of internalizing and externalizing symptomatology were measured via Achenbach's Child Behavior Checklist (Achenbach & Edelbrock, 1983), based on reports by the custodial parent. Internal consistency coefficients on the CBCL within this sample, as well as consistency coefficients for other questionnaire-based measures used in the study, are presented in Table 2 along with means and standard deviations for each.

Children's *social competence in everyday life* was assessed via the Social Adjustment Inventory for Children and Adolescents (SAICA; John, Gammon, Prusoff, & Warner, 1987), a semistructured interview that was administered to all children and to their custodial parents. This instrument consists of 77 items that pertain to functioning in four role areas, that is, school, spare time activities, peer relations, and home. In addition to various subscale scores, a total social adjustment score can be derived from the SAICA; it was this score that was used in the present study (low overall SAICA scores are indicative of relatively good functioning).

As mentioned previously, children's and mothers' reports on the SAICA had been used as supplements to the K-SADS psychiatric interviews in arriving at children's "best estimate" diagnoses. Social competence scores were, nevertheless, independently examined as child outcomes in this study, since the SAICA samples a wider range of behavioral domains than those encompassed within psychiatric diagnoses, and it captures not just negative extremes of adjustment but positive ones as well (e.g., excellence in school or in extracurricular activities).

Risk/protective factors—In the context of maternal psychosocial characteristics, *maternal psychiatric history* was measured based on a modified version of the SADS-L (Endicott & Spitzer, 1978), yielding DSM-III-R diagnoses. The SADS-L is a widely used semi-structured interview, which has empirically established reliability and validity (Endicott & Spitzer, 1978, 1979). Apart from the proband parents' own reports, additional information on their psychiatric status was often available from interviews with the proband's spouses and their relatives, using the Family History-RDC method (Andreasen, Rice, Endicott, Reich, & Coryell, 1986), as well as from medical records. Based on data obtained across all these sources of information, Ph.D. or M.D. level clinicians arrived at "best estimate diagnoses" (Leckman et al., 1982). Reliability of these diagnoses was good; on a subset of cases that were independently reviewed by a second clinician, agreement was found to be 100% for any Affective/Anxiety disorder, and κ coefficients of .73 and .87 respectively were obtained for antisocial personality disorder and alcoholism.

Proband parents completed Zuckerman's (1984) measure of *sensation seeking*, a 72-item questionnaire that yields scores on a General scale and four subscales, Thrill and Adventure Seeking (desire to take physical risks), Boredom Susceptibility (need to seek change or novelty), Experience Seeking (seeking new experiences through unconventional behavior), and Disinhibition (interest in going against conventions and social norms). Acceptable psychometric properties for this measure have been documented (Zuckerman, 1984).

Maternal behavioral inhibition was assessed by the Retrospective Self-Report of Inhibition (RSRI; Reznick et al., 1992), a 30-item instrument with responses coded on a five-point scale. Good psychometric properties have been documented for the RSRI (Reznick et al., 1992). Mothers also completed the Multiphasic Personality Questionnaire (Tellegen, 1982). A 300-item questionnaire with a dichotomous response scale, the MPQ yields scores on 11 primary personality dimensions and three higher order traits, that is, *Positive Affectivity* (reflecting characteristics conducive to joy, excitement, vigor, and positive engagement), *Negative Affectivity* (associated with anxiety, anger, and related states of negative engagement), and *Constraint* (a self-restraint or response inhibition factor). High levels of

reliability and validity have been demonstrated for the MPQ in a range of subject populations (Gjerde, Block, & Block, 1988; Harkness, McNulty, & Ben-Porath, 1995; Tellegen, 1982).

Both mothers' and children's cognitive abilities were assessed by the Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981). A test of receptive vocabulary, the PPVT-R has well established reliability and validity (Sattler, 1982), and has frequently been used as a global indicator of cognitive competence among both mothers and children living in conditions of chronic socioeconomic disadvantage (e.g., Bradley et al., 1994; Brooks-Gunn et al., 1996; Chase-Lansdale, Brooks-Gunn, & Zamsky, 1994; Luster & McAdoo, 1994; Walker, Green-wood, Hart, & Carta, 1994).

Results

Checks on sample heterogeneity

At the outset, exploratory analyses were conducted to ascertain the comparability of the children whose addicted proband parent was a mother, as opposed to the small group of children whose fathers—but not mothers—were drug users. Across several child and mother indices, the former cohort was consistently at a disadvantage (see Hill & Muka, 1996, for comparable findings with alcoholic mothers vs. fathers). These differences substantiated our decision not to include children of addicted fathers while examining risk/protective factors in this study.

A parallel set of analyses was performed to examine differences associated with the mother's primary end-stage drug of choice, that is, opioids alone, cocaine alone, and both cocaine and opioids. Results indicated nonsignificant differences across multiple aspects of both children's and mothers' functioning; thus, data on these children were analyzed together.

Psychopathology among children and mothers

Child psychopathology—Table 1 presents rates of major DSM-III-R psychiatric disorders among the 78 unrelated children in the sample as well as the entire cohort of 119 children. As shown in this table, approximately 67% of the 78 unrelated children had at least one psychiatric diagnosis; almost half (46%) had at least one Affective/Anxiety disorder, and approximately 30% had at least one Disruptive disorder.

Analyses of differences in rates of childhood disorder by gender revealed a single difference, that is, boys had significantly higher rates than girls of ADHD (17% versus 0). With regard to ethnic differences, Caucasian children were more likely than minorities to have at least one diagnosis (76% vs. 52%); they also had significantly higher rates on three specific disorders: Overanxious disorder (12.0% vs. 0%), ADHD (12% vs. 0%), and ODD (31% vs. 10%).

To further characterize the extent of dys-function among children in this sample, clinical *t* scores were computed on CBCL scores. Using a cutoff of 60 (Biederman et al., in press; Wilens et al., 1995a), we found that 50% of the children had a significant *t* score on at least one CBCL subscale. On the overall Internalizing and Externalizing subscales respectively, 13% and 14% of the children had significant *t* scores.

Maternal psychopathology—Rates of disorders among mothers are presented in the third column of Table 1. An overwhelming 89.7% of mothers had at least one affective or anxiety disorder; 60% had comorbid alcoholism, and almost 30% had diagnoses of Antisocial Personality Disorder. Analyses of ethnic differences indicated a single difference: Caucasians had significantly higher rates of alcoholism (69.9% vs. 42.9%).

Data reduction of maternal attributes

In an attempt to reduce the number of variables representing maternal personality/psychopathology attributes, factor analyses were performed using varimax rotation. Using dual criteria of the scree plot and eigenvalues greater than one, analyses of the 10 attributes in question indicated a two-factor solution. An acceptable value of Kaiser–Meyer–Olkin (KMO) measure of sample adequacy was obtained (.62; Norusis, 1994). One of the two factors in this solution involved high maternal sensation seeking and low constraint in behaviors (factor loadings are indicated in parentheses): SSS Experience Seeking (.86), SSS Boredom Susceptibility (.81), SSS Thrill/Adventure Seeking (.65), MPQ Constraint (–.74), and SSS Disinhibition (.55). The second factor involved maternal psychopathology: total number of psychiatric diagnoses (.70), suicidal history (dummy coded as 0 and 1; .70), RCRI behavioral inhibition (.73), MPQ Negative Affectivity (.56), MPQ Positive Affectivity (–.40), and SSS Disinhibition (.46). With the exception of SSS Disinhibition which loaded on both factors, all variables loaded strongly on only one factor: loadings on the other factor were below .30. Based on these analyses, therefore, two composite scores were derived using standardized scores, summing according to the direction of factor loadings, and excluding SSS Disinhibition from the composite scores. The composite scores were labeled *Maternal Sensation Seeking* and *Maternal Psychiatric Illness* respectively.

Intercorrelations

Intercorrelations among the variables, presented in Table 3, generally indicated significant associations in expected directions with two exceptions. First, unlike other associations among child psychopathology indices, dimensional (CBCL) ratings of internalizing symptoms showed weak associations with other child outcomes. Second, maternal sensation seeking was *positively* linked with maternal cognitive abilities, raising the possibility that the more intelligent mothers in this sample were somewhat more disturbed than others (see the “Hierarchical multiple regression analyses,” and “Discussion” sections for more on negative effects linked with mothers' cognitive abilities).

Hierarchical multiple regression analyses

Given the lack of prior research on older children of drug abusing mothers, the data analytic approach in this study was exploratory in nature. Questions concerning risk/protective factors were examined via hierarchical multiple regression analyses. Separate analyses were conducted for each of the six outcome variables—Affective/Anxiety and Disruptive diagnoses, CBCL Internalizing and Externalizing scores, and SAICA mother and child reports—with the first two of these dummy coded for inclusion in these regressions (Cohen & Cohen, 1983).

The order of entry of the first few variables in these analyses was dictated by temporal considerations (Cohen & Cohen, 1983), so that the child's gender, age, and ethnicity—the first variables to be “fixed”—were included at the outset. Given the primary interest in psychopathology within this research, the two composites of maternal psychopathology were entered next, and the order of entry of these two variables within the block was allowed to vary according to decreasing tolerance (Tabachnick & Fidell, 1989). The last two variables entered were maternal cognitive abilities and child cognitive abilities, in that order.

Guided by previous evidence, a series of three interaction effects was also explored. These included interactions between (a) the composite indices of maternal psychopathology, given evidence that for children, coexisting forms of maternal psychopathology signal worse prognosis than either one existing alone (e.g., Radke–Yarrow & Klimes–Dougan, 1997), and (b) ethnicity and both maternal and child cognitive competence indices, in light of findings

that links between intelligence and psychosocial constructs can vary substantially across ethnic groups (Brooks–Gunn et al., 1996). In the interest of avoiding Type I errors, the interaction effects were examined individually only if the set of three considered as a block yielded a significant increase in R^2 .

Results of the regression analyses are presented in Table 4. As shown in this table, a single finding was obtained for child gender; mother's SAICA reports were better for daughters than for sons. Child age was positively linked with incidence of Affective/Anxiety disorders and mothers' reports on the SAICA. Ethnicity was linked with Disruptive diagnoses and with both mothers' and children's reports on the SAICA; in each case, the direction of these findings favored African Americans. Maternal Psychiatric Illness was associated with CBCL Internalizing and Externalizing disorders and mother's reports on the SAICA, whereas Maternal Sensation Seeking was linked with child Disruptive diagnoses. Mothers' cognitive abilities were positively linked with incidence of child Affective/Anxiety diagnoses, and three negative associations were found for child cognitive abilities, with mothers' reports on the SAICA and on both internalizing and externalizing symptoms.

The block of three interaction terms was nonsignificant in relation to Affection/Anxiety diagnoses and child SAICA reports, but was significant for the other four outcomes at $p < .05$. Examination of terms within the blocks indicated the following significant effects: (a) Maternal Psychiatric Illness $\times$ Maternal Sensation Seeking in relation to child Disruptive diagnoses and Externalizing CBCL scores; (b) maternal cognitive competence $\times$ ethnicity in relation to both Disruptive diagnoses and mothers' reports on the SAICA; and (c) child cognitive competence $\times$ ethnicity in relation to child Internalizing and Externalizing disorders.

The pattern underlying each of these interaction effects is displayed in Figures 1a–f. As shown in Figures 1a and 1b, coexisting high levels of psychiatric illness and sensation seeking increased the likelihood of disruptive behaviors among children. Figures 1c and 1d indicate that children's disruptive behavior problems and disturbances in everyday functioning were most pronounced among offspring of African American mothers with relatively high cognitive functioning. Finally, Figures 1e and 1f indicate that low levels of child cognitive abilities were positively linked with mothers' reports of child symptomatology, but only among Caucasian youth.

Discussion

Our discussion of findings is presented according to the discrete groups of risk/protective factors examined. In turn, we discuss findings on maternal psychopathology, maternal and child cognitive abilities, and the child sociodemographic characteristics of age, ethnicity, and gender. Rates of psychopathology among addicted mothers' offspring are considered next, followed by limitations of this study and directions for future research.

Risk and protective factors

Of the maternal composites examined here, *maternal sensation seeking* was associated with diagnoses of disruptive behavior disorders in children and *maternal psychiatric illness* was linked with mothers' reports of children's externalizing and internalizing symptoms, as well

²Given (a) considerations regarding statistical power, (b) that our sample included predominantly lower class families, and (c) previous findings that with a restricted range, SES is unlikely to show strong associations with outcomes (e.g., Luster & McAdoo, 1994; Luthar, 1995), SES was not included in the central analyses (Table 4). However, replicatory analyses were conducted of all regressions, with SES entered at Step 4 after ethnicity. Results were no different from those reported in the tables. Similarly, single mother household status was unrelated to all six outcomes, and associations reported in Table 4 were essentially unaltered by inclusion of this variable.

as with problems in everyday social competence. The apparently heightened vulnerability among offspring of particularly troubled mothers may reflect genetic influences (Rutter, 1990), parents' role modeling of dysfunctional behaviors (Downey & Coyne, 1990; Cummings & Cicchetti, 1990; Patterson, 1982), and/or disturbances in distressed mothers' parenting behaviors (see McLoyd, 1990). In addition, the trends documented may reflect, in part, psychiatrically affected mothers' tendencies to view their offspring in a relatively negative light (see Fergusson, Lynskey, & Horwood, 1993; Renouf & Kovacs, 1993).

Results of this study also suggested that *coexisting forms of maternal disturbance*—high psychiatric illness along with high sensation seeking—exacerbated risk to offspring. These findings are consistent with other findings among children of psychiatrically affected mothers. In comparing depressed mothers with and without personality disorders, for instance, Radke–Yarrow and colleagues found that the former tend to be more critical and psychologically unavailable in interactions with their offspring (DeMulder, Tarullo, Klimes–Dogan, Free, & Radke–Yarrow, 1995) and that children's problems on the CBCL were strongly associated with mothers' scores on dimensional assessments of personality disorder (Radke–Yarrow & Klimes–Dogan, 1997).

Our findings on *maternal cognitive ability* indicated that as compared to mothers with relatively low cognitive competence, those with *higher* abilities had children with poorer psychosocial outcomes. These trends were particularly pronounced among African American families, and consistent findings were seen on two child outcomes: disruptive behavior diagnoses and mothers' reports on everyday competence. In short, among African American mothers, higher cognitive abilities seemed linked with reports of relatively poor adjustment among their offspring.

These apparently counterintuitive findings might stem in part from variations in the mothers' social advantages and educational background. Typically, scores on vocabulary-based measures such as the PPVT-R are influenced by individuals' levels of education. Thus, one might conjecture that the African-American mothers with high cognitive ability scores had more privileged backgrounds than others, and that drug addiction among these mothers may have been related to relatively greater psychopathology, greater censure or ostracism from their upwardly mobile families, and/or simply more feelings of personal failure.

Trends such as these may also involve specific parenting behaviors among the more intelligent mothers, as suggested by Goodman, Simonoff, and Stevenson (1995) who obtained findings similar to ours. In their recent epidemiological study of 11–13-year-old children, these authors found that although high child intelligence was protective in terms of child psychopathology, high levels of intelligence among parents was linked with greater child symptomatology as indexed by both parents' and school reports. In discussing their results, Goodman and colleagues speculated that bright parents may exert excessive pressure on children to succeed intellectually and academically, and/or may display other behaviors that engender maladjustment in children such as tendencies toward overprotectiveness.

Our findings with *child cognitive abilities* indicated three main effects, each in relation to mothers' reports on children's functioning. Children's cognitive abilities were negatively associated with maternal reports on adaptive behavior problems as well as both internalizing and externalizing symptoms. The findings suggest two underlying possibilities. First, high intelligence may have served as a protective factor (or low intelligence as a vulnerability factor) given that IQ is linked with children's coping abilities as well as with success experiences at school (e.g., Luthar, Woolston, Sparrow, Zimmerman, & Riddle, 1995; Lynam, Moffitt, & Stouthamer–Loeber, 1993; Masten et al., 1988). Alternatively or

additionally, the mothers' perceptions may have been colored somewhat by their children's intelligence, wherein they viewed bright children more positively than others.

Interaction effects were also found involving child cognitive abilities with ethnicity: links between child intelligence and both internalizing and externalizing symptoms were stronger among Caucasian than among minority children. Rather than indicating protective effects of high intelligence, the data showed that low cognitive skills were linked with heightened vulnerability among Caucasian, but not African American youth. Again, these findings may reflect more negative perceptions among mothers of the less intelligent Caucasian children, and/or relatively poor functioning among the children themselves.

Interpretability of our various findings on cognitive abilities is constrained by measurement issues, since assessments were based on a single measure of receptive vocabulary among both children and mothers. Previous research has, however, yielded promising findings regarding the validity of the measure we used, the PPVT-R, as an index of global cognitive abilities among disadvantaged samples. For example, in research from the eight-site Infant Health and Development Program (Brooks-Gunn et al., 1996) where the PPVT-R was used to assess mothers' cognitive abilities, scores on this instrument shared substantial variance with maternal educational level. Similarly, studies of disadvantaged youth have found similar correlates for children's receptive vocabulary and for other cognitive indices including standardized achievement tests as well as measures of abilities (Luster & McAdoo, 1994; Walker et al., 1994). Finally, confidence in our findings on cognitive abilities is buttressed by the previously cited findings by Goodman et al. (1995) that, whereas high child IQ was protective in nature, high parental intelligence was linked with greater emotional disturbance among offspring.

With regard to the various child sociodemographic indices examined, results of this study showed that the child's *age* was linked with increasing rates of Affective/Anxiety diagnoses as well as with poorer levels of social competence. Viewed in tandem with previous work with infant and preschool children of drug abusers (see Hawley & Disney, 1992; Mayes & Bornstein, 1997), these trends suggest that outcomes among addicted mothers' offspring may deteriorate the longer the child lives with the mother. This assumption is consistent with findings with other psychiatrically disturbed mothers. Cummings and Davies (1994), for example, report increasingly strong relations between maternal depression and child behavior problems as children get older, reflecting accruing risks with increasingly adverse effects on child functioning as offspring live longer with their disturbed care-givers.

Our findings with *ethnicity* indicated that for both disruptive behavior diagnoses and social competence—as rated by the child and the mother—African American children were at an advantage relative to Caucasians. These findings too have precedents in the literature. In their 3 year longitudinal study of African American and Caucasian youth in high crime neighborhoods, for example, Peterson and colleagues (1994) found that as compared to Caucasian parents, minority parents had stronger norms against deviant behaviors among their offspring. Similarly, Baldwin and colleagues (1993) showed that within groups of only low SES families, African American children had better mental health than Caucasians. These authors speculated that minority groups, having had a long history of disadvantage in this country, may have developed more effective ways of coping with chronic disadvantage over the years. Alternatively, the negative connotations of living in poverty might be felt more keenly by Caucasians as compared to African Americans for whom there is a greater precedence of others living in similar circumstances. Similar explanations might be offered to account for the findings that in our largely underprivileged sample, African American children were reported to have had less maladjustment than others.

Our failure to detect *gender differences* across major psychiatric disorders flies in the face of other trends in the literature. In general, boys have higher rates of disruptive disorders, and girls more often have internalizing disorders such as depression (Cicchetti & Toth, 1995; Kazdin, 1987). On the other hand, our findings with substance abusers' children mirror data on addicted adults. Research has shown that while there do exist some gender differences in profiles of psychiatric disorders among drug addicts, the magnitude of these differences is less than it is in the general population (Robins & Regier, 1991; Rounsaville, Weissman, Kleber, & Wilber, 1982). This attenuation of gender differences may, in part, reflect the high psychosocial adversity that addicts face (Luthar, Glick, Zigler, & Rounsaville, 1993). In other words, given the host of difficulties they encounter, female addicts may develop not only the typically “female” disorders such as depression, but also the more “male” diagnoses such as antisocial personality disorder (and the converse for males). Similar explanations might account for the paucity of gender differences here among addicts' offspring.

Extent of psychopathology among addicted mothers' offspring

The primary objective within this study was to examine risk/protective factors for psychopathology among addicted mothers' offspring rather than to quantify the degree of disturbance shown by these children. Nevertheless, parallel data published by other research groups permit two tentative inferences regarding the rates we detected. These inferences—one of which is unsurprising but the other possibly less so—are first, that addicted mothers' offspring show greater disturbance than youth in the general population, and second, that the degree of child psychopathology associated with maternal drug abuse is *not* necessarily greater than that linked with other forms of maternal psychiatric dysfunction.

Estimated rates of DSM-III-R childhood disorders in the general population are available in a recent epidemiological study of pre-adolescent and adolescent youth (Cohen et al., 1993). As compared with rates in this report, it is clear that addicted mothers' offspring demonstrated markedly greater vulnerability to psychopathology with respect to various disorders. For example, rates of major depression were 19.3% in the present study as compared to incidence rates of 3.3% among 10–16-year-old children in the population, and alcohol abuse/dependence rates were 5.0% here, versus 1.7% in the population.

Viewed along with reports by Hill and Muka (1996) and by Hammen and colleagues (Hammen, 1991; Hammen, Burge, Burney, & Adrian, 1990), our findings suggest that children of drug abusing mothers are not substantially more dysfunctional than offspring of other psychiatrically ill mothers. The investigations by Hill and Hammen each sampled children in a similar age range (i.e., 8–18 years) and both involved assessments based on the Kiddie-SADS. (Both samples also included multiple children per family in some instances.) Whereas 61% of addicted mothers' offspring in the present study had at least one psychiatric disorder, comparable rates of 60% were documented by Hill and Muka (1996) among at-risk children in families with a high density of female alcoholism (typically, the mothers were affected). Hammen and colleagues' studies involving depressed mothers revealed still higher rates of child disorders: at least one diagnosis occurred among 82% and 72% of children of mothers with unipolar and bipolar depression, respectively. Interestingly, even among those depressed mothers who had no lifetime comorbid substance abuse (this was true of most mothers in Hammen's study), 73% of their children had at least one diagnosis (Hammen, 1991).

Obviously, inferences based on comparisons across studies can be tentative at best. Although all three studies report on lifetime diagnoses integrating both mothers' and children's reports on the same assessment instrument (the Kiddie SADS), other aspects of methodology varied (e.g., the Hill and Hammen studies involved primarily Caucasian and middle-class families, and sample sizes were smaller than those in the present study).

Similarly, although all three studies involved treatment seeking mothers, one might conjecture that among *nontreatment* seeking individuals, substance abusing women (and their children) would fare more poorly than would their depressed or alcoholic counterparts. These caveats notwithstanding, it is striking that despite the multiple and serious adversities that children of addicted mothers in this study faced, their overall psychiatric functioning does not appear to be worse than that reported among children of alcoholic and/or depressed mothers from far less disadvantaged families.

Raising as they do, inconsistencies with widely held stereotypes about drug abusing mothers—that they are inimical to their children's welfare far more than are other psychiatrically affected mothers (Luthar, Cushing, & McMahon, 1997)—these findings clearly warrant careful empirical scrutiny in the future. Invaluable would be research efforts aimed at teasing apart those effects of maternal psychopathology that are linked with drug abuse *per se* as opposed to those associated with common comorbid problems, such as maternal depression or alcoholism. Such questions regarding specificity of effects might be effectively pursued by using multiple demographically matched groups of mothers, such as those with addiction only, those with addiction and affective disorders, and those with affective disorders alone.

A final concern vis-à-vis rates of childhood disorders is the question of whether children of opioid- versus cocaine-abusing mothers might reflect differential profiles of psychopathology. Whereas analyses in this study indicated few differences in this regard, conclusiveness of findings is limited by the small sample size and the possibility of Type II errors. On the other hand, it should be noted that previous family genetic studies have established that among drug abusers' families, there is little evidence for specificity of transmission of disorders. In other words, although cocaine and opioid abusers themselves show somewhat varying profiles of comorbid psychopathology, addicts' relatives typically show heightened risk for several disorders and not just the particular psychiatric problems evidenced by the affected proband (see Ripple & Luthar (1996) for a review).

Limitations and future directions

As suggested in the preceding discussions, salient among the limitations of this study is the lack of control group data. From the standpoint of the central objectives of this study—that is, to examine risk and protective factors among addicted mothers' offspring—the absence of comparison data is not a limiting factor (see Cicchetti & Toth, 1995; Luthar, 1993). Comparison groups are, however, helpful in ascertaining where the psychosocial adjustment of at-risk samples might lie on some “real world” scales (Luthar & Zigler, 1991). In future investigations, it would be useful to determine how the degree of psychopathology identified among addicts' offspring might compare with disorders among offspring of underprivileged, disenfranchised mothers with and/or without other psychiatric disorders.

A second limitation lies in the cross-sectional nature of this research, which precludes any definitive conclusions about causality. We are presently conducting follow-up assessments on the cohort of children discussed here, and scrutiny of cross-lagged associations with these data could be invaluable in further illuminating causal links suggested here.

Third, there was a fairly wide spread in chronological age among children in this study. Recognizing this, age was controlled for in all analyses about risk and protective factors. In the future, however, it would be useful to explore issues such as those raised here using a sample with a narrower age range.

Fourth, it would be useful to reexamine trends suggested here on maternal and child cognitive abilities using other measures of intelligence. Notwithstanding the previously

cited evidence on the validity of the PPVT-R among disadvantaged populations, this instrument does assess a relatively limited aspect of cognitive functioning and is not culture free. For both theory and research, there could be much value in further scrutiny of the apparently contrary trends identified in this study and others (Goodman et al., 1995): that whereas high *child* intelligence can be protective in terms of child psychopathology, high *parental* intelligence might serve as a vulnerability factor.

In future research, there would also be value to examining in greater depth the “proximal” aspects of mothers' psychosocial functioning—parenting behaviors that directly affect children—in relation to child outcomes. Of particular interest would be disciplinary patterns, child maltreatment, and expressions of nurturance (Cicchetti & Lynch, 1995; Luthar et al., 1997) as potential mediators of the effects of maternal substance abuse and comorbid psychopathology on children. Also useful would be data on the children's living arrangements since their birth, given that addicts' offspring are often placed in the care of relatives or in foster care for considerable lengths of time (Levy & Rutter, 1992). Inclusion of such indices might bolster the predictive power of family-based models of children's adjustment beyond levels that were achieved in this study (R^2 values between .23 and .34).

Final directions for future research would be to sample addicted mothers other than just those seeking treatment, and to include paternal characteristics in models such as those examined here (Phares & Compas, 1992; Rutter, 1990). While working with addicted individuals, however, it should be noted that substantial logistical difficulties can occur in this context. For example, our own research as well as others' (Goldstein et al., 1995; Wilens et al., 1995b) has indicated that obtaining interviews with addicted fathers is often difficult because many have little or no contact with their children.

Whereas various methodological limitations have been noted here, several features of this research argue for its contributions to the field. This is among the first published reports by any research group on older children of opioid- or cocaine-abusing mothers, involving comprehensive assessments of psychiatric and psychosocial functioning of both mothers and children, with psychometric indicators that at-test, in general, to the veracity of the data obtained. Given the paucity of prior research on this population, findings of this study might serve as guides for future research incorporating more sophisticated and more resource-intensive designs, including, for example, larger samples with appropriate comparison groups, and comprehensive longitudinal assessments of psychosocial and cognitive functioning.

Summary and Conclusions

In summary, our examination of risk and protective factors among addicted mothers' offspring indicated the following trends. First, mothers' overall psychiatric illness was associated with their reports of symptomatology and social competence among their children, and mothers who were highly sensation seeking more often had children with disruptive behavior diagnoses. Second, the combination of high psychiatric distress and high sensation seeking among mothers increased the likelihood of disruptive problems among children.

Third, higher levels of maternal cognitive abilities—particularly among African Americans—were associated with reports of relatively *poor* psychosocial outcomes among children, possibly reflecting greater dysfunction among bright minority mothers. By contrast, among children (only Caucasians), low cognitive abilities were linked with high maternal reports of symptomatology. These findings add to a growing body of evidence underscoring the need to consider intelligence–adjustment links not only in terms of main effects but also in

interactive models that incorporate other demographic and psychosocial indices (White, Moffitt, & Silva, 1989).

Fourth, in regard to the child sociodemographic attributes, relatively few gender differences were found on children's psychiatric functioning. Older children, however, showed more problems than did younger offspring, ostensibly reflecting the greater length of time they had endured significant adversities in their lives. Finally, children and mothers of African American (as opposed to Caucasian) descent had comparatively positive outcomes. These findings are congruent with other research on disadvantaged families which have been viewed as suggesting that over time, minority individuals may have developed somewhat better skills at coping with life under underprivileged circumstances. The constellation of findings obtained here underscores the importance of further empirical study of older children of addicted mothers and provides specific directions for future prospective research on this vulnerable population.

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Figure 1.

(a,b) Interaction between Maternal Psychiatric Illness and Maternal Sensation Seeking in relation to child outcomes. (c,d) Interaction between maternal cognitive abilities and ethnicity in relation to child outcomes. (e,f) Interaction between child cognitive abilities and ethnicity in relation to child outcomes.

Table 1

Psychiatric disorders among children and mothers in sample

Psychiatric Diagnosis	Children		Mothers (<i>n</i> = 78)
	One Child Per Family (<i>n</i> = 78)	Including Siblings (<i>n</i> = 119)	
Any diagnosis ^a	66.7 (52)	61.3 (73)	100 (78)
Any affective/anxiety	46.2 (36)	39.5 (47)	89.7 (70)
Major Depression	25.6 (20)	19.3 (23)	66.7 (52)
Dysthymia	7.7 (6)	6.7 (8)	19.2 (15)
Separation Anxiety	14.1 (11)	12.6 (15)	19.2 (15)
Overanxious	7.7 (6)	5.9 (7)	20.5 (16)
Generalized Anxiety	—	—	23.1 (18)
Any childhood disruptive disorder	29.5 (23)	30.3 (36)	37.2 (29)
Oppositional Defiant	23.1 (18)	18.5 (22)	6.4 (5)
Conduct	9.0 (7)	8.4 (10)	35.9 (28)
Attention Deficit Hyperactivity	7.7 (6)	10.9 (13)	10.3 (8)
Antisocial Personality	—	—	29.5 (23)
Any substance	10.3 (8)	6.7 (119)	100 (78)
Alcohol Abuse/Dependence	7.7 (6)	5.0 (6)	60.3 (47)
Drug Abuse/Dependence	6.4 (5)	4.2 (5)	100 (78)

Note: Values are percentages, and numbers of individuals are in parentheses.

^aIncludes Adjustment Disorders; with these disorders excluded, rates are 60 and 56% for the unrelated children (*n* = 78) and overall sample (*n* = 119) respectively.

Table 2Mean scores on questionnaire-based measures and α coefficients of internal consistency

Measure	Mean	SD	α ($n = 78$)
Child measures			
CBCL ^a : Internalizing (raw score)	6.38	7.25	.90
CBCL: Externalizing (raw score)	8.11	8.83	.94
CBCL: Internalizing (t score)	48.59	11.60	
CBCL: Externalizing (t score)	48.26	12.00	
SAICA ^b : Mother report	1.59	0.26	.89
SAICA: Child report	1.59	0.26	.86
Mother measures			
SSS ^c : Boredom susceptibility	6.10	3.00	.67
SSS: Experience seeking	8.52	3.26	.72
SSS: Disinhibition	5.21	2.61	.64
SSS: Thrill/adventure seeking	6.60	3.22	.78
RSRI ^d	2.43	0.56	.90
MPQ ^e : Negative affectivity	144.10	15.17	
MPQ: Positive affectivity	144.21	11.97	
MPQ: Constraint	163.94	10.45	

^aChild Behavior Checklist.^bSocial Adjustment Inventory for Children & Adolescents.^cSensation Seeking Scale.^dRetrospective Self-Report of Inhibition.^eMultiphasic Personality Questionnaire. Alpha coefficients are not provided for MPQ scores because they are composites involving disparate weighting patterns of individual subscales. The 11 MPQ subscales had alpha coefficients ranging between .70 and .89 (median .81).

Table 3

Intercorrelations of risk/protective variables and child outcomes

	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender ^a												
2. Age	.04											
3. Ethnicity	.00	-.35**										
4. Maternal psychiatric illness	.04	-.20 ⁺	.22*									
5. Maternal sensation seeking	.08	.10	.18	-.15								
6. Maternal cognitive abilities	.07	.17	.46***	-.03	.35**							
7. Child's cognitive abilities	-.01	-.23*	.51***	.02	.28*	.45***						
8. Affective/anxiety disorder	-.06	.30**	.02	-.01	.01	.30**	.12					
9. Disruptive disorder	.09	.14	.15	.07	.28*	.25*	.13	.25*				
10. CBCL: Internalizing	.02	-.12	.17	.44***	-.04	.00	-.13	.19	.05			
11. CBCL: Externalizing	.10	-.05	.16	.38***	.08	-.03	-.07	.07	.36**	.72***		
12. SAICA: Mother report	.25*	.21 ⁺	.12	.18	.09	.27*	-.12	.21 ⁺	.56***	.15	.35**	
13. SAICA: Child report	.13	.20 ⁺	.20 ⁺	.09	.15	.28*	.18	.28*	.56***	.02	.19 ⁺	.72***

Note: Unless otherwise specified, all variables refer to child characteristics.

n = 78.

^aCategorical variables are dummy coded as follows: Gender, 1 = boys, 0 = girls; Ethnicity, 1 = Caucasian, 0 = African American.⁺ p < .10;

* p < .05;

** p < .01;

*** p < .001.

Table 4

Hierarchical multiple regression analyses predicting child outcomes

Criterion	Step	Affective/Anxiety Disorders			Disruptive Disorders			Internalizing (CBCL)			Externalizing (CBCL)			SAICA (Mother)			SAICA (Child)		
		B ^a	R ² Δ	B	R ² Δ	B	R ² Δ	B	R ² Δ	B	R ² Δ	B	R ² Δ	B	R ² Δ	B	R ² Δ	B	R ² Δ
Gender ^b	1	-.06	.00	.09	.01	.31	.00	1.50	.01	.13	.06*	.07	.02						
Age	2	.05	.09**	.02	.02	-.29	.02	-.18	.01	.02	.04 ⁺	.02	.03						
Ethnicity	3	.15	.02	.21	.04 ⁺	2.20	.02	2.80	.03	.11	.04 ⁺	.16	.08**						
Maternal psychiatric illness (MPI)	4	-.01	.00	.01	.00	.99	.17***	.90	.12**	.02	.04 ⁺	.01	.01						
Maternal sensation seeking (MSS)	5	-.01	.00	.04	.05*	.03	.00	.25	.01	.00	.00	.01	.01						
Cognitive abilities: Mother (CA-M)	6	.01	.05*	.00	.01	-.02	.00	-.07	.02	.00	.02	.00	.01						
Cognitive abilities: Child (CA-C)	7	.00	.01	.00	.00	-.14	.06*	-.12	.04 ⁺	-.01	.05*	.00	.00						
Interaction terms																			
MPI × MSS	8			.01	.07*	.12	.02	.20	.05*	.00	.01								
CA-M × ethnicity	9			-.02	.05*	-.05	.00	-.12	.01	-.01	.07*								
CA-C × ethnicity	10			.01	.01	-.26	.05*	-.23	.03 ⁺	.00	.00								
Total R ²			.23		.26		.33		.31		.34		.23						

Note: n = 78.

^a As recommended by Aiken and West (1991), unstandardized regression coefficients are reported because standardized coefficients are inappropriate with interaction terms; also, interaction terms in these analyses involve centered variables.

^b Gender, 1 = boys, 0 = girls; Ethnicity, 1 = Caucasian, 0 = African American.

⁺ $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$.