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COGNITIVE AND BEHAVIORAL-EMOTIONAL FUNCTIONING DURING THE EARLY SCHOOL-AGE YEARS FOR PRETERM BORN CHILDREN: THE ROLE OF THE MOTHER-CHILD RELATIONSHIP

by

Lynda M. Richtsmeier

A Dissertation Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

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APPROVAL PAGE

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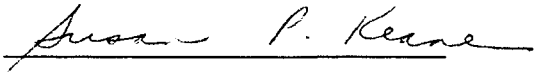
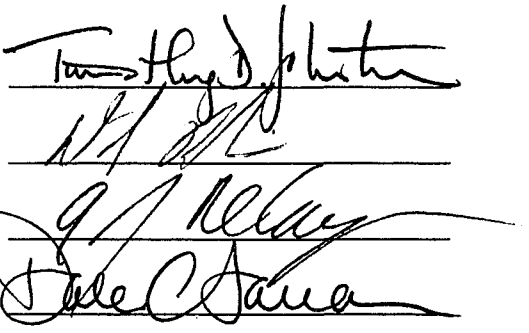
Dissertation Advisor 

Committee Members 

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The present study investigated whether the mother-child relationship functioned as a moderator (i.e., protective factor) in reducing the effect of biological risk on preterm born children's cognitive and behavioral-emotional functioning during the early school-age years. Preterm born children's cognitive and behavioral-emotional functioning was also compared to a group of demographically similar full-term born peers. The Perinatal Risk Inventory (PERI) was used to determine the severity of preterm born children's perinatal medical complications, and provided a measure of biological risk. Both children's and mother's perceptions of the quality of the mother-child relationship were obtained. Significant predictors of preterm born children's cognitive and behavioral-emotional functioning during the early school-age years included, severity of children's perinatal medical complications, current stressors in the family context, and children's and mother's perceptions of the quality of the mother-child relationship, and these factors had differential effects depending on the outcome assessed. Analyses provided preliminary support for the hypothesis that the mother-child relationship functioned as a moderator of the relationship between biological risk and preterm born children's cognitive and behavioral-emotional functioning during the early school-age years. The only significant group difference found between preterm and full-term born children was in their reports of depressive symptoms.

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CHAPTER I

Introduction

Preterm birth, and its attendant medical complications, constitutes a significant risk for subsequent cognitive, behavioral, and/or socioemotional difficulties. Compared with their peers, children born preterm have been found to exhibit more learning and behavioral problems during the early school-age years (Brandt, Magyary, Hammond, & Barnard, 1992; Cohen, Parmelee, Sigman, & Beckwith, 1988; see Hoy, Bill, & Sykes, 1988 for a review). Longitudinal research studies, however, have also indicated considerable individual differences in developmental outcomes among children born preterm (see Aylward, Pfeiffer, Wright, & Verhulst, 1989 for a review). For example, the percentage of children born preterm who receive special school services ranges from 28 to 64% (Eilers, Desai, Wilson, & Cunningham, 1986; Grunau, 1986; Lefebvre, Bard, Veilleux, & Martel, 1988; Lloyd, 1984; Vohr & Coll, 1985).

Over the past few decades, advances in neonatal medicine have resulted in increased survival rates for infants born prematurely (Gross, Slagle, D'Eugenio, & Mettelman, 1992; Hack & Fanaroff, 1989). Consequently, updated investigations of developmental outcomes for these "at-risk" children are greatly needed. Given that children's early school performance can have significant implications for their future adaptation (Jacobs, 1990; Thompson, Lampripon, Johnnson, & Eckstein, 1990), investigations of preterm born children's cognitive and behavioral-emotional functioning during the early school-age years is particularly important.

Substantial research has focused on identifying the biological (i.e., medical complications) and environmental factors (i.e., family socioeconomic status) that are related to developmental outcomes among preterm born children. However, our understanding of potential moderators (i.e., protective factors) of preterm born children's adaptation during the early school-age years is rather limited. In particular, researchers have not adequately examined whether the mother-child relationship contributes to and/or moderates the relation between biological risk and preterm children's cognitive, behavioral, and socioemotional functioning during the early school-age years (Brandt et al., 1992; Greenberg & Crnic, 1988; Hack, Klein, & Taylor, 1995). A better understanding of moderator factors can help to elucidate developmental processes (Cicchetti, 1989), and provide information needed to establish effective intervention programs for preterm born children identified to be at high-risk for developmental difficulties (Fagan & Singer, 1981; Ramey, Zeskind, & Hunter, 1981).

Models of Development

The central premise of interaction models of development is that there is a relationship between biological and environmental factors (Fiese & Sameroff, 1989; Sameroff & Chandler, 1975). In contrast, main effect models of development are guided by the assumption that biological and environmental factors exert influences on development which are independent of each other. Based on a series of retrospective studies, Pasamanick and Knobloch (1961) concluded that there was a "continuum of reproductive causality," or that there was a positive, direct relationship between the

severity of perinatal complications and the child's subsequent intellectual and/or psychosocial disability, and that this relationship was independent of the child's ecological context. Prospective research studies, however, did not support this original hypothesis (see Sameroff & Chandler, 1975 for a review). Lack of a direct relation between perinatal risk factors and children's intellectual and psychosocial competence prompted interest in the social context of development, and the concept of a "continuum of caretaking casualty" (Sameroff & Chandler, 1975) was hypothesized to describe the range of developmental disorders that could be attributed to the socioeconomic environment in which the child was reared.

Researchers interested in testing an interaction model of development have focused their efforts on investigating the nature of risk, vulnerability, and protective mechanisms as they unfold and interact across development to produce individual differences in the quality of children's adaptation. Garmezy (1985) has defined protective factors (i.e., moderators of risk) as attributes of the person, environment, situation, or event that decrease the probability of psychopathological outcomes based upon an individual's at-risk status. Similarly, Rutter (1987, 1990) has conceptualized a protective process as involving a modification of the person's response to the risk situation, such that the developmental trajectory is more positive than would be the case if the protective process was not operative. The importance of research which investigates risk and protective (moderator) factors is that it is based upon a model that seeks to understand the developmental roots of psychopathology, as well as the capacity of the individual to achieve successful outcomes despite adversity (Masten, Best, & Garmezy, 1990; Rutter, 1987).

Role of Biological Factors

It has been well documented that preterm infants, comparable to each other in terms of gestational age and birthweight, may develop different medical complications, such as intraventricular hemorrhages (IVH), respiratory distress syndrome (RDS), hydrocephalus, and/or bronchopulmonary dysplasia (BPD). With the advancements in neonatal medicine over the past few decades, researchers have been able to more specifically identify the severity of preterm born children's medical complications (e.g., intraventricular hemorrhages (IVH) have been subgrouped into four grades), and research has indicated that preterm infants with severe medical complications (i.e., BPD, severe grades of IVH) are at greater risk for developmental problems than are preterm infants with less severe medical complications (i.e., RDS, minor grades of IVH) (Landry, Fletcher, Zarling, Chapieski, & Frances, 1984; Landry, Chapieski, Richardson, Palmer, & Hall, 1990) . Accordingly, many researchers have recommended that an index of biological risk, one that summarizes both prematurity and illness severity, be used when the purpose of the investigation is to identify preterm infants at risk for developmental difficulties (e.g., Minde, Whitelaw, Brown, & Fitzhardinge, 1983; Scheiner & Sexton, 1991; Siegel et al., 1982). However, many researchers who have studied developmental outcomes for high-risk preterm infants have reported significant main effects for severity of perinatal complications without adequately controlling for the effects of the child's socioeconomic environment in their study design (e.g., Berman et al., 1986; Landry et al., 1984; Landry, Chapieski, Fletcher, & Denson, 1988; Vohr, Bell, & Oh, 1982).

Role of Socioeconomic Environment

Given that the incidence of preterm birth is negatively correlated with family socioeconomic status (SES) (Berkowitz, 1981; Kopp & Krakow, 1983) and that high-risk preterm infants are believed to be more vulnerable to poor environmental conditions than healthy full-term infants (Escalona, 1984; Sameroff, 1986), it is especially important that the impact of the socioeconomic environment be considered when investigating developmental outcomes among children born preterm. Researchers who have investigated both the preterm born child's socioeconomic environment and biological risk, have found that the best prediction of children's functioning was achieved by using a combination of environmental and biological variables (e.g., Siegel, 1982; Werner & Smith, 1971).

Socioeconomic status (SES) has also been found to be a powerful moderator of biological risk for preterm born children's developmental outcomes. For example, based on a longitudinal study, Hunt, Cooper, and Tooley (1988) found that severity of neonatal illness predicted whether preterm born children evidenced a learning disability at age 8, while parents' education level was correlated with the severity of the learning disability. Thus, if researchers want to determine the unique contribution of other potential moderator factors for preterm born children's development, they must control for the effects of SES in their study design.

Role of Mother-Child Relationship

Increasing support has been obtained in recent years for the role of the parent-child relationship in promoting positive adjustment for "high-risk" children (e.g. Farber & Egeland, 1988; Hammen, Burge, & Stansbury, 1990; Rutter, 1989). Within the parenting literature, researchers have consistently identified warmth and control as important dimensions of the parent-child relationship (Amato, 1990; Bornstein, 1989; Maccoby & Martin, 1983; Rollins & Thomas, 1979; Schaefer, 1959). According to Maccoby and Martin (1983), parental warmth (i.e., praise, encouragement, physical affection, approval) and control (i.e., consistent enforcement of rules and structure) are necessary for children to learn to inhibit inappropriate behaviors and to engage in socially appropriate behaviors. Research by Parpal and Maccoby (1985) has indicated that maternal warmth and sensitivity facilitates social development for normal children. Likewise, Baumrind (1971, 1991) has reported a positive relation between measures of parental responsiveness and control, and children's intellectual, academic, and social competencies.

According to Rohner (1986), warmth is a bipolar dimension of parental behavior, with acceptance defining one end of the continuum and rejection defining the other end. Parental rejection can be manifested in the form of hostility and aggression, indifference and neglect, and/or undifferentiated rejection (Rohner, 1986). Specifically, Rohner (1986) conceptualized hostility (i.e., anger, resentment, enmity) and indifference (i.e., lack of concern for the child) as internal psychological feelings within the individual, and aggression (i.e., physical and verbal) and neglect (i.e., physical and psychological) as the

behavioral manifestations of these respective internal states. Undifferentiated rejection occurs when children perceive parental rejection, but this rejection does not clearly reflect either hostility/aggression or indifference/neglect (Rohner, 1986).

Parental control has been conceptualized in many ways in the literature (see Rollins & Thomas, 1979 for a review). Some examples of terms used in the literature include: restrictiveness (Baldwin, 1955; Baumrind & Black, 1967); authoritative, authoritarian, and permissive control (Baumrind, 1967, 1971); and psychological and behavioral control (Barber, Olsen, & Shagle, 1994; Steinberg, 1990). Based on investigations of children's reports of their parents' child-rearing behaviors, Schaefer (1965), and later, Schludermann and Schludermann (1970) identified two dimensions of parental control, including (a) psychological autonomy (i.e., control of children's activities through methods that promote their development as an individual apart from the parent) versus psychological control (i.e., control of children's activities through methods which arouse guilt or instill anxiety), and (b) firm control (i.e., control of children's activities through enforcement of rules and limits) versus lax control (i.e., nonenforcement of rules and limits).

Overall, research that has examined the role of the parent-child relationship for preterm born children's development has been limited in its methodology and scope. There has been considerable investigations which have utilized observational data of mother-infant interactions from birth to 24-months. For example, the longitudinal investigation by Crnic and colleagues (Crnic & Greenberg, 1987; Crnic, Greenberg, Ragozin, Robinson, & Basham, 1983; Crnic, Greenberg, Robinson, & Ragozin, 1984)

indicated that the quality of mother-infant interactions (i.e., degree of maternal responsiveness) was related to children's developmental outcomes at 18- and 24-months of age. Beckwith and Cohen (1984) have reported that preterm children who were observed to receive higher levels of maternal responsiveness during infancy achieved greater intellectual competency at age 5 when compared with preterm children who experienced lower levels of maternal responsiveness during infancy. Moreover, when these preterm born children were followed-up at age twelve, it was found that children whose mothers had been consistently more responsive during both infancy and early adolescence, as well as children whose mothers had become more responsive by age twelve, had greater intellectual competency and academic achievement, fewer behavioral and emotional problems, and more positive self-esteem than children whose mothers were consistently less responsive both during infancy and at age twelve (Beckwith, Roding, & Cohen, 1992). More recently, Brandt et al. (1992) investigated the role of the mother-child relationship by collecting maternal perceptions of their relationship with their preterm born child. This research indicated that maternal perceptions of the quality of the mother-child relationship were related to learning and behavioral-emotional problems during the second grade for preterm born children.

There is a lack of research, however, that has investigated preterm born children's perceptions of the quality of their relationship with their parent, even though this has been an area of active research in other literatures (e.g., Michaels, Messe', & Stollak, 1983; Parpal & Maccoby, 1985; Rohner, 1980, 1986). The importance of children's perceptions of parental behavior is based upon the assumption that these perceptions may

be more related to children's adjustment than are the actual behaviors of the parent (Dubin & Dubin, 1965; Goldin, 1969; Kagan, 1977; Rohner, 1986; Schaefer, 1965).

Role of Negative Life Stress

As discussed above, in order to better understand whether the mother-child relationship contributes to and/or moderates the relation between biological risk and preterm born children's developmental functioning, researchers need to control for the effects of other significant environmental factors. In addition to socioeconomic status (SES), negative life stress experienced by the mother has been found to be a significant predictor of both children's adjustment and mother-child interactions. Research by Patterson (1983) has indicated that on days in which mothers were more stressed, they were found to be more irritable and their child was found to be more aggressive than on days in which mothers were less stressed. Likewise, Webster-Stratton (1989) reported that in families where mothers were highly stressed, preschool-aged children were found to be more oppositional and less compliant compared to children in families where mothers had fewer stressors.

Based upon their longitudinal investigations of preterm and full-term infants, Crnic and colleagues (Crnic & Greenberg, 1987; Crnic et al., 1983; Crnic et al., 1984) found that the quality of mother-infant interactions were positively related to children's developmental outcomes at 18- and 24-months, and that this relation was affected by the severity of negative life events experienced by the mother. That is, mothers who reported higher negative stress were observed to be less responsive in their interactions

with their infant than mothers who reported lower negative stress. In addition, Werner and Smith (1982) reported that the level of familial stress was related to children's development, such that the high-risk children in their study who did not develop later problems, (i.e., the "resilient children") came from family environments characterized by fewer stressful experiences.

Statement of Purpose

There were two main purposes for the present study:

(1) To compare preterm born children's cognitive and behavioral-emotional functioning during the early school-age years to a demographically similar group of full-term born children. These analyses will provide an updated assessment of preterm born children's functioning during the early school-age years and will determine whether their functioning is different from a "normal" control group of full-term born children.

(2) To examine the degree to which the concurrent mother-child relationship contributes to and/or moderates the relation between biological risk (i.e., severity of perinatal medical complications) and cognitive and behavioral-emotional functioning during the early school-age years for preterm born children, after controlling for the effects of other environmental factors (i.e., family socioeconomic status (SES) and negative life stress experienced by the mother) which have been found to be associated with children's cognitive and behavioral-emotional functioning. These analyses will provide the opportunity to test whether the mother-child relationship functioned as a moderator in reducing the effect of biological risk on preterm born children's cognitive and behavioral-emotional functioning during the early school-age years.

Hypotheses

The specific hypotheses studied were:

(1) Given the research which has established the importance of environmental factors for preterm children's later development (e.g., Sameroff & Chandler, 1975; Siegel, 1984; Werner & Smith, 1971), it was expected that demographically similar groups of preterm and full-term born children would not significantly differ on measures of cognitive and behavioral-emotional functioning during the early school-age years.

(2) Given the research which has established the importance of both biological and environmental factors for preterm born children's development (e.g., Brandt et al., 1992; Crnic et al., 1983; Crnic et al., 1984; Werner & Smith, 1977, 1982), it was expected that socioeconomic status (SES), negative life stress, and severity of perinatal medical complications (i.e., biological risk) would contribute to the prediction of preterm born children's cognitive and behavioral-emotional functioning during the early school-age years. Specifically, it was hypothesized that (a) a positive correlation would be found between SES and children's cognitive competence, a negative correlation would be found between SES and children's problematic behavioral-emotional functioning, a negative correlation would be found between negative life stress and children's cognitive competence, and a positive correlation would be found between negative life stress and children's problematic behavioral-emotional functioning, and (b) a negative correlation would be found between severity of perinatal medical complications and children's cognitive competence and a positive correlation would be found between severity of perinatal medical complications and children's problematic behavioral-emotional functioning.

Given the research which has established the importance of maternal warmth and control for children's development (e.g., Baumrind, 1971, 1991; Parpal & Maccoby, 1985), it was expected that the mother-child relationship would predict cognitive and behavioral-emotional functioning during the early school-age years for preterm born children even after other environmental factors (i.e., family SES and negative life stress experienced by the mother) were considered. Specifically, it was hypothesized that (c) a negative correlation would be found between measures of maternal rejection and psychological control and children's cognitive functioning and a positive correlation would be found between measures of maternal rejection and psychological control and children's problematic behavioral-emotional functioning, even after accounting for the effects of SES and negative life stress.

From the perspective of an interactional model of development (e.g., Fiese & Sameroff, 1989), it was expected that the mother-child relationship would moderate the relation between biological risk and children's cognitive and behavioral-emotional functioning during the early school-age years. Specifically, it was hypothesized that (d) the level of maternal rejection and psychological control in the mother-child relationship would have a moderating effect on biological risk for cognitive and behavioral-emotional functioning during the early school-age years for preterm born children, even after accounting for the effects of SES and negative life stress. For example, it was expected that children with a history of severe perinatal medical complications (i.e., higher score on an additive index of biological risk) who also reported having experienced low levels of rejection and psychological control in their relationship with their mother would

demonstrate higher cognitive competence and fewer behavioral-emotional problems than those children with a history of severe perinatal medical complications who also reported having experienced high levels of rejection and psychological control in their relationship with their mother.

CHAPTER II

Method

Subjects

Seventy-three children (44 girls and 29 boys) and their mothers participated in this study. Children ranged in age from 6.25 to 8.83 years (M = 7.43, SD = 0.67), and 49 were preterm born and 24 full-term born. Sixteen children were rising first graders, 38 rising second graders, and 19 rising third graders. Mothers ranged in age from 24 to 45 years (M = 36.67, SD = 5.11), and 84% of mothers were currently married, 4% were single, and 12% were separated or divorced. The sample was primarily Caucasian (73%). Family socioeconomic status (SES), as measured by the four-factor Hollingshead index (1975), ranged from 12 to 66 (M = 45.46, SD = 12.24).

The preterm sample (n=49) was drawn from a cohort of 317 surviving preterm infants who were admitted to the neonatal intensive care unit (NICU) of Moses Cone Memorial Hospital in Greensboro, North Carolina between November, 1985 and December, 1987 (see Table 1 for demographic information). Selection criteria for the preterm sample consisted of gestational age less than 37 weeks and absence of major neurological or physical impairments (e.g., congenital defects, mental retardation, sensory or motor problems). Of the original cohort, 72 families (23%) were located and contacted for participation. Ten of the children who were located, however, had been identified with a physical or neurologic impairment (i.e., mental retardation, blindness,

cerebral palsy) and thus, were not included in the present study. Of the 62 children who met selection criteria, 49 children and their mothers (79%) agreed to participate in the present study. Nonparticipants most frequently cited busy schedules as their reason for declining the invitation to participate. No significant differences between children who participated (n=49), children who were lost to follow-up (n=256), and children who refused participation (n=13) were found for children's gender, race, gestational age, or birthweight (see Table 2).

The comparison sample of full-term born children (n=24) consisted of children who had a normal perinatal course (see Table 1 for demographic information). These children were recruited from a parochial school and several after school programs located in Greensboro, North Carolina.

Measures

Predictor Variables

Hollingshead Four-Factor Index of Socioeconomic Status (SES). (Hollingshead, 1975). This measure provided a multi-dimensional index of the family's socioeconomic status (*SES*). Information regarding parents' education level, occupation, and marital status was collected during a clinical interview with the mother. Level of education was scored on a 7-point ordinal scale, ranging from less than seventh grade education (1) to graduate/professional training (7). Occupation was graded on a 9-point ordinal scale, ranging from service worker (1) to major professional (9). Socioeconomic status (*SES*) for 2-parent households was calculated by taking the average of the mother's and father's

education and occupation levels. In single parent families, *SES* was calculated based on the single parents' education and occupation level. In both cases, *SES* scores can range from 8 to 66, with higher scores indicating higher family social status.

Life Experiences Survey (LES). (Sarason, Johnson, & Siegel, 1978). This 46-item paper-and-pencil questionnaire provided an assessment of negative and positive life changes experienced by the mother during the past 12 months. Each item was scored based on the "impact" it had for the mother, using a 7-point ordinal scale, ranging from "extremely negative" (-3) to "extremely positive" (+3). A *Negative Life Events Score* (*N-LES*) was derived by summing the impact ratings of the events experienced as negative by the mother, with higher scores indicating greater negative life stress. This measure has established validity and test-retest reliability coefficients over 5- to 8-week intervals, ranging from .56 to .88 (Sarason et al., 1978).

Perinatal Risk Inventory (PERI). (Scheiner & Sexton, 1991). This 18-item inventory provided a summary score which represented the severity of the preterm born child's perinatal medical complications (see Appendix A). Each item on the inventory was scored on a 4-point ordinal scale, ranging from 0 to 3, with higher scores indicating a greater likelihood that the particular perinatal event would cause subsequent developmental abnormalities. The *PERI* total score was derived by summing the severity rating of the 18-items. This inventory was completed by a developmental pediatrician (M.E.) who reviewed each preterm born child's neonatal medical record. Given that the *PERI* does not require subjective ratings to determine scores for the items, interrater reliability was not necessary.

Parental Acceptance-Rejection Questionnaire (PARQ). (Rohner, 1990). This 60-item paper-and-pencil questionnaire provided an assessment of maternal acceptance and rejection along four dimensions: (a) warmth/affection (WA), (b) aggression/hostility (AH), (c) neglect/indifference (NI), and (d) undifferentiated rejection (UR). The parent form (*PARQ-P*) was used to assess mother's perceptions of their behavior towards their child, and the child form (*PARQ-C*) was used to assess children's perceptions of their mother's behavior toward them. On these measures, the mother and child were asked to indicate the degree to which they agreed with each statement, using a 4-point ordinal scale, ranging from "almost always true" (4), "sometimes true" (3), "rarely true" (2), to "almost never true" (1) of the mother. Higher scores on the AH, NI, and UR subscales and a lower score on the WA subscale reflect more problematic parent-child relations (i.e., greater parental rejection). The total score (with WA reverse-scored) can range from 60 to 240, with higher scores indicating increased parental rejection. Past research has demonstrated good reliability (Cronbach's alpha coefficients = .86 to .95 for the *PARQ-P*, and .72 to .90 for the *PARQ-C*) and established convergent, discriminant, and construct validity for these scales (Rohner, 1990).

Parental Report of Parental Behavior (PRPB) and *Child Report of Parental Behavior (CRPB)*. (Schludermann & Schludermann, 1970). These 108-item paper-and-pencil questionnaires provided an assessment of several dimensions of parenting behavior. The *PRPB* was used to assess mothers' perceptions of their behavior towards their child, and the *CRPB* was used to assess children's perceptions of their mothers' behavior toward them. On these measures, the mother and child are asked to indicate

the degree to which they agreed with each statement, using a 3-point ordinal scale, ranging from "like" (3), "somewhat like" (2), to "not like" (1) the mother. The *PRPB* and *CRPB* are shortened-versions of Schaefer's (1965) original Child Report of Parental Behavior Inventory (CRPBI) which had 260-items. Schludermann and Schludermann (1970) have reported data which indicated that the factor structures of the *PRPB* and *CRPB* were consistent with that of Schaefer's (1965) original version. The three factors that have been repeatedly identified in the literature are: (a) acceptance-rejection (AR), (b) psychological control-psychological autonomy (CA), and (c) firm control-lax control (FL). For the present study, items included in the psychological control-psychological autonomy factor and firm control-lax control factor of the *PRPB* and *CRPB* were administered to mothers and children, respectively. The psychological control-psychological autonomy (CA) factor of the *PRPB* and *CRPB* includes 6 subscales (total of 33 items) which assess the degree to which the parent uses indirect means to control their child's activities and behaviors. The subscales contained in the CA factor are: (a) intrusiveness, (b) control through guilt, (c) hostile control, (d) inconsistent discipline, (e) instilling persistent anxiety, and (f) withdrawal of relations. Total scores on the CA factor can range from 11 to 33, with higher scores indicating increased control of children's activities and behaviors through psychological control techniques. The firm control-lax control (FL) factor of the *PRPB* and *CRPB* includes 5 subscales (total of 25 items) which assess the degree to which the parent uses direct means (i.e., sets and enforces rules and regulations) to control their child's activities and behaviors. The subscales contained in the FL factor are: (a) control, (b) enforcement, (c)

nonenforcement, (d) lax discipline, and (e) extreme autonomy. Total scores on the FL factor (with reverse scoring on the nonenforcement, lax discipline, and extreme autonomy scales) can range from 10 to 30, with higher scores indicating increased control of children's activities and behaviors through direct means. The *PRPB* and *CRPB* have established validity (Schludermann & Schludermann, 1971) and median internal consistency reliabilities for the subscales ranging from .66 to .84 (Schaefer, 1965).

Outcome Variables

Child Depression Inventory (CDI). (Kovacs, 1992). This 27-item paper-and-pencil questionnaire provided an assessment of affective, cognitive, motivational, and somatic symptoms of depression in children. Children were asked to rate the severity of each symptom by choosing one of three alternative statements which "best" described him/her during the past 2 weeks. The statements are rated from 0 to 2 in the direction of increasing severity. Cronbach's alpha coefficients for normal children have ranged from .87 to .94, and test-retest reliabilities, over 1- to 4-week intervals, have ranged from .38 to .82 (Kovacs, 1983; Saylor, Finch, Spirito, & Bennett, 1984). The *CDI* has been identified as the most widely used measure of childhood depression (Kazdin, 1987). Although it may not discriminate adequately between depressed and nondepressed subgroups of psychiatric inpatients (Saylor et al., 1984), it has demonstrated adequate criterion-related validity (Lobovits & Handal, 1985).

Child Behavior Checklist (CBCL) and *Teacher Report Form (TRF)*. (Achenbach, 1991a, 1991b). These 113-item paper-and-pencil questionnaires provided an assessment

of a broad range of childhood behavioral and socioemotional difficulties on several subscales and three global scales: (a) Internalizing (i.e., anxious, depressed, or overcontrolled behavior), (b) Externalizing (i.e., aggressive, delinquent, or undercontrolled behavior), and (c) Total Behavior Problems. The *CBCL* was completed by the child's mother and the *TRF* was completed by the child's teacher. On these measures, the informant was asked to indicate the degree to which s/he agrees with each statement, using a 3-point scale, ranging from "not true" (0), "somewhat true" (1), to "very true" (2) of the child now or in the past 6 months. The *CBCL* has established validity and a test-retest reliability of .89, .93, and .93 for the Internalizing, Externalizing, and Total Behavior Problems Scales, respectively (Achenbach, 1991a). The *TRF* has established validity and a test-retest reliability of .91, .92, and .95 for the Internalizing, Externalizing, and Total Behavior Problems Scales, respectively (Achenbach, 1991b).

Conners' Abbreviated Symptom Questionnaire (ASQ). (Conners, 1992). This 10-item paper-and-pencil questionnaire provided an assessment of hyperactive behaviors among children. Two forms of the *ASQ* were used in the present study. The *ASQ-P* was completed by the child's mother, and the *ASQ-T* was completed by the child's teacher. On both forms, the informant was asked to indicate the degree to which each statement described the child during the past month, using a 4-point ordinal scale, ranging from "not at all" (0), "just a little" (1), "pretty much" (3), to "very much" (3). The Conners' parent and teacher rating scales have established validity and test-retest reliabilities ranging from .70 to .90 (Conners, 1973). Moreover, the Conners' *ASQ* has proven to be reliable in identifying hyperactive children (Sprague & Sleator, 1973).

Peabody Picture Vocabulary Test-Revised (PPVT-R). (Dunn & Dunn, 1981). This instrument provided an assessment of children's receptive vocabulary skills. Items were administered and scored according to standardized instructions outlined by Dunn and Dunn (1981). For each item administered, children were asked to point to the picture (4 alternatives are given) that represented the word which the researcher read out loud. The PPVT-R has been shown to have good reliability (Cronbach's alpha coefficients = .61 to .88) and adequate content, construct, and criterion-related validity (Dunn & Dunn, 1981).

Wechsler Intelligence Scale for Children-Third Edition (WISC-III) - *Vocabulary Subtest*. (Wechsler, 1991). The vocabulary subtest of the WISC-III provided an assessment of children's expressive language abilities. Items were administered and scored on a 3-point scale according to the standardized instructions outlined by Wechsler (1991). For each item administered, children were asked to tell what each word means. This subscale has demonstrated a test-retest reliability of .82 for 6 to 7 year-olds and a mean split-half reliability of .87 for 6 to 8 year-olds, as well as adequate construct validity (Wechsler, 1991). For the current study, inter-rater reliability (% agreement) for the *WISC-Vocab* was .85. Differences between the two clinical graduate student raters were resolved through discussion.

Developmental Test of Visual-Motor Integration (VMI). (Beery, 1989). This measure provided an assessment of children's visual-spatial perception and graphomotor skill in coping geometric designs. Items were administered and scored according to standardized instructions outlined by Beery (1989). The VMI has demonstrated test-

retest reliability of .92, over a 2-week interval, and adequate construct validity (Beery, 1989). For the current study, interrater reliability (% agreement) for the *VMI* was .95. Differences between the two clinical graduate student raters were resolved through discussion.

Procedure

Recruitment of the preterm sample involved sending a letter (see Appendix B) which provided a description of the present study to the 317 families who had children born preterm (i.e., gestational age < 37 weeks) and admitted to the Neonatal Intensive Care Unit (NICU) of Moses Cone Memorial Hospital in Greensboro, North Carolina, between November, 1985 and December, 1987. Addresses and telephone numbers for these families were obtained from the NICU's birth log book. In addition, the Health Department and several private pediatrians in Greensboro provided current addresses and telephone numbers for those children who were identified in the NICU's birth log book as their patients. Following the distribution of the letter, families were contacted by the researcher by phone in order to provide them with more information about the project and to request their participation.

Recruitment of the full-term sample involved sending a letter (see Appendix C) which provided a description of the present study to families of children at a parochial school and several after-school programs. If parents were interested in receiving more information, they were asked to provide their telephone number in order to be contacted by the researcher. Families who indicated an interest were then contacted by phone in

order to provide them with information about the project and to request their participation.

Assessments were conducted in the Department of Psychology at the University of North Carolina at Greensboro (UNCG) between May and August of 1994, at a time that was convenient for each family. At the start of each individual assessment session, the researcher obtained written consent from the mother for her and her child (see Appendix D). Each mother and child were assured confidentiality of all information and were informed of their ability to discontinue participation at any time. Demographic information was collected during an initial interview with the mother and child. The order of administration of measures was randomized across subjects. Instructions for the mother's self-report measures (i.e., *LES*, *PARQ-P*, *PRPB*, *CBCL*, *ASQ-P*) were reviewed with the mother. While the mother completed her self-report measures, the researcher met with the child in a different room to administer the cognitive tasks (i.e., *VMI*, *WISC-Vocab*, *PPVT-R*) and the child self-report measures (i.e., *PARQ-C*, *CRPB*, *CDI*). Self-report measures were administered verbally to the child and the child's verbal responses were recorded on the questionnaires by the researcher. Care was taken to make sure that the child understood the directions for each questionnaire and any words that a child did not understand were defined. Each mother received a Healthtex gift certificate (good for two articles of clothing) for her participation and each child received a small toy and a "Fun Buck" for use at a local amusement center for his/her participation.

With the mother's consent (see Appendix E), the *TRF* and *ASQ-T* were mailed to the child's teacher from the 94-95 school year along with a cover letter (see Appendix

F) which explained the current study. Teachers were asked to return completed questionnaires in an enclosed self-addressed, stamped envelope. Teachers who did not respond to this request within 2 weeks were contacted by phone and asked to complete the measures. Teachers were not reimbursed for their participation. Mothers of preterm born children also gave their informed consent (See Appendix G) for their child's NICU medical records to be reviewed by the researcher and a developmental pediatrician (M.E.) in order to obtain information needed to complete the *PERI* measure.

The results of the entire study were provided to those mothers who indicated an interest, the Women's Hospital High-Risk Follow-up Clinic, and Healthtex Corporation. If requested, the results of children's individual assessments were provided to their mothers.

CHAPTER III

Results

Comparisons of Preterm and Full-term Groups on Demographic Variables

T-tests were used to assess between-group differences on continuous variables and chi-square tests were used to assess such differences for nominal variables. Comparisons indicated that the preterm and full-term samples were not significantly different on any demographic variable including: child age, gender, and grade level; mother age, education level, and marital status; race; and socioeconomic status (see Table 1). Thus, although the preterm and full-term samples were not matched groups, they were considered to be demographically similar groups.

Descriptive Statistics

As recommended by Achenbach (1991a, 1991b), raw score totals for the Internalizing, Externalizing, and Total Behavior Problem scales on the *CBCL* and *TRF* were used in the statistical analyses because such scores reflect greater differentiation among nondeviant subjects than T-scores. Raw score totals for the *CDI*, *ASQ-P*, and *ASQ-T* were also used in the statistical analyses.

Simple descriptive statistics were used to characterize the full sample (see Tables 3 & 4), preterm sample (see Tables 5 & 6), and full-term sample (see Tables 7 & 8). Mean scores, standard deviations, and ranges for the outcome variables were generally

consistent with normative data on these measures. The coefficient alphas (Cronbach, 1951) for the predictor and outcome measures indicated internal consistencies of .75 to .97 for the present study, with the exception of the *CRPB-FL* (alpha = .60) and *PRPB-FL* (alpha = .63) measures (see Tables 3 & 4). Due to the lower internal consistencies for the *CRPB-FL* and *PRPB-FL*, these measures were not included in the statistical analyses that follow. Examination of coefficient alphas for 6-year-olds, 7-year-olds, and 8-year-olds reports on the *CRPB-CA* (see Table 9) indicated that additional error variance was present in younger children's reports on this measure.

The Perinatal Risk Inventory (*PERI*) was used in the current study to obtain a measure of the severity of preterm born children's perinatal medical complications (see Appendix A). The percentage of preterm born children in the current study who met criteria for the various items on the *PERI* are reported in Table 10 for descriptive purposes.

Evaluation of Assumptions of Multivariate Analysis

Results of evaluation of assumptions indicated that transformation of some data was necessary to reduce the positive skewness in their distributions, to reduce the number of outliers, and to improve the normality, linearity, and homoscedasticity of residuals. Square root transformations of raw data were obtained for the following measures: *CBCL*, *CBCL-I*, *CBCL-E*, *TRF*, *TRF-I*, *TRF-E*, *ASQ-P*, *ASQ-T*, and *CDI*. The analyses that follow utilized these transformed variables.

Comparisons of Cognitive and Behavioral-Emotional Functioning for Preterm and Full-term Born Children

It was hypothesized that, as a group, preterm and full-term born children would not significantly differ on measures of cognitive and behavioral-emotional functioning during the early school-age years. Rather than conducting 12 univariate analyses, multivariate analyses of variance (MANOVAs) were used as a screen for the univariate F-test. Outcome measures that measured the same domain of functioning (i.e., cognitive functioning) were included in the same MANOVA in order to aid in the interpretation. The total scores (*CBCL* and *TRF*) were tested in a separate MANOVA from their scale scores (e.g. *CBCL-I*) because they are linear combinations of the scale scores and thus, can not be tested in the same MANOVA. Results of the MANOVAs indicated that preterm and full-term born children did not significantly differ in their scores on the *ASQ-P*, *CBCL-I*, *CBCL-E*, *ASQ-T*, *TRF-I*, and *TRF-E* (Wilks' $F(6,54) = 1.24$, $p < .30$), the *CBCL* and *TRF* (Wilks' $F(2,58) = 1.61$, $p < .21$), or the *WISC-vocab*, *PPVT-R*, and *VMI* (Wilks' $F(3,69) = 1.95$, $p < .13$) (see Table 11). The univariate analysis of variance (ANOVA) for the *CDI*, however, revealed a significant group effect ($F(1,71) = 2.31$, $p < .02$). Examination of means indicated that preterm born children reported more problems with depressive symptoms during the early school-age years than full-term born children (see Table 11).

Intercorrelational Analyses for Predictor Variables

Significant intercorrelations among predictor variables ranged from -.27 to .56, indicating low to moderate correlations among the variables, but not to the point of multicollinearity (see Table 12). Serious problems with multicollinearity are more likely with correlations above .70 (Hanushek & Jackson, 1977). The shared variance between *PARQ-C* and *CRPB-CA* ($r = .30$, $p < .01$) and between *PARQ-P* and *PRPB-CA* ($r = .56$, $p < .0001$) supported Rohner's (1990) assumption that measures of maternal acceptance-rejection (i.e., *PARQ-C* and *PARQ-P*) and maternal control (i.e., *CRPB-CA* and *PRPB-CA*) are assessing related, though different aspects of the mother-child relationship. The negative correlations between *SES* and *PARQ-C* ($r = -.27$, $p < .05$) and *SES* and *CRPB-CA* ($r = -.24$, $p < .05$) indicated that children from lower *SES* families perceived their mothers as being more rejecting and as using higher levels of psychological control techniques to influence their behaviors than children from higher *SES* families. No significant relation was found between mothers' reports of negative life stress (*N-LES*) and the quality of the mother-child relationship. A small correlation ($r = .26$, $p < .05$) was found between children's and mothers' reports on the *CRPB-CA* and *PRPB-CA*, suggesting that children and mother's have somewhat similar perceptions regarding the level of psychological control techniques used by the mother. A non-significant correlation ($r = .10$, p = n.s.) was found between children's and mothers' reports on the *PARQ-C* and *PARQ-P*, suggesting that children and mothers do not have similar perceptions regarding the level of maternal rejection in the mother-child relationship.

Intercorrelational Analyses for Outcome Variables

Significant intercorrelations among outcome measures ranged from -.43 to .92, indicating moderate to high correlations among the variables (see Table 13). Overall, measures of cognitive functioning were negatively correlated with measures of behavioral-emotional functioning, indicating that children who had higher cognitive competencies also had fewer behavioral-emotional difficulties during the early school-age years. For example, a moderate relationship was found between *WISC-vocab* and *CDI* ($r = -.43$, $p < .0001$) and *WISC-vocab* and *ASQ-T* ($r = -.41$, $p < .001$), indicating that children who scored higher on a test of expressive language reported fewer depressive symptoms and were evaluated by their teachers as having fewer problems with hyperactivity than were children who scored lower on a test of expressive language. Consistent with past research (Achenbach, McConaughy, & Howell, 1987), only moderate relationships were found among child, mother, and teacher reports of children's behavioral-emotional functioning during the early school-age years [e.g., *CBCL* and *TRF* ($r = .31$, $p < .05$), *ASQ-P* and *ASQ-T* ($r = .54$, $p < .0001$), *CDI* and *CBCL* ($r = .30$, $p < .01$), and *CDI* and *TRF* ($r = .36$, $p < .01$).

Preliminary Analyses

Before conducting the proposed regression analyses, it was necessary to determine whether individual differences in cognitive and behavioral-emotional functioning were due primarily to differences in children's *Age* or *Gender*. Using multivariate analysis of variance (MANOVA), it was determined that scores on the *ASQ-P*, *ASQ-T*, *CBCL*, and

TRF measures significantly varied as a function of children's *Gender* [Wilks' $F(4,43) = 4.69$, $p < .01$], such that teachers and mothers reported more behavioral-emotional problems for boys than girls (see Table 14). Although not statistically significant at the .05 level, the MANOVA test for the *CBCL-I*, *CBCL-E*, *TRF-I*, and *TRF-E* indicated an association between children's *Gender* and behavioral-emotional problems [Wilks' $F(4,43) = 1.83$, $p < .14$], such that teachers and mothers reported more externalizing behavioral problems for boys than girls, and more internalizing behavioral problems for girls than boys (see Table 14). Subsequently, *Gender* was included as a covariate in the regression equations for *ASQ-P*, *ASQ-T*, *CBCL*, *CBCL-I*, *CBCL-E*, *TRF*, *TRF-I*, and *TRF-E*. *Age* was not found to be associated with any outcome measure, and thus, was not included in the regression equations.

Relationship Among Socioeconomic Status, Negative Life Events, Biological Risk, Mother-Child Relationship, and Preterm Born Children's Cognitive and Behavioral-Emotional Functioning

A series of block hierarchical multiple regression analyses were performed to determine (a) the extent to which variability in preterm born children's cognitive and behavioral-emotional functioning could be accounted for by family SES, negative life stress experienced by their mothers, severity of biological risk, and the quality of the mother-child relationship and (b) whether the mother-child relationship functioned as a moderator of biological risk for children's outcomes during the early school-age years. The use of hierarchical multiple regression is consistent with the approach recommended

by Baron and Kenny (1986) and Cohen and Cohen (1983) for assessing moderator effects. Statistically, a moderator is a variable that "affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable" (Baron & Kenny, 1986, p. 1174). A moderator hypothesis is supported if the predictor x moderator interaction term in a hierarchical regression analysis is significant.

In each of the hierarchical multiple regression analyses, the covariate variables (*SES*, *N-LES*, and *GENDER* as indicated above) were entered first, followed by the biological risk variable (*PERI*), the mother-child relationship variables (*PARQ-P*, *PARQ-C*, *CRPB-CA*, *PRPB-CA*), and the biological risk X mother-child relationship interactions. Tables 15 through 26 display, for each dependent variable, the standardized regression coefficients, R^2, R^2 change, and F associated with R^2 change at each step, and the Model R^2.

The specific hypotheses studied included: (a) family socioeconomic status (SES) would be positively correlated with measures of cognitive competence and negatively correlated with measures of problematic behavioral-emotional functioning, and negative life events experienced by the mother would be negatively correlated with measures of cognitive competence and positively correlated with measures of problematic behavioral-emotional functioning, (b) severity of children's perinatal medical complications (i.e., biological risk) would be negatively correlated with measures of cognitive competence and positively correlated with measures of problematic behavioral-emotional functioning, (c) mother-child relationship (i.e., level of maternal rejection and psychological control) would be negatively correlated with children's cognitive competence and positively

correlated with children's problematic behavioral-emotional functioning, even after accounting for the effects of SES and negative life events, and (d) mother-child relationship would function as a moderator of the relation between severity of perinatal medical complications (i.e., biological risk) and cognitive and behavioral-emotional functioning during the early school-age years.

Prediction of Preterm Born Children's Cognitive Competence (see Tables 15-17).

Hypothesis (a): The covariate measures (*SES*, *N-LES*) did not account for a significant amount of the variance in children's *VMI* scores. In contrast, *SES* accounted for a significant amount of the variance in children's *PPVT-R* scores (Beta = .31, $p < .05$; R^2 change = .24, $F(2,42) = 6.76$, $p < .01$), indicating that family socioeconomic status was positively correlated with preterm born children's receptive language skills. In addition, *N-LES* accounted for a significant amount of the variance in children's *PPVT-R* scores (Beta = -.37, $p < .01$; R^2 change = .24, $F(2,42) = 6.76$, $p < .01$), indicating that negative life stress experienced by the mother was negatively correlated with preterm born children's receptive language skills.

Hypothesis (b): The biological risk measure (*PERI*) did not account for a significant amount of the variance in children's *WISC-vocab* and *PPVT-R* scores. In contrast, the biological risk measure (*PERI*) was a significant predictor of children's *VMI* scores (Beta = -.30, $p < .05$; R^2 change = .09, $F(1,41) = 4.16$, $p < .05$), indicating that severity of perinatal medical complications was negatively correlated with preterm born children's visual-motor skills. Supplementary analyses revealed that preterm born

children's visual-motor skills were significantly associated with four items on the *PERI*: (a) item #10, severity of ventilation ($r = -.32$, $p < .01$), (b) item #16, severity of congenital infection ($r = -.23$, $p < .05$), (c) item #17, severity of hyperbilirubinemia ($r = -.29$, $p < .05$), and (d) item #18, severity of associated neonatal problems ($r = -.26$, $p < .05$).

Hypothesis (c): The mother-child relationship measures (*PARQ-C*, *PARQ-P*, *CRPB-CA*, *PRPB-CA*) did not account for a significant amount of the variance in children's *VMI* scores. In contrast, the mother-child relationship measures significantly predicted *WISC-Vocab* scores (R^2 change = .23, $F(4,37) = 3.29$, $p < .05$) and *PPVT-R* scores (R^2 change = .20, $F(4,37) = 3.22$, $p < .05$), even after controlling for the variance attributable to *SES* and *N-LES*. Examination of the individual Beta weights for the mother-child relationship measures indicated that *PARQ-C* (Beta = -.42, $p < .05$) was negatively correlated with *WISC-vocab*. That is, preterm born children who perceived higher levels of maternal rejection demonstrated lower expressive language skills.

Hypothesis (d): The interaction terms between biological risk and mother-child relationship measures did not account for a significant amount of the variance in children's *VMI*, *WISC-vocab*, or *PPVT-R* scores, indicating that the mother-child relationship was not a significant moderator of the relation between severity of perinatal complications and preterm born children's cognitive competence during the early school-age years.

Prediction of Preterm Born Children's Behavioral-Emotional Functioning: A Child-Rated Measure (see Table 18).

Hypothesis (a): The covariate measures (*SES*, *N-LES*) did not account for a significant amount of the variance in children's *CDI* scores, indicating that family SES and negative stress experienced by the mother were not significantly associated with preterm born children's reports of depressive symptoms.

Hypothesis (b): The biological risk measure (*PERI*) did not account for a significant amount of the variance in children's *CDI* scores, indicating that severity of perinatal events was not significantly associated with preterm born children's reports of depressive symptoms.

Hypothesis (c): The mother-child relationship measures (*PARQ-C*, *PARQ-P*, *CRPB-CA*, *PRPB-CA*) did not account for a significant amount of the variance in children's *CDI* scores, indicating that children's and mothers' perceptions of the level of maternal rejection and control were not significantly associated with preterm born children's reports of depressive symptoms.

Hypothesis (d): The interaction terms between biological risk and mother-child relationship measures did not account for a significant amount of the variance in children's *CDI* scores, indicating that the mother-child relationship was not a significant moderator of the relation between severity of perinatal complications and preterm born children's reports of depressive symptoms during the early school-age years.

Prediction of Preterm Born Children's Behavioral-Emotional Functioning: Mother-Rated Measures (see Tables 19-22).

Hypothesis (a): The covariate measures (*SES*, *N-LES*, and *GENDER*) did not account for a significant amount of the variance in *CBCL-I* scores. In contrast, *SES* accounted for a significant amount of the variance in *CBCL* (Beta = -.32, $p < .05$; R^2 change = .28, $F(3,41) = 5.43$, $p < .01$) and *CBCL-E* scores (Beta = -.38, $p < .01$; R^2 change = .33, $F(3,41) = 6.69$, $p < .001$), indicating that socioeconomic status was negatively correlated with mothers' reports of preterm born children's externalizing behavioral problems. In addition, *GENDER* accounted for a significant amount of the variance in *CBCL* (Beta = -.40, $p < .01$; R^2 change = .28, $F(3,41) = 5.43$, $p < .01$), *CBCL-E* (Beta = -.41, $p < .01$; R^2 change = .33, $F(3,41) = 6.69$, $p < .001$), and *ASQ-P* scores (Beta = -.36, $p < .05$; R^2 change = .19, $F(3,41) = 3.10$, $p < .05$), indicating that mothers reported that preterm born boys experienced more externalizing behavioral problems than preterm born girls.

Hypothesis (b): The biological risk measure (*PERI*) did not account for a significant amount of the variance in *CBCL* and *CBCL-I* scores, indicating that severity of perinatal medical complications was not related to mothers' reports of preterm born children's internalizing behavioral problems. Although not statistically significant at the .05 level, the biological risk measure (*PERI*) showed a trend in the expected direction as a predictor of children's *CBCL-E* (R^2 change = .05, $F(1,41) = 3.13$, $p = .08$) and *ASQ-P* scores (R^2 change = .06, $F(1,41) = 3.13$, $p = .09$), suggesting that severity of

perinatal medical complications are related to preterm born children's externalizing behavioral difficulties.

Hypothesis (c): The mother-child relationship measures (*PARQ-C*, *PARQ-P*, *CRPB-CA*, *PRPB-CA*) did not account for a significant amount of the variance in *ASQ-P* and *CBCL-I* scores. In contrast, the mother-child relationship measures significantly predicted *CBCL* (R^2 change = .23, $F(4,36) = 4.69$, $p < .01$) and *CBCL-E* scores (R^2 change = .22, $F(4,36) = 5.05$, $p < .01$), even after controlling for the variance attributable to *SES* and *N-LES*. Examination of the individual Beta weights for the mother-child relationship measures indicated that *PARQ-P* was positively correlated with *CBCL* (Beta = .37, $p < .01$) and *CBCL-E* scores (Beta = .29, $p < .05$), indicating that mothers who reported higher levels of rejection in their relationship with their child had preterm born children who experienced greater externalizing behavioral problems. In addition, *PRPB-CA* was positively correlated with *CBCL-E* scores (Beta = .28, $p < .05$), indicating that mothers who reported greater use of psychological control techniques to influence their child's behavior had preterm born children who experienced greater externalizing behavioral problems.

Hypothesis (d): The interaction terms between biological risk and mother-child relationship measures did not account for a significant amount of the variance in *CBCL*, *CBCL-I*, and *ASQ-P* scores. In contrast, the interaction term between biological risk (*PERI)* and mother-child relationship measures did account for a significant amount of the variance in *CBCL-E* scores (R^2 change = .11, $F(4,32) = 3.13$, $p < .05$), even after controlling for the variance attributable to *SES* and *N-LES*. Examination of the individual

Beta weights for the interaction terms indicated that the interaction term of *PERI* x *PRPB-CA* was positively correlated with *CBCL-E* scores (Beta = 2.82, $p < .01$). Following the procedure used by Masten et al. (1988) and Wyman, Cowen, Work, & Kerley (1993) to elucidate interactions between risk and moderator variables when the sample size is relatively small, the regression equation for *CBCL-E* was solved for the preterm sample using high and low values ($\pm$ 1 SD) of *PRPB-CA* and *PERI*, with the remaining variable (*CBCL-E*) set at its mean. The resulting *CBCL-E* values (see Figure 1) showed more disparate adjustment for low versus high *PRPB-CA* groups under the high birth risk condition, than under the low birth risk condition. This finding provides preliminary support for the moderator hypothesis, such that preterm born children with a history of severe perinatal medical complications and who also experienced low levels of psychological control in their relationship with their mothers experienced fewer externalizing behavioral problems than those preterm born children with a history of severe perinatal medical complications and who also reported having experienced high levels of psychological control in their relationship with their mothers.

Prediction of Preterm Born Children's Behavioral-Emotional Functioning: Teacher-Rated Measures (see Tables 23-26).

Hypothesis (a): The covariate measures (*SES*, *N-LES*, and *GENDER*) did not account for a significant amount of the variance in children's *TRF*, *TRF-I*, *TRF-E*, and *ASQ-T* scores, indicating that family SES and negative stress experienced by the mother

were not significantly associated with teachers' reports of preterm born children's behavioral-emotional problems in the school environment.

Hypothesis (b): The biological risk measure (*PERI*) did not account for a significant amount of the variance in *ASQ-T*, *TRF*, *TRF-I*, and *TRF-E* scores, indicating that severity of perinatal medical complications was not significantly related to teachers' reports of preterm born children's behavioral-emotional problems in the school environment.

Hypothesis (c): The mother-child relationship measures (*PARQ-C*, *PARQ-P*, *CRPB-CA*, *PRPB-CA*) did not account for a significant amount of the variance in *ASQ-T*, *TRF*, *TRF-I*, and *TRF-E* scores, indicating that children's and mothers' perceptions of maternal rejection and control were not significantly associated with teachers' reports of preterm born children's behavioral-emotional problems in the school environment.

Hypothesis (d): The interaction terms between biological risk and mother-child relationship measures did not account for a significant amount of the variance in *ASQ-T*, *TRF*, *TRF-I*, and *TRF-E* scores, indicating that the mother-child relationship was not a significant moderator of the relation between severity of perinatal complications and teachers' reports of preterm born children's behavioral-emotional problems in the school environment.

Exploratory Analyses I

Following the procedure used by Katz and Gottman (1995) to protect against Type II error when testing the significance of interactions between risk and moderator

variables, additional regression equations were solved for the preterm sample. The Katz and Gottman (1995) procedure was based upon Rutter's (1990) assertion that the best potential protective factor (i.e., moderator variable) will not correlate with either the risk variable or dependent variables, indicating that the protective effect is evident only in combination with the risk variable. However, for the present study, we expected that the mother-child relationship (i.e., the potential moderator variable) would be related with the outcome measures and the risk variable. Examination of the zero-order correlations between the risk measure (*PERI)*, the potential moderator variables (*PARQ-C*, *PARQ-P*, *CRPB-CA*, and *PRPB-CA*), and the outcome variables (*VMI*, *WISC-vocab*, *PPVT-R*, *CDI*, *CBCL*, *CBCL-I*, *CBCL-E*, *ASQ-M*, *TRF*, *TRF-I*, *TRF-E*, and *ASQ-T*) indicated that this was true in many cases. Significant correlations included: *PARQ-C* and *WISC-vocab* ($r = -.49$, $p < .001$), *PPVT-R* ($r = -.34$, $p < .01$), and *CDI*($r = .37$, $p < .001$); *PARQ-P* and *CBCL* ($r = .54$, $p < .0001$); *CBCL-I* ($r = .47$, $p < .001$), and *CBCL-E* ($r = .55$, $p < .0001$); *CRPB-CA* and *WISC-vocab* ($r = -.35$, $p < .01$), *PPVT-R* ($r = -.43$, $p < .001$), and *CBCL-E* ($r = .24$, $p < .05$); *PRPB-CA* and *PPVT-R* ($r = -.34$, $p < .01$), *CBCL* ($r = .59$, $p < .0001$); *CBCL-I* ($r = .22$, $p < .05$), and *CBCL-E* ($r = .59$, $p < .0001$); and *PERI* and *VMI* ($r = -.29$, $p < .01$).

Thus, for each outcome measure, the regression equation included only the mother-child relationship measures that were not significantly correlated with the biological risk measure (*PERI*) and the outcome measure under investigation. For these regression equations, the covariate measures (*SES*, *N-LES*, and *GENDER* as indicated above) were entered first, followed by the biological risk measure (*PERI*) for the *VMI*

equation only[1], and then the interaction term(s) between the *PERI* and the mother-child relationship measure(s). As previously reported (see Table 15), there was a significant main effect of biological risk (Beta = -.31, $p < .05$, R^2 Change = .09, $F(1,42) = 4.44$, $p < .04$) for *VMI*, indicating that severity of perinatal medical complications was negatively correlated with preterm born children's visual-motor skills. None of these regression equations, however, resulted in significant birth risk x mother-child relationship interactions.

Exploratory Analyses II

Katz and Gottman's (1995) procedure also included examining the significance of the moderator variable in high versus low risk groups. Following Rutter (1990), if the mother-child relationship is a moderator, it should have no effect in the low birth risk group, and its effect should be found in the high birth risk group. To determine if such relationships held true for the present study, the combined sample of preterm and full-term born children was utilized in order to obtain more statistical power. The full-term born children selected for the present study had a normal perinatal course, by their mother's report, and thus received a *PERI* score of zero. Hierarchical multiple regression analyses were performed separately for low and high birth risk groups. For these analyses, low and high birth risk groups were determined by a median split on the

[1] Given that *PERI* was significantly correlated with *VMI* score ($r = -.31$, $p < .01$) it was entered into the regression equation prior to the interaction term to account for any significant main effect of biological risk.

biological risk measure (*PERI*). This resulted in the low birth risk group having *PERI* scores of 0 or 1 and the high birth risk group having *PERI* scores of greater than 3.

Prior to conducting the regression analyses, comparisons of means for the outcome measures for the low and high birth risk groups were conducted (see Table 27). Using multivariate analyses of covariance (MANCOVAs), it was determined that the low risk and high risk groups did not significantly differ on *ASQ-P*, *CBCL-I*, *CBCL-E*, *ASQ-T*, *TRF-I*, and *TRF-E* scores (Wilks' $\underline{F}(6,33) = 0.76$, $\underline{p} < .15$), *CBCL* and *TRF* scores (Wilks' $\underline{F}(2,37) = 0.96$, $\underline{p} < .47$), or *WISC-vocab*, *PPVT-R*, and *VMI* scores (Wilks' $\underline{F}(3,44) = 0.93$, $\underline{p} < .38$). In contrast, the ANCOVA for the *CDI* revealed a significant group effect ($\underline{F}(3,46) = 5.60$, $\underline{p} < .02$), indicating that children with high birth risk histories reported more problems with depressive symptoms during the early school-age years than children with low birth risk histories (see Table 27).

In each of the hierarchical multiple regression analyses, the covariate variables (*SES*, *N-LES*, and *GENDER* as indicated above) were entered first, followed by the biological risk variable (*PERI*), and the mother-child relationship variables (*PARQ-P*, *PARQ-C*, *CRPB-CA*, *PRPB-CA*). Tables 28 and 29 display, for each dependent variable, R^2 change at each step, p-value of the F-test associated with R^2 change at each step, and the Model R^2 for the low birth risk and high birth risk groups, respectively. The results of these exploratory analyses indicated that the mother-child relationship measures accounted for a significant amount of the variance in children's *WISC-vocab* (R^2 change $= .33$, $\underline{F}(7,24) = 3.35$, $\underline{p} < .05$), *CBCL* (R^2 change $= .28$, $\underline{F}(7,24) = 3.93$, $\underline{p} < .05$), and *CBCL-I* scores (R^2 change $= .39$, $\underline{F}(7,24) = 4.49$, $\underline{p} < .01$) for the high biological

risk group and not for the low biological risk group (see Tables 27 and 28). Examination of the individual Beta weights for the mother-child relationship measures indicated that *PARQ-C* was negatively correlated with *WISC-vocab* scores (Beta = -.52, $p < .05$), indicating that children who had high birth risk histories and who also perceived higher levels of maternal rejection demonstrated lower expressive language skills. The Beta weight for the *PARQ-P* indicated that this measure was positively correlated with *CBCL* (Beta = .36, $p < .05$) and *CBCL-I* scores (Beta = .54, $p < .01$), indicating that children who had high birth risk histories and who also had mothers who reported higher levels of rejection towards them experienced greater internalizing behavioral problems.

CHAPTER IV

Discussion

In the area of developmental psychopathology, researchers have noted that both developmental history and current circumstances have important implications for children who are "at-risk" for developmental problems (Sroufe, Egeland, & Krentzer, 1990). The present study examined a multivariate model of development, which included biological and environmental factors, for preterm born children's cognitive and behavioral-emotional functioning during the early school-age years. This study contributed to the present literature by examining whether the mother-child relationship functioned as a moderator (i.e., protective factor) in reducing the effect of biological risk on children's cognitive and behavioral-emotional functioning, after accounting for the effects of other significant contextual factors (family SES and negative life stress) which have been found to be associated with children's adaptation. Providing an updated assessment of preterm born children's cognitive and behavioral-emotional functioning during the early school-age years, as well as comparing preterm born children's functioning to a demographically similar group of full-term born children was also central in the present study.

Differences Between Preterm and Full-term Groups

It was hypothesized that during the early school-age years, demographically similar groups of preterm and full-term born children would not significantly differ in

their cognitive skills and behavioral-emotional functioning. The results of the present study partially supported this null hypothesis. No differences were found between preterm and full-term born children on measures of cognitive functioning, as well as on their mothers' and teachers' assessments of their behavioral-emotional functioning. In contrast, significant differences were found between preterm and full-term born children in terms of their perceptions of the extent to which they experienced depressive symptoms.

Only recently have researchers begun to systematically study children's own assessments of their internal feelings and perceptions of their social situation. The finding that children's self-perceptions of their internal feelings and behaviors differed from their mothers' and teachers' reports of their behavioral-emotional difficulties provides support for the importance of investigating whether children's self perceptions of their social experience determine specific pathways towards maladjustment, as proposed by Hymel and Franke (1985). Although the present study did not indicate a significant relationship between mother-child interactions and children's reports of depressive symptoms, other researchers (e.g., Kandel, 1982) have reported strong relationships between negative parenting and childhood depression. Given that school-age children form their self-images through social comparisons and internalization of evaluative judgements from significant others (Harter, 1983; Ruble, 1983), it seems plausible that parenting and children's experience of depressive symptoms would be related.

The present study provided evidence that children's reports of depressive symptoms were correlated with their language skills. It is possible that poor expressive and receptive language skills lead to depressive symptoms, or depressive symptoms lead to children's failure to obtain expressive and receptive language skills, or depressive symptoms and poor language skills were reciprocally related, with each reinforcing the other (Kellam et al., 1991; Rutter, 1986; Rutter, Tizard, & Whitmore, 1970). Although the relation between childhood depressive symptoms and language development needs to be assessed longitudinally to determine causal relationships, a cognitive model of depression (Beck, 1976; Graham, 1991; Seligman, 1984) could explain the current preliminary findings. Cognitive theories of depression would predict that high risk children who are vulnerable to depressive symptoms and who repeatedly experience developmental difficulties, such as delayed language development, might develop an attributional style that centers on low self-competence, hopelessness, and low expectations for success, all of which are components of depression. Whether preterm born children are at-risk for developing such an attributional style awaits further research.

Importance of Socioeconomic Status and Negative Life Stress

It was hypothesized that family socioeconomic status (SES) and negative life stress experienced by the mother would be related to preterm born children's cognitive and behavioral-emotional functioning during the early school-age years. Specifically, socioeconomic status (SES) was positively correlated with children's receptive language

skills and negatively correlated with children's externalizing behavioral problems, while negative life stress experienced by the mother was negatively correlated with children's receptive and expressive language skills. These findings suggest that children's competencies for mastering language tasks were related to, and possibly influenced by, their current family circumstances, and that specific domains of functioning were related to different aspects of the family environment. In the present study, the measure of life stress represented the mother's perceptions of the negative influences on the family as the result of negative changes in her life during the preceding twelve months. It is possible that negative stress experienced by the mother, as well as a lower SES family environment may have contributed to a familial context that reduced the availability of the parent to be responsive to their preterm born child's language development and behavior, placing the child at increased risk for developmental difficulties. Substantial research has indicated that factors known to contribute to children's language development (i.e., availability of stimulating toys and books, parental encouragement and support for intellectual accomplishments) have been reported to occur less often in low SES environments than in high SES environments (e.g., Bradley, Caldwell, & Rock, 1988; Vibbert & Bornstein, 1989). Research has also indicated that highly stressed mothers interact more aversively and less positively with their children than mothers with lower levels of stress (Dumas, Gibson, & Albin, 1989; Webster-Stratton & Hammond, 1988), which may have implications for children's language development, such that mothers who are highly stressed do not support or encourage their children's language skill development.

Importance of Perinatal Biological Risk

It was hypothesized that the severity of perinatal medical complications would be related to preterm born children's cognitive and behavioral-emotional functioning during the early school-age years. The results of the hierarchical multiple regression analyses indicated that, after statistically controlling for the importance of family socioeconomic status (SES) and negative stress experienced by the mother, severity of perinatal medical complications (i.e., biological risk) was found to be negatively correlated with children's visual-motor skills. In contrast, the severity of perinatal medical complications was not found to be significantly associated with children's language skills, their perceptions of the extent to which they experienced depressive symptoms, or their mothers' and teachers' assessments of their behavioral-emotional functioning. The finding that school-age children with a history of severe perinatal medical complications demonstrated weaker visual-motor skills, but similar language skills, than children with a history of less severe perinatal complications is consistent with other studies (e.g., Caputo, Goldstein, & Taub, 1981; Hunt, 1981; Siegel, 1982; Vohr & Coll, 1985) which reported a strong correlation between biological risk factors and preterm born children's visual-motor skills. The correlation between severity of ventilation, item # 10 on the *PERI*, and children's visual-motor skills is consistent with Landry and colleagues findings (Landry et al., 1984; Landry et al., 1990) that preterm infants with bronchopulmonary dysplasia (BPD) evidenced lower scores on visual-motor tasks. However, neither the present study or past research has determined the mechanism by which perinatal medical complications contribute to weaker visual-motor skills.

The finding that preterm born children reported greater depressive symptoms than full-term born children and that the severity of preterm born children's perinatal complications did not significantly predict their depressive symptomatology suggests that preterm born children may perceive themselves differently than their full-term born peers, regardless of the severity of their medical complications at birth. Clinical observations suggests that preterm born children may feel poorly about themselves as a result of their identification in being a member of an "at-risk" group. Likewise, parents of preterm born children may have placed more importance on their child's early learning and/or social experiences in school, compared to parents of "normal" full-term born peers, which in turn impacted children's self-perceptions. Although these hypotheses await further longitudinal research, the findings from the present study would support assessments of preterm born children's perceptions of their self-image, mood, and behavior, as they make the transition to elementary school.

Importance of the Mother-Child Relationship

It was hypothesized that the mother-child relationship would predict cognitive and behavioral-emotional functioning during the early school-age years for preterm born children, even after other environmental factors (i.e., family SES and negative life stress experienced by the mother) were considered. As predicted, measures of maternal rejection and psychological control were positively correlated with children's behavioral-emotional difficulties and negatively correlated with children's cognitive functioning. Specifically, mothers' reports of rejection in their relationship with their child and

mothers' reports that they attempted to control their child's behavior through methods which arouse guilt or instilled anxiety were associated with externalizing behavioral problems for their child. These findings are consistent with previous studies that have documented the association of parenting behavior with children's development (e.g., Dumas, LaFreniere, Beaudin, & Verlaan, 1992; Maccoby, 1992; Parke & Slaby, 1983; Parpal & Maccoby, 1985; Patterson, 1982). However, when interpretating the results of the present study, it is important to recognize that common method variance (i.e., mothers provided reports of both their relationship with their child and their child's level of behavioral-emotional functioning) may have inflated the correlations. Moreover, these data do not allow one to determine whether the mother-child relationship influences child adjustment, whether child adjustment influences parenting behaviors, or whether the two sets of constructs are related to each other in a bi-directional manner.

In the present study, children's perceptions of maternal rejection was negatively correlated with their expressive language skills. One interpretation is that this correlation solely represents a language skill. However, it is also possible that children who experience their mothers as being more rejecting do not seek experiences that would facilitate their cognitive development, or that their mothers do not provide such experiences. The lack of significant association between child and mother reports of the level of maternal rejection in the mother-child relationship could possibly be due to different patterns of underlying needs, motives, and defenses that accompany the different social roles of the mother and child. Further research is need to examine the concordance between parent and child perceptions of their relationship across

development, and to incorporate other aspects of the parent-child relationship in the prediction of preterm born children's adaptation and development.

Mother-Child Relationship as a Moderator of Biological Risk

From the perspective of an interactional model of development (e.g., Fiese & Sameroff, 1989), it was predicted that the mother-child relationship would moderate the relation between biological risk and preterm born children's cognitive and behavioral-emotional functioning during the early school-age years. Except for a single regression equation, the interaction terms in the hierarchical regression analyses for the preterm group did not reach significance. The one significant interaction term indicated that preterm born children with a history of severe perinatal medical complications and who also experienced low levels of psychological control in their relationship with their mothers experienced fewer externalizing behavioral problems than those preterm born children with a history of severe perinatal medical complications and who also reported having experienced high levels of psychological control in their relationship with their mothers.

Given the small sample size, it is likely that the present study did not have adequate power to demonstrate a moderator effect (cf. Wahlsten, 1990, 1991, 1993). Thus, further exploratory analyses were conducted to investigate if the mother-child relationship functioned as a moderator (i.e., protective factor) in reducing the effect of biological risk on children's cognitive and behavioral-emotional functioning. Results indicated that for children with high birth risk histories, children's perceptions of high

levels of maternal rejection was negatively associated with their expressive language skills and mothers' reports of high levels of rejection in their relationship with their child was positively correlated with children's internalizing behavioral problems. These findings are consistent with Rutter's (1990) definition of a moderator as having an effect in the high risk group, but not having an effect in the low risk group. Thus, it is concluded that the results of the present study represent a first step towards showing that the mother-child relationship facilitates sound adaptation for children with significant birth risk. Replication of these findings with a larger sample is needed to unequivocally determine if the quality of the mother-child relationship modifies children' adaptation following a high-risk birth.

Limitations of the present study

A major limitation of the present study is that the direction of the theorized effects of the mother-child relationship on children's cognitive and behavioral-emotional functioning during the early school-age years cannot be determined. It is possible that mothers adopt rejecting behaviors and control styles as a function of their child's characteristics. It is also possible that these types of parenting behaviors contribute to more problems in children's cognitive and behavioral-emotional functioning. According to transactional models of development (Fiese & Sameroff, 1989), it is likely that reciprocal and cyclical associations exist between familial interactions and children's cognitive and behavioral-emotional functioning. However, a more precise understanding of such relationships requires longitudinal data. The present study is also limited by

the fact that the assessment of familial relationship/interactions included only the mother-child dyad, without consideration of the importance of other relationships. Future research needs to assess the lager context of environmental influences on the preterm born child by including the father-child, sibling, and peer relationships. In addition, the present study is limited by the sample characteristics such that the children studied were primarily Caucasian (73%) and the majority of the mothers were married (84%). Thus, the results of the present study cannot be generalized to other samples with different ethnic, cultural, and social compositions due to the possibility that parenting may have a different meaning in these settings.

Reporting biases are another possible limitation of the present study. For example, the present study relied on self-report data to measure children's behavioral-emotional functioning. However, given the large body of literature on parent-child interactions, and the lack of research that has assessed preterm children's perceptions of their parents' behaviors, it was felt that the use of self-report data was needed and justified in the assessment of the mother-child relationship. For example, observations measured within a family might reveal a significant amount of maternal rejection, but the child may not perceive his/her mother's anger as being directed at him/her, and therefore may not feel "rejected." In addition, mothers were asked to report on both their relationship with their child and their child's behavioral-emotional problems. Since this could lead to a bias in reporting (i.e., maternal emotional functioning and family stress may influence the mother's reporting of the child's behavior), children's and teacher's reports of behavioral-emotional problems were obtained. Finally, the problem of attrition

should not be overlooked when drawing conclusions based upon the data that were collected. It is possible that those mothers who had lingering concerns about their child's functioning may have been more likely to participate in the present study than those who did not.

Conclusions

Significant predictors of preterm born children's cognitive and behavioral-emotional functioning during the school-age years included, severity of perinatal medical complications, family socioeconomic status, negative life stress experienced by the mother, and the quality of the mother-child relationship, and these factors exerted differential effects depending on the type of outcome assessed. Given that children's performance during the early school-age years has implications for their ongoing academic success and perceptions of competence, as well as their risk for later behavioral and/or socioemotional problems (Jacobs, 1990; Thompson, Lampripon, Johnson, & Eckstein, 1990), it is critical that we fully understand how biological risk and environmental factors influence preterm children's functioning during these years. The exploratory analyses that protected against Type II error provided evidence that the mother-child relationship functioned as a moderator of the relationship between biological risk and children's cognitive and behavioral-emotional functioning during the early school-age years. Future research will need to incorporate other aspects of family functioning, as well as the larger context of environmental influences on the child and assess these relationships longitudinally in order to obtain a more comprehensive understanding of preterm children's development and to determine causal relationships.

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Appendix A

Perinatal Risk Inventory

1. Apgar score: less than 3 at 1 minute, 5 or less at 5 minutes, or less than 3 at 1 minute in a neonate requiring intubation before 5 minutes.
   - 0 No neurobehavioral abnormalities
   - 1 Hyperalert
   - 2 Mild hypotonia
   - 3 Severe hypotonia

2. EEG
   - 0 Normal EEG or not performed
   - 1 Abnormal EEG, but normal at discharge
   - 2 Abnormalities on EEG (not flat or periodic) with continued abnormalities at discharge
   - 3 Periodic or flat EEG with continued abnormalities at discharge

3. Seizures (nonmetabolic)
   - 0 No problem
   - 1 Suspected seizure; not treated with anticonvulsant
   - 2 One or more seizures with response to a single anticonvulsant
   - 3 One or more seizures with resistance to therapy requiring 2 or more anticonvulsant

4. Intracranial hemorrhage (grade I, isolated germinal matrix hemorrhage; grade II, IVH with normal ventricular size; grade III, IVH with ventricular dilation; grade IV, intraventricular and parenchymal hemorrhage)
   - 0 Negative CT or ultrasound, or not performed
   - 1 Subarachnoid hemorrhage with seizures or grade I and grade II IVH
   - 2 Grade III IVH
   - 3 Grade IV IVH

Appendix A

Perinatal Risk Inventory
(continued)

5. Hydrocephalus (evidence of increased pressure)
   - 0 No evidence of hydrocephalus on ultrasound or CT
   - 1 Suspected on clinical basis (i.e., diagnosis based on rapidly increasing head size [> 1.3 cm/wk] and/or spreading sutures), resolved without treatment
   - 2 Hydrocephalus confirmed on ultrasound or CT; without shunt; treated medically or repeated intraventricular taps
   - 3 Hydrocephalus confirmed on CT or ultrasound; shunt required

6. CT or ultrasound without evidence of hydrocephalus, or intracranial hemorrhage, but other CNS findings
   - 0 Negative CT or ultrasound or not done
   - 1 Abnormal findings with return to normal prior to discharge
   - 2 Identified abnormalities not specified elsewhere without return to normal prior to discharge
   - 3 Loss of parenchyma, decreased mantel or other abnormalities which may result in parenchymal injury not specified elsewhere

7. Premature with weight > 3rd percentile (appropriate for gestational age); if score < 10th percentile, item 8
   - 0 >32 weeks
   - 1 32-30 weeks
   - 2 29-27 weeks
   - 3 26-24 weeks

8. Weight for gestational age (Dubowitz or estimated date of confinement)
   - 0 Weight appropriate for gestational age
   - 1 < 10th percentile for weight, but > 3rd percentile
   - 2 < 3rd percentile for weight
   - 3 < 3rd percentile for weight, with a 2 or 3 in other categories of perinatal index

Appendix A

Perinatal Risk Inventory
(continued)

9. Dysmorphic features (i.e., minor dysmorphic: features have minimal medical implications although may require surgery, i.e., skin tag. Major dysmorphic: features have major medical implications for patients and physician, i.e., cleft palate or tracheo-esophageal fistula).
   - 0 None or 1 dysmorphic feature
   - 1 Two minor dysmorphic features
   - 2 Three or more minor dysmorphic features, or 1 major feature, with normal chromosomes
   - 3 Chromosomal abnormalities or a syndrome known to be associated with developmental disabilities such as Down syndrome or fetal alcohol syndrome

10. Ventilation
   - 0 Not ventilated
   - 1 Seven days or less
   - 2 Eight to 21 days
   - 3 > 21 days or clinical diagnosis of BPD with tachypnea

11. Head growth (premature infant hospitalized 6 wk or more)
   - 0 Head size > 10% and < 90% for gestational age with 3.5 cm or greater growth in first 6 wk
   - 1 Initial head circumference in the 5th-10th percentile with 3.5 cm or greater growth in the first 6 wk
   - 2 Initial head circumference in > 3rd percentile with less than 3.5 cm growth in the first 6 wk
   - 3 Initial head circumference < 3rd percentile for gestational age with < 3.5 cm for the first 6 wk

Appendix A

Perinatal Risk Inventory
(continued)

12. Head growth (term infants hospitalized > 3 weeks)
    - 0 Initial head circumference > 10th percentile with average head growth > = 0.3 cm/week
    - 1 Initial head circumference > 10th percentile with average head growth < 0.29 cm/week
    - 2 Initial head circumference below the 10th percentile with average head growth > 0.3 cm/week
    - 3 Initial head circumference below the 10th percentile with average head growth < 0.29 cm/week

13. Polycythemia (venous hematocrit)
    - 0 Hematocrit < 65%
    - 1 Hematocrit > 65% and < 70 % without exchange transfusion
    - 2 Hematocrit > 65% without symptoms with exchange transfusion
    - 3 Hematocrit > 65% requiring exchange transfusion because of hypoglycemia, lethargy, apnea, or seizures

14. Meningitis
    - 0 None
    - 1 Suspected diagnosis on clinical or laboratory basis without bacterial or viral confirmation
    - 2 Confirmed diagnosis with or without seizures with adequate tone and state control within 72 hours
    - 3 Confirmed diagnosis with persistent hypotonia or obtunded stated or seizures with persist for more than 72 hours

15. Hypoglycemia (regardless of gestational age, < 1.7 mmol/L [30 mg/dL] on heelstick)
    - 0 No hypoglycemia
    - 1 Hypoglycemia without symptoms, requiring oral feedings only
    - 2 Hypoglycemia with lethargy or hypotonia; requiring treatment with IV glucose
    - 3 Hypoglycemia with seizures; requiring treatment with IV glucose, glucagon, or corticotropin

Appendix A

Perinatal Risk Inventory
(continued)

16. Congenital infection
    - 0 No suspicion of congenital infection
    - 1 Suspected, but without viral or serologic confirmed
    - 2 Suspected, may include small for gestational age (i.e., 3rd percentile or below) only, with viral or serologic confirmed
    - 3 Clearly identified diagnosis by culture or serology associated with signs and symptoms, i.e., jaundice, chorioretinitis, or hepatosplenomegaly

17. Hyperbilirubinemia
    - 0 Not requiring therapy
    - 1 Mild; requiring phototherapy or single exchange
    - 2 Hyperbilirubinemia requiring 2 or more exchange transfusions
    - 3 Hyperbilirubinemia requiring 2 or more exchange transfusions and associated with neurologic changes such as lethargy or increased irritability

18. Associated medical problems such as hydrops, RPO, cyanotic heart disease, BPD, necrotizing enterocolitis (non-CNS), A-O incompatable, PDA, hypertension, VATER, numothroax & chest tube, or PAC.
    - 0 No associated medical problems complicating the neonatal course
    - 1 Associated medical problems suspected, but not substantiated
    - 2 Established neonatal problems, but resolved prior to discharge
    - 3 Persistent medical problems at time of discharge such as grade II RPO, ileostomy, supplemental oxygen requirement, nasogastric tube

* Abbreviations: EEG, electroencephalogram; CT, compute tomography; IVH, intraventricular hemorrhage; CNS, central nervous system; BPD, bronchopulmonary dysplasia; IV, intravenous; ROP, retinopathy of prematurity; PAC, premature atrial contractions, PDA, patent ductus arteriosis.

Appendix B

Letter to Parents of Preterm Born Children

April, 1994

Dear Parent:

I am writing to inform you of a program that the Women's Hospital Follow-up Clinic will be involved in this coming year. We are contacting the families who had children born at Moses Cone Memorial Hospital between November 1985 and December 1987 and assessed at our clinic to invite them to participate in this project.

This program is being conducted with the assistance of Lynda Richtsmeier, M.A., a graduate student in clinical psychology at the University of North Carolina at Greensboro (UNCG). Ms. Richtsmeier will be contacting you by phone in order to provide more information about this research project so you can decide about whether or not to participate. Your participation in this project would be strictly confidential.

We are also please to announce that Healthtex Corporation has donated over 1,500 dollars worth of gift certificates to this project. Thus, in return for your participation, you will receive a Healthtex gift certificate that can be redeemed for two (2) Healthtex outfits at their company store located here in Greensboro. Your child will receive a small prize and a Celebration Station "Fun Buck" for his/her participation.

Your participation would not only provide information for research, but also provide you with a current assessment of your child's development.

Sincerely,

Marian F. Earls, M.D., F.A.A.P.
Developmental Pediatrician

Allison Dubisson, M.A.
High Risk Clinic Research Associate

Lynda Richtsmeier, M.A.
Graduate Student

Susan P. Keane, Ph.D.
UNCG Faculty Supervisor

Appendix C

Letter to Parents of Full-term Born Children

May 1994

Dear Parent:

I am a doctoral graduate student at the University of North Carolina at Greensboro (UNCG). I am presently working on my dissertation research project and I would like to ask if you and your child would help me in this project. The focus of this study is to better understand the development of preterm and full-term born children. Your participation would not only provide information for research, but also provide you with a current assessment of your child's cognitive and social development.

I am also pleased to announce that Healthtex Corporation has donated over 1,500 dollars worth of gift certificates to this project. Thus, in return for your participation, you will receive a Healthtex gift certificate that can be redeemed for two (2) Healthtex outfits at their company store located here in Greensboro. Your child will receive a small prize and a Celebration Station "Fun Buck" for his/her participation.

If you would like me to contact you in order to provide more information about this project so you can decide about whether or not to participate, please complete the information below and return this letter to the main office at your child's school/or after school program. Or, if it is more convenient, you may call and leave a message stating this information on my confidential voice mail (334-5013 ext. 224) or send this letter directly to me at UNCG.

I hope you will consider participating in this important project.

Sincerely,

Lynda M. Richtsmeier, M.A. Graduate Student

Susan P. Keane, Ph.D. Faculty Supervisor

Yes, I am interested in having Lynda Richtsmeier contact me about this project.

Name: _____

Address: _____

Phone #: _____

Appendix D

Consent Form

Dear Parent:

I am a doctoral graduate student at the University of North Carolina at Greensboro (UNCG). I am presently working on a research project, under the supervision of Susan P. Keane, Ph.D., a faculty member at UNCG, and in cooperation with the Women's Hospital Follow-up Clinic. The focus of this study is to better understand the development of full-term and preterm born children.

Those mothers and children who participate in this study will be asked to complete several questionnaires. These questionnaires will ask questions about your child's behavior, family relationships, and life experiences. All information given by you and your child will be strictly confidential, and it is being used solely for research purposes. You and your child may ask questions or cease participating in this study at any time, and your child will be informed of this at the beginning of the study.

Your participation will require approximately 60-90 minutes. You will receive one Healthtex coupon, good for the purchase of 2 free articles of clothing, and your child will receive a Celebration fun buck, good for 4 free tokens, and a small toy for his/her participation. You will also have the opportunity to find out about your data and the results of the entire study can be mailed to you if you express interest.

Thank you for your consideration of this matter.

Sincerely,

Lynda Richtsmeier, M.A.

I, _____, have read the above statement and agree to take part in this study, understanding that I may withdraw at any time.

I, _____, have read the above statement and agree to allow my child to participate in this study if they wish to take part.

I wish to have the results of this study sent to me. _____ YES ____ NO

_____ _____

Witness date

Appendix E

Consent Form to Contact Teachers

I give Lynda M. Richtsmeier permission to speak with my child's teacher, (Ms./Mr. _____). I understand that the information obtained will be kept confidential by Lynda and those who work with her at the University of North Carolina. Any information obtained will be used in relation to the project in which my family has participated. The teacher will be asked to fill out two standard questionnaires. No other information will be requested.

_____ _____

Parent/guardian signature Witness

_____ _____

date date

_____

Child's name

_____

Teacher's Name:
School:
Phone #:

Appendix F

Letter to Teachers

May 1994

Dear Teacher:

I am a doctoral graduate student at the University of North Carolina at Greensboro (UNCG). I am presently working on my dissertation research project and I would like to ask if you could help me in this project. The focus of this study is to better understand the development of full-term and preterm born children.

Recently, _____ participated in this study. We would appreciate if you could complete two brief questionnaires based upon your interactions and observations of this child. Enclosed you will also find a stamped, self-addressed envelop for you to return these questionnaires back to me at UNCG.

I hope you will be able to contribute to this important research project. Your participation is greatly appreciated.

Sincerely,

Lynda M. Richtsmeier, M.A.
Graduate Student

Susan P. Keane, Ph.D.
Faculty Supervisor

Parent consent:

I give Lynda M. Richtsmeier permission to speak with my child's teacher, (Ms./Mr. _____). I understand that the information obtained will be kept confidential by Lynda and those who work with her at the University of North carolina. Any information obtained will be used in relation to the project in which my family has participated. The teacher will be asked to fill out two standard questionnaires. No other information will be requested.

_____
parent/guardian signature

_____
child's name

_____
date

Appendix G

Consent Form to Review Hospital Records

I give Lynda M. Richtsmeier, M.A. and Marian Earls, M.D. permission to review my child's medical file to obtain information regarding my child's neonatal history. I understand that the information obtained will be kept confidential by Lynda and those who work with her at the University of North Carolina at Greensboro (UNCG). The information that is obtained from my child's medical file will only be used in relation to the project in which my family has participated in at UNCG.

_____ _____

Parent/guardian signature Witness

_____ _____

date date

_____

Child's name

_____

Child's date of birth

Table 1

Demographic Information for Preterm and Full-term Samples.

	Preterm (n=49)			Full-term (n=24)				
	M	SD	%	M	SD	%	t or X^2	p
Child:								
Age (yrs)[1]	7.39	0.66	-	7.50	0.69	-	-.63	.53
Gender							.61	.44
Girls	-	-	57	-	-	67		
Boys	-	-	43	-	-	33		
Grade[1]							4.01	.13
Rising 1st	-	-	29	-	-	8		
Rising 2nd	-	-	49	-	-	58		
Rising 3rd	-	-	22	-	-	33		
Family:								
Mother's Age (yrs)[1]	37.24	4.86	-	35.50	5.51	-	1.38	.17
Marital Status[1]							-1.15	.33
Single	-	-	6	-	-	0		
Married	-	-	80	-	-	92		
Separated/Divorced	-	-	14	-	-	2		
Race							.57	.45
Caucasian	-	-	69	-	-	79		
African-American	-	-	29	-	-	21		
Asian	-	-	2	-	-	-		
Family SES[1]	44.10	12.82	-	48.23	10.69	-	-1.36	.18
Mother's Ed. (yrs)[2]	14.55	2.22	-	15.21	2.47	-	-1.15	.26
Marital Status[2]							1.32	.52
Single	-	-	12	-	-	8		
Married	-	-	84	-	-	92		
Separated/Divorced	-	-	4	-	-	-		

Note: [1]=At time of study. [2]=At time of child's birth.

Table 2

Demographic and Perinatal Information for Preterm Sample, Children Lost to Follow-up, and Children who Refused Participation.

	Preterm sample (n=49)			Children lost to f/u[1] (n=256)			Non-participants[1] (n=13)				
	M	SD	%	M	SD	%	M	SD	%	F	p
GA[2]	32.82	2.64	-	32.46	2.92	-	32.31	2.63	-	.35	.71
	range (26-36)			range (26-36)			range (27-36)				
Weight[3]	1783	579	-	1741	596	-	1748	455	-	.11	.90
	range (680-3155)			range (592-3380)			range (1180-2845)				
Gender:										3.31	.19
Girls	-	-	57	-	-	47	-	-	31		
Boys	-	-	43	-	-	53	-	-	69		
Race[4]:										3.79	.15
Caucasian	-	-	69	-	-	57	-	-	46		
Af-Am.[5]	-	-	29	-	-	42	-	-	54		
Asian	-	-	2	-	-	1	-	-	0		

Note:

[1] Information on these children was obtained from the Neonatal Intensive Care Unit's (NICU) birth log book.

[2] GA = Gestational Age.

[3] Weight in grams.

[4] Due to the small sample size, Asian was not included in the Race X^2.

[5] Af-Am. = African-American

Table 3

Means, Standard Deviations, Ranges, and Coefficient Alphas for Predictor Variables for the Full Sample.

Measures	n	M	SD	Range	Cronbach's Coefficient Alpha[1]
SES	73	45.46	12.24	12 - 66	---
N-LES	73	3.19	4.04	0 - 20	---
PERI	73	3.03	3.64	0 - 16	---
PARQ-P	73	84.95	13.19	62 - 119	.78[2]
PARQ-C	71	92.08	15.98	63 - 130	.75[3]
PRPB-CA	73	15.55	2.10	12 - 21	.83[4]
CRPB-CA	69	19.97	3.84	13 - 30	.88[5]
PRPB-FL	73	23.35	1.55	19 - 27	.63[6]
CRPB-FL	69	22.77	2.13	19 - 28	.60[7]

Note:

Variables: SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; CRPB-FL = Child Report of Parenting Behavior-Firm Control/Lax Control Factor; PRPB-FL = Parent Report of Parenting Behavior-Firm Control/Lax Control Factor.

[1] Coefficient alpha is a measure of internal consistency of items within a scale (Cronbach, 1951). A high alpha indicates that the items in a scale are sampling the same content area.

[2] Alphas for PARQ-P subscales ranged from .54 to .84.

[3] Alphas for PARQ-C subscales ranged from .63 to .83.

[4] Alphas for PRPB-CA subscales ranged from .20 to .72.

[5] Alphas for CRPB-CA subscales ranged from .54 to .71.

[6] Alphas for PRPB-FL subscales ranged from .20 to .61.

[7] Alphas for CRPB-FL subscales ranged from .31 to .58.

Table 4

Means, Standard Deviations, Ranges, and Coefficient Alphas for Outcome Variables for the Full Sample.

Measures	n	M	SD	Range	Cronbach's Coefficient Alpha[1]
CDI[2]	73	6.16	5.80	0 - 72	.83
ASQ-P[2]	73	8.15	6.88	0 - 29	.92
ASQ-T[2]	61	5.34	7.26	0 - 30	.94
CBCL[2]	73	24.38	17.44	3 - 84	.93
CBCL-I[2]	73	5.44	5.19	0 - 23	.83
CBCL-E[2]	73	7.97	6.99	0 - 33	.89
TRF[2]	61	20.72	26.25	0 - 131	.97
TRF-I[2]	61	5.90	7.01	0 - 32	.90
TRF-E[2]	61	4.82	8.70	0 - 48	.95
WISC-Vocab[3]	73	11.23	3.07	3 - 19	---
PPVT-R[4]	73	106.32	15.63	66 - 140	---
VMI[4]	73	96.71	10.77	71 - 123	---

Note:
Variables: CDI = Child Depression Inventory; ASQ-P = Abbreviated Symptom Questionnaire-Parent Form; ASQ-T = Abbreviated Symptom Questionnaire-Teacher Form; CBCL = Child Behavior Checklist; CBCL-I = Child Behavior Checklist-Internalizing Scale; CBCL-E = Child Behavior Checklist-Externalizing Scale; TRF = Teacher Report Form; TRF-I = Teacher Report Form-Internalizing Scale; TRF-E = Teacher Report Form-Externalizing Scale; WISC-Vocab = Vocabulary subtest from the WISC-III; PPVT-R = Peabody Picture Vocabulary Test-Revised; VMI = Developmental Test of Visual-Motor Integration.

[1] Coefficient alpha is a measure of internal consistency of items within a scale (Cronbach, 1951). A high alpha indicates that the items in a scale are sampling the same content area.

[2] Raw scores

[3] Standard Score (M = 10, SD = 3).

[4] Standard Score (M = 100, SD = 15).

Table 5

Means, Standard Deviations, and Ranges for Predictor Variables for the Preterm Sample.

Measures	n	M	SD	Range
SES	49	44.10	12.82	12 - 66
N-LES	49	1.45	1.16	0 - 4
PERI	49	4.51	3.62	0 - 16
PARQ-P	49	83.55	12.16	62 - 108
PARQ-C	47	93.19	15.86	68 - 130
PRPB-CA	49	15.33	2.10	12 - 21
CRPB-CA	46	20.33	3.96	13 - 30
PRPB-FL	49	23.35	1.55	19 - 27
CRPB-FL	46	22.83	2.25	19 - 28

Note:

Variables: SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; CRPB-FL = Child Report of Parenting Behavior-Firm Control/Lax Control Factor; PRPB-FL = Parent Report of Parenting Behavior-Firm Control/Lax Control Factor.

[1] Raw scores

[2] Standard Score (M = 10, SD = 3).

[3] Standard Score (M = 100, SD = 15).

Table 6

Means, Standard Deviations, and Ranges for Outcome Variables for the Preterm Sample.

Measures	n	M	SD	Range
CDI[1]	49	7.24	6.40	0 - 27
ASQ-P[1]	49	8.51	7.35	0 - 29
ASQ-T[1]	40	6.70	8.20	0 - 30
CBCL[1]	49	25.84	19.65	3 - 84
CBCL-I[1]	49	5.39	5.56	0 - 23
CBCL-E[1]	49	8.18	7.72	0 - 33
TRF[1]	40	25.38	29.65	0 - 131
TRF-I[1]	40	6.90	7.59	0 - 32
TRF-E[1]	40	5.85	10.25	0 - 48
WISC-Vocab[2]	49	10.96	3.12	3 - 18
PPVT-R[3]	49	104.78	15.58	66 - 137
VMI[3]	49	94.65	10.38	71 - 115

Note:
Variables: CDI = Child Depression Inventory; ASQ-P = Abbreviated Symptom Questionnaire-Parent Form; ASQ-T = Abbreviated Symptom Questionnaire-Teacher Form; CBCL = Child Behavior Checklist; CBCL-I = Child Behavior Checklist-Internalizing Scale; CBCL-E = Child Behavior Checklist-Externalizing Scale; TRF = Teacher Report Form; TRF-I = Teacher Report Form-Internalizing Scale; TRF-E = Teacher Report Form-Externalizing Scale; WISC-Vocab = Vocabulary subtest from the WISC-III; PPVT-R = Peabody Picture Vocabulary Test-Revised; VMI = Developmental Test of Visual-Motor Integration.
[1] Raw scores
[2] Standard Score (M = 10, SD = 3).
[3] Standard Score (M = 100, SD = 15).

Table 7

Means, Standard Deviations, and Ranges for Predictor Variables for the Full-term Sample.

Measures	n	M	SD	Range
SES	24	48.23	10.69	26 - 66
N-LES	24	2.71	3.28	0 - 11
PERI	24	0.00	0.00	0 - 0
PARQ-P	24	87.79	14.95	68 - 119
PARQ-C	24	89.92	16.32	63 - 120
PRPB-CA	24	15.99	2.07	12 - 21
CRPB-CA	23	19.23	3.55	14 - 27
PRPB-FL	24	23.35	1.56	20 - 26
CRPB-FL	23	22.64	1.91	18 - 26

Note:

Variables: SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; CRPB-FL = Child Report of Parenting Behavior-Firm Control/Lax Control Factor; PRPB-FL = Parent Report of Parenting Behavior-Firm Control/Lax Control Factor.

[1] Raw scores

[2] Standard Score (M = 10, SD = 3).

[3] Standard Score (M = 100, SD = 15).

Table 8

Means, Standard Deviations, and Ranges for Outcome Variables for the Full-term Sample.

Measures	n	M	SD	Range
CDI[1]	24	3.96	3.47	0 - 15
ASQ-P[1]	24	7.42	5.87	0 - 25
ASQ-T[1]	21	2.76	4.02	0 - 18
CBCL[1]	24	21.42	11.52	4 - 46
CBCL-I[1]	24	5.54	4.45	1 - 21
CBCL-E[1]	24	7.54	5.29	0 - 19
TRF[1]	21	11.86	15.08	0 - 70
TRF-I[1]	21	4.00	5.41	0 - 21
TRF-E[1]	21	2.86	3.99	0 - 16
WISC-Vocab[2]	24	11.79	2.93	8 - 19
PPVT-R[3]	24	109.46	15.58	81 - 140
VMI[3]	24	100.92	10.53	82 - 123

Note:
Variables: CDI = Child Depression Inventory; ASQ-P = Abbreviated Symptom Questionnaire-Parent Form; ASQ-T = Abbreviated Symptom Questionnaire-Teacher Form; CBCL = Child Behavior Checklist; CBCL-I = Child Behavior Checklist-Internalizing Scale; CBCL-E = Child Behavior Checklist-Externalizing Scale; TRF = Teacher Report Form; TRF-I = Teacher Report Form-Internalizing Scale; TRF-E = Teacher Report Form-Externalizing Scale; WISC-Vocab = Vocabulary subtest from the WISC-III; PPVT-R = Peabody Picture Vocabulary Test-Revised; VMI = Developmental Test of Visual-Motor Integration.
[1] Raw scores
[2] Standard Score (M = 10, SD = 3).
[3] Standard Score (M = 100, SD = 15).

Table 9

Cronbach's Alpha Coefficients[1] by Age for the *CRPB-CA* Measure.

	6-y-olds	7-y-olds	8-y-olds	Full Sample
CRPB-CA Subscales:				
Intrusiveness	.50	.70	.62	.63
Control through quilt	.34	.68	.63	.60
Hostile control	.54	.70	.83	.71
Inconsistent discipline	.46	.53	.75	.59
Instilling persistent anxiety	-.08	.42	.73	.54
Withdrawal of relations	.38	.63	.83	.68

Note:
CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor

[1] Coefficient alpha is a measure of internal consistency of items within a scale (Cronbach, 1951). A high alpha indicates that the items in a scale are sampling the same content area.

Table 10

Percentage of Children in Preterm Sample Meeting Criteria for Various Perinatal Events on the Perinatal Risk Inventory (PERI).

PERI Item #	Perinatal Event	% meeting criteria
1	Neurobehavioral abnormalities at birth.	14%
4	Grade III intraventricular hemorrhage (IVH).	2%
6	CNS abnormalities with return to normal prior to discharge.	4%
6	CNS abnormalities, without evidence of hydrocephalus or intracranial hemorrhage.	2%
7	Gestational Age (GA) between 30-32 weeks.	25%
7	GA between 27-29 weeks.	14%
7	GA less than or equal to 26 weeks.	2%
9	Minor dysmorphic features.	2%
10	Ventilation for 7 days or less.	14%
10	Ventilation for 8 to 21 days.	6%
10	Ventilation for greater than 21 days or clinical diagnosis of bronchopulmonary dysplasia (BPD) with tachypnea.	6%
11	Initial head circumference in the 5th-10th percentile with 3.5 cm or greater growth in the first 6 weeks.	4%
11	Initial head circumference greater than the 3rd percentile with less than 3.5 cm growth in the first 6 weeks.	2%
11	Initial head circumference less than the 3rd percentile with less than 3.5 cm growth in the first 6 weeks.	2%

Table 10
(cont.)

Percentage of Children in Preterm Sample Meeting Criteria for Various Perinatal Events on the Perinatal Risk Inventory (PERI).

PERI Item #	Perinatal Event	% meeting criteria
14	Suspected diagnosis of meningitis on a clinical or laboratory basis without bacterial or viral confirmation.	31%
15	Hypoglycemia without symptoms and required only oral feedings.	6%
15	Hypoglycemia with lethargy or hypotonia and required treatment with IV glucose.	8%
16	Suspected congenital infection, but without viral or serologic confirmed.	67%
16	Suspected congenital infection with viral or serologic confirmed.	2%
17	Mild hyperbilirubinemia and required phototherapy or single exchange.	65%
18	Associated medical problems [i.e., hydrops, retinopathy of prematurity (RPO), cyanotic heart disease, BPD, necrotizing enterocolitis (non-CNS), A-O incompatable, patent ductus arteriosis (PDA), hypertension, VATER, pneumothorax & chest tube, and/or premature atrial contractions (PAC)] suspected, but not substantiated.	4%
18	Established neonatal problems, but resolved prior to discharge.	27%
18	Persistent medical problems at time of discharge.	2%

Table 11

Comparisons of Means for Outcome Measures for the Preterm and Full-term Samples.

	Preterms			Full-terms				
Measures	n	M	SD	n	M	SD	F[1]	p
CDI[2]	49	7.24	6.40	24	3.96	3.47	2.31	.02
MANOVA for the following six variables: $F(6,54) = 1.24$, $p < .30$								
ASQ-P[2]	49	8.51	7.35	24	7.42	5.87	.30	.59
CBCL-I[2]	49	5.39	5.56	24	5.54	4.45	.67	.42
CBCL-E[2]	49	8.18	7.72	24	7.54	5.29	.16	.69
ASQ-T[2]	40	6.70	8.20	21	2.76	4.02	3.97	.05
TRF-I[2]	40	6.90	7.59	21	4.00	5.41	2.54	.12
TRF-E[2]	40	5.85	10.25	21	2.86	3.99	1.06	.31
MANOVA for the following two variables: $F(2,58) = 1.61$, $p < .21$								
CBCL[2]	49	25.84	19.65	24	21.42	11.52	.14	.71
TRF[2]	40	25.38	29.65	21	11.86	15.08	3.24	.08
MANOVA for the following three variables: $F(3,69) = 1.95$, $p < .13$								
WISC-vocab[3]	49	10.96	3.12	24	11.79	2.93	1.19	.28
PPVT-R[3]	49	104.78	15.58	24	109.46	15.58	1.45	.23
VMI[3]	49	94.65	10.38	24	100.92	10.53	5.81	.02

Note:
Variables: CDI = Child Depression Inventory; ASQ-P = Abbreviated Symptom Questionnaire-Parent Form; CBCL = Child Behavior Checklist; CBCL-I = Child Behavior Checklist-Internalizing Scale; CBCL-E = Child Behavior Checklist-Externalizing Scale; ASQ-T = Abbreviated Symptom Questionnaire-Teacher Form; TRF = Teacher Report Form; TRF-I = Teacher Report Form-Internalizing Scale; TRF-E = Teacher Report Form-Externalizing Scale; WISC-Vocab = Vocabulary subtest from the WISC-III; PPVT-R = Peabody Picture Vocabulary Test-Revised; VMI = Developmental Test of Visual-Motor Integration.
[1] Univariate F test.
[2] Raw Score.
[3] Standard Score.

Table 12

Zero-order Correlation Coefficients Among Predictors.

Variable	1	2	3	4	5	6	7	8
1. AGE	_	.13	.06	.02	-.08	-.01	.08	.09
2. SES		-	-.05	-.09	-.27[a]	-.10	-.24[a]	-.22
3. N_LES			-	.03	.14	.05	.08	.12
4. PERI				_	.30[b]	-.05	-.08	-.01
5. PARQ-C					-	.10	.30[b]	.21
6. PARQ-P						-	.06	.56[d]
7. CRPB-CA							-	.26[a]
8. PRPB-CA								_

Note:
n=73, exceptions: PARQ-C n=71, CRPB-CA n=69.
Variables: SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[a] $p < .05$.
[b] $p < .01$.
[d] $p < .0001$.

Table 13

Zero-order Correlation Coefficients Among Outcome Measures.

Variable	2	3	4	5	6	7	8	9	10	11	12
1. WISC-Vocab	.72[c]	.36[b]	-.13	.05	-.11	-.37[b]	-.15	-.31[b]	-.28[a]	-.41[c]	-.43[d]
2. PPVT-R	_	.34[b]	-.27[a]	-.08	-.28[a]	-.27[a]	-.10	-.19	-.27[a]	-.28[a]	-.33[a]
3. VMI		_	-.21	.00	-.23[a]	-.34[b]	-.24	-.20	-.13	-.31[a]	-.27[a]
4. CBCL			_	.73[d]	.85[d]	.31[a]	.27[a]	.15	.69[d]	.26[a]	.30[b]
5. CBCL-I				_	.44[d]	.14	.34[b]	-.04	.32[b]	.00	.18
6. CBCL-E					_	.18	.06	.13	.63[d]	.19	.22
7. TRF						_	.78[d]	.84[d]	.52[d]	.92[d]	.36[b]
8. TRF-I							_	.47[d]	.35[b]	.57[d]	.32[b]
9. TRF-E								_	.40[d]	.85[d]	.11
10. ASQ-P									_	.54[d]	.34[b]
11. ASQ-T										_	.39[b]
12. CDI											_

Note:
Variables: WISC-Vocab = Vocabulary subtest from the WISC-III; PPVT-R = Peabody Picture Vocabulary Test-Revised; VMI = Developmental Test of Visual-Motor Integration; CBCL = Child Behavior Checklist; CBCL-I = Child Behavior Checklist-Internalizing Scale; CBCL-E = Child Behavior Checklist-Externalizing Scale; TRF = Teacher Report Form; TRF-I = Teacher Report Form-Internalizing Scale; TRF-E = Teacher Report Form-Externalizing Scale; ASQ-P = Abbreviated Symptom Questionnaire-Parent Form; ASQ-T = Abbreviated Symptom Questionnaire-Teacher Form; CDI = Child Depression Inventory.
[a] $p < .05$.
[b] $p < .01$.
[c] $p < .001$.
[d] $p < .0001$.

Table 14

Means and standard deviations from MANOVA analyses.

	Boys (n=26)		Girls (n=35)	
Measures[1]	M	SD	M	SD
ASQ-P	2.79	1.22	2.28	1.25
ASQ-T	2.26	1.57	1.39	1.37
CBCL	5.01	1.75	4.37	1.50
TRF	4.27	3.02	3.43	2.11
CBCL-I	2.07	1.26	2.10	1.03
TRF-I	1.79	1.67	2.06	1.31
CBCL-E	2.90	1.32	2.14	1.15
TRF-E	1.82	2.02	1.19	1.29

Note:
Variables: ASQ-P = Abbreviated Symptom Questionnaire-Parent Form; ASQ-T = Abbreviated Symptom Questionnaire-Teacher Form; CBCL = Child Behavior Checklist; TRF = Teacher Report Form; CBCL-I = Child Behavior Checklist-Internalizing Scale; CBCL-E = Child Behavior Checklist-Externalizing Scale; TRF-I = Teacher Report Form-Internalizing Scale; TRF-E = Teacher Report Form-Externalizing Scale;
[1] Square Root of Raw Scores

Table 15

Hierarchical Multiple Regression Results for Prediction of VMI.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	.18			
	N-LES	- .01	.03	.03	.74
2.	PERI	- .30[a]	.12	.09	4.16[a]
3.	PARQ-C	- .04			
	PARQ-P	.16			
	CRPB-CA	.07			
	PRPB-CA	- .31	.19	.06	.73
4.	PERI x PARQ-C	- .42			
	PERI x PARQ-P	- .01			
	PERI x CRPB-CA	2.42[a]			
	PERI x PRPB-CA	- .31	.32	.13	1.60

Model R^2 = .32
Model F (11,33) = 1.41, p=.22

Note:
[1] VMI = Developmental Test of Visual-Motor Integration; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.
[a] $p < .05$.

Table 16

Hierarchical Multiple Regression Results for Prediction of WISC-Vocab.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	.18			
	N-LES	- .28	.12	.12	2.81
2.	PERI	- .08	.12	.006	.29
3.	PARQ-C	- .42[a]			
	PARQ-P	- .09			
	CRPB-CA	- .20			
	PRPB-CA	.01	.35	.23	3.29[a]
4.	PERI x PARQ-C	.59			
	PERI x PARQ-P	1.07			
	PERI x CRPB-CA	.30			
	PERI x PRPB-CA	-1.12	.37	.02	.27

Model R^2 = .37
Model F (11,33) = 1.80, p=.10

Note:
[1] WISC-Vocab = Vocabulary subtest from the WISC-III; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.
[a] $p < .05$.

Table 17

Hierarchical Multiple Regression Results for Prediction of PPVT-R.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	.31[a]			
	N-LES	- .37[b]	.24	.24	6.76[b]
2.	PERI	.03	.24	.001	.03
3.	PARQ-C	- .20			
	PARQ-P	- .13			
	CRPB-CA	- .25			
	PRPB-CA	- .17	.44	.20	3.22[a]
4.	PERI x PARQ-C	.49			
	PERI x PARQ-P	- .86			
	PERI x CRPB-CA	.60			
	PERI x PRPB-CA	- .70	.46	.03	.38

Model R^2 = .46
Model F (11,33) = 2.60, p=.02

Note:
[1] PPVT-R = Peabody Picture Vocabulary Test-Revised; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.
[a] $p < .05$.
[b] $p < .01$.

Table 18

Hierarchical Multiple Regression Results for Prediction of CDI.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	- .22			
	N-LES	.11	.06	.06	1.41
2.	PERI	.20	.10	.04	1.78
3.	PARQ-C	.33			
	PARQ-P	.04			
	CRPB-CA	- .08			
	PRPB-CA	- .01	.18	.08	.84
4.	PERI x PARQ-C	- .27			
	PERI x PARQ-P	.82			
	PERI x CRPB-CA	.04			
	PERI x PRPB-CA	.92	.21	.04	.39

Model R^2 = .21
Model F (11,33) = .81, p=.63

Note:
[1] CDI = Child Depression Inventory; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.

Table 19

Hierarchical Multiple Regression Results for Prediction of ASQ-P.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	- .23			
	N-LES	.13			
	GENDER	- .36[a]	.19	.19	3.10[a]
2.	PERI	.25	.24	.06	3.13
3.	PARQ-C	- .02			
	PARQ-P	.27			
	CRPB-CA	.18			
	PRPB-CA	- .10	.32	.08	1.06
4.	PERI x PARQ-C	- .32			
	PERI x PARQ-P	-2.34			
	PERI x CRPB-CA	.98			
	PERI x PRPB-CA	2.29	.40	.08	.99

Model R^2 = .40
Model F (12,32) = 1.77, p=.10

Note:
[1] ASQ-P = Abbreviated Symptom Questionnaire-parent report; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.
[a] $p < .05$.

Table 20

Hierarchical Multiple Regression Results for Prediction of CBCL.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	- .32[a]			
	N-LES	.18			
	GENDER	- .40[b]	.28	.28	5.43[b]
2.	PERI	.21	.33	.04	2.48
3.	PARQ-C	- .03			
	PARQ-P	.37[b]			
	CRPB-CA	.04			
	PRPB-CA	.19	.56	.23	4.69[b]
4.	PERI x PARQ-C	.08			
	PERI x PARQ-P	-1.36			
	PERI x CRPB-CA	.50			
	PERI x PRPB-CA	2.00[a]	.61	.05	1.12

Model R^2 = .61
Model F (12,32) = 4.19, p=.001

Note:
[1] CBCL = Child Behavior Checklist; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.
[a] $p < .05$.
[b] $p < .01$.

Table 21

Hierarchical Multiple Regression Results for Prediction of CBCL-I.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	- .27			
	N-LES	.13			
	GENDER	- .19	.12	.12	1.94
2.	PERI	.01	.12	.00	.001
3.	PARQ-C	.02			
	PARQ-P	.39[a]			
	CRPB-CA	.08			
	PRPB-CA	.06	.30	.18	2.33
4.	PERI x PARQ-C	1.37			
	PERI x PARQ-P	.85			
	PERI x CRPB-CA	- .22			
	PERI x PRPB-CA	.25	.37	.06	.79

Model R^2 = .37
Model F (12,33) = 1.54, p=.16

Note:
[1] CBCL-I = Child Behavior Checklist-Internalizing Scale; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.
[a] $p < .05$.

Table 22

Hierarchical Multiple Regression Results for Prediction of CBCL-E.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	- .38[b]			
	N-LES	.17			
	GENDER	- .41[b]	.33	.33	6.69[c]
2.	PERI	.23	.38	.05	3.18
3.	PARQ-C	- .05			
	PARQ-P	.29[a]			
	CRPB-CA	.03			
	PRPB-CA	.28[a]	.60	.22	5.05[b]
4.	PERI x PARQ-C	.13			
	PERI x PARQ-P	.95			
	PERI x CRPB-CA	.50			
	PERI x PRPB-CA	2.82[b]	.71	.11	3.13[a]

Model R^2 = .71
Model F (12,33) = 6.64, p=.001

Note:
[1] CBCL-E = Child Behavior Checklist-Externalizing Scale; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.
[a] $p < .05$.
[b] $p < .01$.

Table 23

Hierarchical Multiple Regression Results for Prediction of ASQ-T.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	- .06			
	N-LES	.16			
	GENDER	- .36	.13	.13	1.65
2.	PERI	- .08	.14	.006	.21
3.	PARQ-C	.01			
	PARQ-P	.16			
	CRPB-CA	.03			
	PRPB-CA	- .01	.17	.03	.20
4.	PERI x PARQ-C	- .90			
	PERI x PARQ-P	1.91			
	PERI x CRPB-CA	-2.74			
	PERI x PRPB-CA	-1.38	.32	.15	1.27

Model R^2 = .32
Model F (12,23) = 0.88, p=.57

Note:
[1] ASQ-T = Abbreviated Symptom Questionnaire-teacher report; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.

Table 24

Hierarchical Multiple Regression Results for Prediction of TRF.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	- .04			
	N-LES	.14			
	GENDER	- .28	.08	.08	.96
2.	PERI	- .07	.09	.005	.16
3.	PARQ-C	.04			
	PARQ-P	.26			
	CRPB-CA	.10			
	PRPB-CA	.03	.17	.09	.70
4.	PERI x PARQ-C	.22			
	PERI x PARQ-P	2.30			
	PERI x CRPB-CA	-3.21[a]			
	PERI x PRPB-CA	-1.65	.34	.17	1.47

Model R^2 = .34
Model F (12,23) = 0.99, p=.48

Note:
[1] TRF = Teacher Report Form; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.
[a] $p < .05$.

Table 25

Hierarchical Multiple Regression Results for Prediction of TRF-I.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	- .02			
	N-LES	.02			
	GENDER	- .06	.004	.004	.04
2.	PERI	- .02	.004	.001	.01
3.	PARQ-C	- .14			
	PARQ-P	.29			
	CRPB-CA	.10			
	PRPB-CA	.05	.14	.14	1.06
4.	PERI x PARQ-C	1.56			
	PERI x PARQ-P	2.44			
	PERI x CRPB-CA	-2.96			
	PERI x PRPB-CA	-1.03	.29	.15	1.17

Model R^2 = .29
Model F (12,23) = 0.76, p=.68

Note:
[1] TRF-I = Teacher Report Form-Internalizing Scale; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.

Table 26

Hierarchical Multiple Regression Results for Prediction of TRF-E.

Step	Predictor[1]	Beta[2]	R^2	R^2 change[3]	F[4]
1.	SES	.05			
	N-LES	.25			
	GENDER	- .32	.12	.12	1.41
2.	PERI	- .08	.12	.01	.20
3.	PARQ-C	- .06			
	PARQ-P	.10			
	CRPB-CA	.18			
	PRPB-CA	- .02	.16	.04	.30
4.	PERI x PARQ-C	- .30			
	PERI x PARQ-P	.59			
	PERI x CRPB-CA	-2.34			
	PERI x PRPB-CA	-2.10	.35	.19	1.68

Model R^2 = .35
Model F (12,23) = 1.03, p=.45

Note:
[1] TRF-E = Teacher Report Form-Externalizing Scale; SES = Socioeconomic Scale; N-LES = Negative Life Events Scale; PERI = Perinatal Risk Inventory; PARQ-C = Parental Acceptance Rejection Questionnaire-Child Report; PARQ-P = Parental Acceptance Rejection Questionnaire-Parent Report; CRPB-CA = Child Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor; PRPB-CA = Parent Report of Parenting Behavior-Psychological Control/Psychological Autonomy Factor.
[2] Standardized regression coefficients after each block's entry.
[3] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[4] F associated with change in R^2.

Table 27

Comparisons of means for Outcome Measures for the Low Birth Risk and High Birth Risk Groups.

	High Risk Group[a]			Low Risk Group[b]				
Measures	n	M	SD	n	M	SD	F[1]	p
CDI[2]	24	2.62	1.00	26	1.79	1.24	5.60	.02
MANCOVA for the following six variables: F (6,33) = 0.76, p < .15								
ASQ-P[2]	19	2.96	1.23	23	2.50	1.06	1.92	.26
CBCL-I[2]	19	1.92	1.11	23	2.23	0.85	1.68	.20
CBCL-E[2]	19	2.51	1.53	23	2.60	1.06	.21	.65
ASQ-T[2]	19	2.30	1.75	23	1.40	1.36	2.55	.12
TRF-I[2]	19	2.26	1.34	23	1.70	1.52	1.04	.31
TRF-E[2]	19	1.89	2.19	23	1.31	1.44	.80	.38
MANCOVA for the following two variables: F (2,37) = 0.96, p < .47								
CBCL[2]	19	4.77	1.81	23	4.59	1.20	.01	.93
TRF[2]	19	4.51	2.92	23	3.31	2.33	1.51	.23
MANCOVA for the following three variables: F (3,36) = 0.93, p < .38								
WISC-vocab[3]	24	10.54	2.78	26	11.58	2.97	0.91	.35
PPVT-R[3]	24	105.29	14.87	26	108.39	16.68	0.01	.92
VMI[3]	24	94.71	11.06	26	100.04	10.90	2.59	.12

Note:
Variables: CDI = Child Depression Inventory; ASQ-P = Abbreviated Symptom Questionnaire-Parent Form; CBCL-I = Child Behavior Checklist-Internalizing Scale; CBCL-E = Child Behavior Checklist-Externalizing Scale; ASQ-T = Abbreviated Symptom Questionnaire-Teacher Form; TRF-I = Teacher Report Form-Internalizing Scale; TRF-E = Teacher Report Form-Externalizing Scale; WISC-Vocab = Vocabulary subtest from the WISC-III; PPVT-R = Peabody Picture Vocabulary Test-Revised; VMI = Developmental Test of Visual-Motor Integration.

[1] F values are univariate tests from ANCOVA analyses (covariates= SES, N-LES)

[2] Square root of raw score.

[3] Standard Score.

[a] High Risk Group = PERI score of > 3

[b] Low Risk Group = PERI score of 0 or 1

Table 28

Summary of the Hierarchical Multiple Regression Analyses for Low Birth Risk Group.

Step	Predictor[1]	VMI	WISC-V	PPVT-R	CDI	CBCL	CBCL-I
1.	Covariates	.09	.31[b]	.35[c]	.05	.14	.08
2.	Birth Risk	.0001	.001	.008	.08	.09	.05
3.	M-C-R	.16	.03	.12	.13	.17	.13
Model R^2 =		.25	.34	.48[b]	.26	.40[*]	.27

Step	Predictor[1]	CBCL-E	ASQ-P	TRF	TRF-I	TRF-E	ASQ-T
1.	Covariates	.11	.04	.16	.07	.17	.21
2.	Birth Risk	.18[b]	.08	.01	.02	.001	.02
3.	M-C-R	.35[c]	.16	.07	.16	.11	.07
Model R^2 =		.63[d]	.27	.25	.26	.28	.30

Note:
[1] Covariates= SES and N-LES; Birth Risk = PERI; M-C-R = PARQ-C, PARQ-P, CRPB-CA, and PRPB-CA.
[2] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[a] $p < .05$.
[b] $p < .01$.
[c] $p < .001$.
[d] $p < .0001$.
[*] $p = .06$.

Table 29

Summary of the Hierarchical Multiple Regression Analyses for High Birth Risk Group.

Step	Predictor[1]	VMI	WISC-V	PPVT-R	CDI	CBCL	CBCL-I
1.	Covariates	.01	.04	.22[a]	.03	.29[a]	.10
2.	Birth Risk	.16[a]	.03	.002	.25[a]	.01	.007
3.	M-C-R	.07	.33[a]	.23	.12	.28[a]	.39[b]
Model R^2 =		.24	.41*	.44[a]	.40*	.59[b]	.50[a]

Step	Predictor[1]	CBCL-E	ASQ-P	TRF	TRF-I	TRF-E	ASQ-T
1.	Covariates	.42[b]	.33[b]	.09	.03	.15	.16
2.	Birth Risk	.02	.06	.02	.003	.05	.02
3.	M-C-R	.20[a]	.06	.08	.25	.02	.03
Model R^2 =		.51[c]	.44*	.19	.29	.21	.21

Note:
[1] Covariates= SES and N-LES; Birth Risk = PERI; M-C-R = PARQ-C, PARQ-P, CRPB-CA, and PRPB-CA.
[2] Increment to R^2 after accounting for all other model terms; need not sum to Model R^2.
[a] $p < .05$.
[b] $p < .01$.
[c] $p < .001$.
* $p = .06$.

CBCL-E Scores as a Function of Level of Psychological Control (PRPB-CA) and Severity of Biological Risk (PERI).