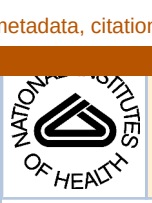

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Cumulative Social Risk, Parenting, and Infant Development in Rural Low-Income Communities

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Synopsis

Objective—The extent to which the severity of exposure to social risk is related to parenting and cognitive development in the first 15 months of an infant's life was studied in a representative diverse sample of families in two rural poor regions in the United States.

Design—One thousand two hundred ninety-two families were followed for the first 15 months of the infant's life.

Results—Evidence supported a pathway from risk severity through maternal sensitivity and warmth, language and learning activities, and maternal language to child outcomes, with the language and learning activities providing the most consistent independent prediction. Race, age, and geographic isolation moderated the associations between risk and different aspects of parenting. Both level and change in maternal engagement, maternal language input, and overall learning environment were related to early cognitive development. Cumulative risk measured as the mean of risk variables was a stronger predictor of parenting and infant development than when measured as the count of risk factors.

Conclusion—Severity of risk exposure is negatively related to parenting and to child development for infants as young as 15 months of age. This study provides evidence supporting a pathway from risk severity through parenting to child outcomes and suggests that both initial parenting skills and change in parenting skills during infancy predict infants' cognitive skills.

Introduction

Family poverty and related social risk factors often have been linked to a variety of poor outcomes for young children (Hart & Risley, 1995; Campbell & Ramey, 1994; NICHD Early Child Care Research Network [ECCRN], 2005; Vernon-Feagans, 1996), especially if poverty and its attendant social risks are experienced during infancy (Duncan & Brooks-Gunn, 2000) or in families isolated in a rural setting (Brody & Flor, 1998). Most hypothesized process models include pathways from poverty and attendant risks through proximal parenting processes to child outcomes to explain why poverty impacts children's development (Sameroff & Fiese, 2000); however, this work has not identified specific aspects of parenting that serve as mediators. The current study was designed to address four issues relating exposure to social

risk in infancy to different aspects of early parenting and to early cognitive development for infants and their families in rural low-income communities.

Cumulative risk models, first proposed by Rutter (1979) and Garmezy, Masten, and Tellegen (1984), were developed to take into account the high likelihood of co-occurrence of social risk factors for children's social and cognitive development such as poverty, single parenthood, low parental education, unemployment, and maternal depression. Studies using the cumulative risk models focus on risk indices to describe the extent of exposure to multiple risk factors and the identification of factors that seem to protect children from the negative impact of exposure to social risk. The model recognizes that distal indices of risk such as poverty, single parenthood, large households, low parental education, unemployment, and stress (such as negative life events) tend to cluster in the same individuals (Masten, Coatsworth, Neemann, Gest, Tellegen, & Garmezy, 1995) and are difficult theoretically and empirically to examine individually (Burchinal, Roberts, Hooper, & Zeisel, 2000). Many investigators have counted risk factors as their measure of cumulative risk, but several have suggested that the mean of the risk variables provides greater power and uses all of the information in each risk variable instead of using only whether the family was above or below a specified cut-point (Burchinal et al., 2000; Deater-Deckard, Dodge, Bates, & Pettit, 1998). Use of the mean of risk variables is not as common as use of the count of risk factors; therefore, the first purpose of this study is to compare the magnitude of association between an infant outcome and hypothesized mediators and cumulative risk indices computed as the sum of risk factors and the mean of risk variables.

Some cumulative risk models postulate an indirect path from distal social risk factors (such as poverty) through parenting to child outcomes (Cummings, Campbell, & Davies, 2000; Sameroff & Fiese, 2000). Specifically, it has been argued that economic hardship and poverty can lead to harsher, less responsive parenting and in turn poorer cognitive outcomes for children (Conger et al., 1992), suggesting that the real causal mechanism is parenting. Data from recent studies have supported this family process model (Burchinal, Roberts, Zeisel, Hennon, & Hooper, 2006; Duncan, Brooks-Gunn, & Klebanov, 1994; Morisset, Barnard, Greenberg, Booth, & Spieker, 1990; NICHD ECCRN, 2005). These studies have found that cognitively stimulating parenting as measured by the Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley, 1984) or maternal emotional sensitivity as measured during mother – child interactions partially or fully mediate relations between social risk factors (such as poverty) and children's early cognitive development in studies that primarily included families from small or large cities (Burchinal et al., 2006; Klebanov, Brooks-Gunn, McCarton, & McCormick, 1998; Krishnakumar & Black, 2002; Linver, Brooks-Gunn, & Kohen, 2002). Thus, there is good evidence that the quality of parenting is an important mediator of the relation between social risk factors related to poverty and child cognitive and language outcomes, at least in suburban or urban areas.

Different aspects of parenting have been examined as mediators for the pathway from cumulative social risk to poorer child outcomes. Various studies have examined access to cognitively stimulating materials, maternal warmth and responsiveness in interactions with the child, and maternal language skills. Children from low-SES families often have less access to cognitively stimulating materials, which accounts for ethnicity differences and at least some of the SES differences in child outcomes (Bradley & Corwyn, 1999; Bradley et al., 2000; Brooks-Gunn & Duncan, 1997). Poverty is related to less warmth and responsiveness and more withdrawal and harshness in mother – child interactions, which also accounts for at least some of the association between poverty and child outcomes in early and middle childhood (Linver et al., 2002; NICHD ECCRN, 2005). Differences in maternal language input in early infancy and early childhood, including less elaborated vocabulary and syntax, have been implicated as an explanatory factor for why low-income children have lower cognitive and language skills in early and middle childhood (Hart & Risley, 1995; Hoff, 2003). To our knowledge, none of

the previous work has examined these different indicators of parenting as possible mediators in a cumulative risk model within the same study, nor have they linked them to early infant outcomes collected prior to 24 months. Furthermore, prior work had not examined change in parenting during infancy. Accordingly, the second goal of our study was to examine the extent to which severity of risk exposure in rural low-income regions is related to level and change in a variety of aspects of parenting during the first 15 months of life, and whether those aspects of parenting mediate the anticipated negative association between cumulative social risk and the child's cognitive skills at 15 months of age.

In addition, identification of “protective” factors, those associated with better outcomes among children exposed to multiple social risks, is an important feature of the cumulative risk model. Protective factors are defined as factors that moderate the negative association between risk and outcomes such that they are stronger predictors of better outcomes for children who experience higher levels of risk than for children who experience lower levels of risk. Parenting has been identified as a protective factor across multiple studies of cumulative risk. Previous studies have reported that positive, involved, and responsive parenting apparently buffers the negative impact of risk exposure on academic achievement and social skills for preschoolers in rural areas (Brody, Murray, Kim, & Brown, 2002), during the transition to school for African American children in suburban areas (Burchinal et al., 2006), and in middle and high school (Garmezy, 1993; Grotevant, 1998; Gutman, Sameroff, & Eccles, 2002). Exposure to social risk is much less related to preschool- or school-age outcomes when parents are positive, involved, and responsive (Brody et al., 2002; Burchinal et al., 2006; Krishnakumar & Black, 2002; Masten et al., 1999; Yeung, Linver, & Brooks-Gunn, 2002). Therefore, a third goal of our study was to test whether access to stimulating materials, warm and sensitive mother – child interactions, and the size of the mother's vocabulary in mother – child interactions serve as protective factors for cognitive development in infancy.

This literature provides important information concerning the role of cumulative risk and protective factors in understanding child outcomes as well as the possible role of different aspects of parenting as mediators or protective factors in understanding the association of cumulative social risk and infant cognitive development. However, few studies have focused on children living outside of urban and suburban areas of the United States. Rural America presents a somewhat different context for development, and it is important to understand whether the relations reported in the extant literature would be supported in a rural environment (O'Hare & Johnson, 2004). Rural communities have undergone substantial economic and social shifts in the past few decades including the loss of quality jobs and migration of young talented adults toward urban and suburban areas (O'Hare & Johnson). Families in rural areas have less access to public transportation, health care, libraries, high-quality child care, and a host of other social services that can support families with young children (Evans, 2003; Vernon-Feagans, Gallagher, & Kainz, in press). There are large entrenched racial differences in rural areas, where African American children are much more likely to live in a female-headed household and be poor (Graefe & Lichter, 2002). However, there are some advantages of rural areas, including more family home ownership, more two-parent families, less random violent crime, smaller schools, and more social and extended family social support (Hofferth & Iceland, 1998; Lichter, 2003; Lichter, Roscigno, & Condron, 2003; Rural Families Data Center, 2004; Whitener, Weber, & Duncan, 2001). For these reasons, the fourth aim of our study was to examine the extent to which cumulative risk is related to child outcomes in these settings because it is possible that findings from urban areas will not apply (Department of Health and Human Services, 2005).

This study focuses on families in three rural poor North Carolina counties and three rural poor Pennsylvania counties because they are part of two large areas of rural poverty — the Black South and Appalachia. The two areas are similar in that each consists of farms, small towns,

and small cities that had relied heavily on agriculture and had historically high rates of intergenerational poverty. They differ in terms of racial composition and history of racial discrimination for families living in the region (i.e., almost all families are European American in PA and about half are African American in NC). They also differ in geography. Families tend to live in the valleys or hollows between mountains in Appalachia and often must take circuitous routes around the mountains to travel from one locale to another. The flatlands and agricultural history of tenant farming resulted in more families living on small acreages in North Carolina where it is easier to travel from one place to another.

We examined several factors that characterize low-income rural communities in these two regions. First, families vary widely in terms of how far they live from jobs, shops, and public institutions such as schools. Such distances could serve as risk factors due to greater isolation and less access to services or as protective factors due to less exposure to drugs, violence, and other social ills associated with more urban living, especially for poor families living in public housing in towns and small cities in predominantly rural regions (Vernon-Feagans et al., in press). Second, ethnicity likely plays a crucial role in defining social risk exposure in the Black South and could moderate the association between social risk and both parenting and child outcomes due to the long history of racism in the South (Greenberg et al., 1999; McLoyd, 1998; Spencer, 1990). Third, it is likely that cumulative risk related to parenting and cognitive development is different in the PA Appalachian and the NC Black South regions, even after accounting for differences related to geographic isolation and ethnicity, due to the cultural differences in the two regions (Dill, 1999). The overall purpose of the current study was to document the levels of cumulative risk experienced within a statistically representative sample of families with young infants in low-income rural communities in the two selected low-income rural regions and to determine the extent to which risk was related to cognitively stimulating and emotionally sensitive parenting of infants between 6 and 15 months of age and to the child's cognitive development at 15 months.

In summary, this study addressed four issues in associating cumulative social risk to parenting and child outcomes in infancy. First, we compared the relative merits of cumulative risk counts and cumulative risk composites. Second, we hypothesized that mothers who experience higher levels of social risk will provide less warm and stimulating parenting and talk less to their infants. Third, we hypothesized that positive and stimulating parenting would protect cognitive development in infants as young as 15 months from the deleterious effects of social risk exposure. Fourth, we expected pathways from risk severity to less sensitive parenting, fewer stimulating materials, and less diverse maternal language to early child cognitive development. Finally, throughout all analyses, we wished to document levels of risk exposure, parenting, and cognitive development in a statistically representative sample of infants and their families in rural low-income communities.

Methods

Participants

The participants in the Family Life Project (FLP) were infants and their families, recruited when the baby was born and followed longitudinally. Assessments of these families when infants were 1, 6, and 15 months are included in this study.

FLP was designed to study families that lived in two of the four major geographic areas of high child rural poverty (Dill, 1999), the Black South and Appalachian Mountains. Specifically, three counties in eastern North Carolina (Sampson, Wayne, and Wilson) were selected to represent the Black South, and three counties in central Pennsylvania (Blair, Cambria, and Huntington) were selected to represent the Appalachian Mountains. The FLP is a stratified sample that is statistically representative of the selected counties in the two regions. A stratified

random sampling procedure was used to recruit a representative sample of 1,292 families at the time that mothers gave birth to a child, with over-sampling of low-income families in both states and African American families in the Black South (there were too few African American families in the Appalachian region to permit over-sampling — it was 95% European American).

A two-stage randomized sample was drawn, sampling hospitals in the first stage and newborn children in the second phase. In the first stage, 3 of 7 hospitals were randomly sampled proportional to size within the central PA Appalachian region, and all 3 hospitals were selected within the NC Black South regions. In the second stage, families of newborn infants born in these hospitals were recruited between September 15, 2003, and September 14, 2004. Every day for a calendar year, mothers were approached in the hospital after giving birth and asked to participate. Families were eligible if they planned to stay in the area for 2 years and if the family spoke English at home. In addition, birth records from surrounding counties were examined, and parents who resided in the selected counties but gave birth in a surrounding county were phoned and asked to participate if eligible. We over-sampled for poverty in both sites and races in one site, recruiting four groups of families in the eastern NC Black South region and two groups in the central PA Appalachian region. Whether the family was low-income was determined by asking if the household income was less than 200% of the national poverty threshold for 2002 for a household of the same size, if the mother had received any social service with similar income requirement (e.g., food stamps, WIC, Medicaid), or whether she or the head of the household had less than a high school education.

In total, FLP recruiters identified 5,471 (57% Black South, 43% Appalachia) women who gave birth to a child during the recruitment period, 72% of whom were eligible for the study. Of those eligible, 68% were willing to be considered for the study. Of those willing to be considered, 58% were randomly selected to participate. Of those invited to participate, 1,292 (82%) families enrolled and completed their first home visit.

Measures

Data for this study were collected during visits to the family's home conducted when children were 6–8 and 15–18 months of age. Home visits lasted approximately 2–3 hours and consisted of a variety of interviews, questionnaires, interactions between the mother (or the primary caregiver if not the mother) and the child, and child assessments. The interviews were conducted with the biological mother in all cases except 11 at the 6-month interview (2 foster parents, 5 maternal grandmothers, 3 paternal grandmothers, and 1 other adult relative) and 19 cases at the 15-month interview (1 foster parent, 11 maternal grandmothers, 2 paternal grandmothers, 1 paternal aunt/uncle, 2 other adult relatives, and 2 unrelated adults). We refer to the primary caregiver as the mother in the text below despite these exceptions.

The mother completed the KFAST literacy screener (Kaufman & Kaufman, 1994). Mothers who read at an eighth-grade reading level or above were given the opportunity to complete questionnaires on their own (86% sample), whereas those who read below an eighth-grade reading level had questionnaires read to them. All new caregivers were screened when they became the child's primary caregiver when assessed.

Geographic isolation—A measure of geographic isolation for each family was developed using Global Positioning System (GPS) technology. The GPS units measured the longitude and latitude for the family residence. These were used to compute the physical distance between the family residence and 10 different community services: the nearest elementary school, high school, supermarket, county seat, doctors' office (any type), freeway on-ramp, library, public park, gas station, and fire station. A single summary score was computed as the mean of the 10 distances and was log transformed to reduce skew in its distribution.

Social risk variables—The 6-month interviews included information about 7 risk factors: maternal education, family income, single parent, number of children in the household, stressors or negative life events, parental unemployment, and neighborhood safety. The interview included questions about the mother's level of education (years associated with final degree achieved), whether the mother was married, whether any parent in the household was employed, and number of children less than 18 years of age in the household.

The Windshield Survey consisted of 12 items that were rated by home visitors at the conclusion of the home visit. The items were drawn from the Post-Visit Reaction Inventory that was used in the FAST Track project (Conduct Problems Prevention Research Group, 1992). Items described how receptive and prepared participants were for the visit as well as general characteristics of the home and surrounding neighborhood. The current study made use of a 3-item neighborhood environment scale ($\alpha = .76$), which consisted of mean ratings for items asking about the safety of the area outside of this building (rated from 1 = *obviously dangerous* to 4 = *above average safety*), the noise level in the neighborhood (rated from 1 = *very quiet* to 4 = *very noisy*; reverse scored), and the safety of the neighborhood (rated from 1 = *very safe/crime free* to 4 = *very unsafe/high risk*; reverse scored).

The Life Experiences Survey (LES; Sarason, Johnson, & Siegel, 1978) assessed family stress. The LES is a 49-item self-report measure that asks participants to identify major life events that occurred to them in the previous 6-month period, including whether the event was perceived as positive or negative, as well as the impact it had on them (from 0 = *no effect* to 4 = *great effect*). The sum of negatively endorsed events was used as an indicator of stress in the current study ($\alpha = .80$).

A cumulative risk score was computed from these 7 risk factors (maternal education, family income, single parent, number of children in the household, number of negative life stressors, parental unemployment, and neighborhood safety). Although counting number of risk factors was more typical, the use of risk composites based on continuous risk variables is becoming more common because it retains more information in the individual risk factors and, thereby, increases power for detecting the interactions necessary to identify protective factors (Burchinal et al., 2000; Deater-Deckard et al., 1998). A factor analysis indicated that a single factor accounted for 38% of the variance in the 7 risk variables and that each risk variable at least partially loaded on the first factor ($.24 < \text{loading} < .80$). Two risk indices were computed, first as the mean of the 7 within-sample standardized risk variables and second as the sum of the corresponding risk factors (less than high school education, income below the poverty threshold, single parent, 4 or more children in the household, 4 or more negative life events, parental unemployment, and neighborhood safety in the bottom quartile).

Parenting—Five parenting measures were collected during the 6- and 15-month assessments. Maternal engagement and harsh parenting were rated from free-play interactions. Parental warmth and access to learning and literacy materials were assessed using a standardized interview. The variety of the maternal language was collected from a book-reading session.

The quality of the home and child care environment was measured with the HOME. The home visitor at the end of her visit filled out three subscales from the HOME Inventory: Parental Responsivity, Acceptance of Child, and Learning Materials. This semi-structured interview measures the degree to which the caregivers are responsive and sensitive in interactions with the child and provides age-appropriate objects that stimulate cognitive skills. The HOME items were rescaled using two scales derived in analyses of 4 large studies (Fuligni, Han, & Brooks-Gunn, 2004). One of those scales, the Parental Warmth scale ($\alpha = .69$), measured the degree to which the mother talked to or caressed the child and expressed positive feelings toward or praised the child. The other, the Learning and Literacy scale ($\alpha = .84$), measured whether the

child had age-appropriate toys, the mother named at least one object for the child, and the family had at least 10 books. The HOME has been a strong predictor of child outcomes regardless of income or ethnicity (e.g., Bradley et al., 2000).

The quality of parenting during mother – infant interactions was assessed during free-play interactions at 6 and 15 months. Mothers were videotaped for 10 min during interactions in which they were given a set of toys and instructed to play with the child as they normally would if they had free time during the day (see Cox, Paley, Burchinal, & Payne, 1999; NICHD ECCRN, 1999, for complete details regarding the procedure). Interactions were later coded to assess levels of mothers' sensitivity, detachment, intrusiveness, positive regard, negative regard, and animation in interacting with the child. Ratings for each code were made on a 1–5 scale, with 1 being *not at all characteristic* and 5 being *highly characteristic*. Based on the results of factor analyses conducted with an oblique rotation (i.e., Promax), maternal positive engagement ($\alpha = .89$) was defined as the mean of mothers' scores for four characteristics: detachment (reverse scored; level of emotional uninvolvement or disengagement), positive regard (level of positive feelings expressed toward child), animation (level of energy), and stimulation for development (appropriate level of scaffolding of activities with child). Maternal harshness ($\alpha = .69$) was defined as the mean of mothers' scores for three characteristics: sensitivity (reversed; level of responsiveness to child's needs, gestures, and expressions), intrusiveness (degree to which mother imposed her own agenda on the interaction, ignoring the baby's signals), and negative regard (level of harsh, negative feelings expressed toward child). Reliability was determined by calculating the intraclass correlation for ratings made by two coders to approximately 30% of the tapes randomly drawn at the 15-month assessment period. Reliability was acceptable for both harshness ($r = .88$) and sensitivity ($r = .80$).

Maternal language input—Maternal language was assessed during a book reading session at 6 and 15 months. The mother was asked to sit in a comfortable chair or couch with her child and was given the book *Baby Faces* (DK Publishing, 1998). This wordless picture book contained a picture of a baby face on each page, with each baby showing a different emotion. The mother was told to go through the book with the infant and to let us know when they were finished. Thus, the time of the picture book session varied considerably. The home visitors were told to end the session after 10 min if the mother had not signaled she was finished at that point. The session was videotaped and transcribed using the software Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 1985). We chose the number of different word roots as a measure of the mother's diversity of vocabulary during the task. This was determined on the basis of unique free morphemes.

Infant outcomes—One of the Bayley Scales of Infant Development (BSID-II; Bayley, 1993) was administered to access infant cognitive development at 15 months. The BSID-II is the most widely used measure of cognitive developmental status for children in the first 2 years of life. The Mental Developmental Index (MDI) describes a child's cognitive skills. These scores are norm-referenced standard scores ($M = 100$, $SD = 15$).

The overall goal of the analyses was to determine the extent to which severity of risk exposure very early in infancy (i.e., at 6 months) was related to various aspects of parenting and cognitive development during infancy, and whether these aspects of parenting served as mediators or moderators in the pathway for risk severity to early cognitive development. There were several steps to the analysis. First, we created a risk index that reflected major demographic variables that have been linked to poor outcomes for children. The descriptive statistics were estimated using survey sampling methods to statistically describe the 3 counties selected in each region. Then, hierarchical linear model analyses addressed the second through the fifth goals by examining the association between cumulative risk and parenting at 6 and 15 months, and hierarchal regression analyses examined the extent to which parenting mediated the anticipated

association between cumulative risk and cognitive development at 15 months. These analyses also took the sampling design and weights into account, so results are statistically representative of the sampled areas.

Results

Descriptive Analysis

The overall level of risk, parenting, and infant cognitive development was examined next by computing statistically representative statistics on all analysis variables for the two regions. As shown in Table 1, the proportion of African American families is substantially higher in our NC Black South region (50%) than in our PA Appalachian Mountain region (6%), $\chi^2(1, n = 1{,}202) = 444$, $p < .001$. In addition, the NC region, on average, had more single, $\chi^2(1, n = 1{,}202) = 88$, $p < .001$, or unemployed, $\chi^2(1, n = 1{,}202) = 25$, $p < .001$, parents who had slightly less education, $t(1202) = 5.78$, $p < .001$, and income, $t(1202) = 8.29$, $p < .001$, and who lived in slightly less safe neighborhoods, $t(1202) = 2.27$, $p < .05$. The risk index was computed as the sum of risk factors and, for analysis, as the mean of within-sample standardized risk variables, and as expected was somewhat higher in the NC region than in the PA region, $t(1202) = 7.27$, $p < .01$. Figure 1 shows the percent of population who experienced none to all of the risk factors based on weighted analyses of the risk sum. Families in the NC Black South region were more likely to report 4 or more risk factors than families in the PA Appalachian region, $\chi^2(1, n = 1{,}200) = 19.8$, $p < .001$.

Next, to address the first aim regarding the relative merits of cumulative risk counts and risk composites, we correlated the risk index (sum and mean), the contextual factors (isolation, region, and ethnicity), the hypothesized mediators/protective factors, and child outcomes (Tables 2 and 3). The cumulative risk indices were moderately to strongly negatively correlated with all parenting variables and modestly correlated with infant cognitive skills. However, stronger associations were observed when both parenting measures and infant cognitive skills were correlated with the risk mean score than with the risk count. Table 2 shows that social risk was lower when families were more isolated or lived in PA, and higher when families were African American. The five measures of parenting were modestly to moderately correlated, suggesting they were measuring different parenting dimensions. The parenting measures were inconsistently related to isolation and region but tended to be lower among the African American families.

Table 3 shows the correlations among the parenting measures at 6 and 15 months and the change in parenting from 6 to 15 months, as well as the correlations between the two risk indices, all parenting measures, and infant cognitive development. Again, the cumulative risk mean score showed stronger associations than did the cumulative risk sum score. Not surprising, the parenting measures showed continuity over time, with correlations ranging $.30 \leq r \leq .64$. A negative correlation between 6-month parenting measures and the change in parenting scores ($-.37 > r > -.67$) indicated that larger gains were made by parents who scored lower at 6 months. This finding likely combines regression to the mean with some true improvement in parenting from 6 to 15 months.

As expected, the cumulative risk index computed as the mean of the risk variables was consistently a stronger predictor of parenting and infant skills than the count of risk factors. Therefore, the cumulative risk mean score was used in all subsequent analyses.

Cumulative Social Risk and Parenting at 6 and 15 Months

To address the second research goal, regression analyses were conducted to determine the extent to which risk severity predicted the selected dimensions of parenting from 6 to 15

months. Random-intercept hierarchical linear models (HLM; Raudenbush & Bryk, 2002) tested the extent to which cumulative social risk predicted each of the five different aspects of parenting and whether age, region, ethnicity, or isolation moderated those associations. A separate random intercept was estimated for each family to account for the repeated assessment in the parenting measures. The model included main effects for risk, ethnicity, region, geographic isolation, and age, and interactions between age and each of the other main effects. Age was included only as a fixed effect because we had only two repeated measures, and age main effects test the extent to which parenting scores changed over time and interactions test the extent to which associations between predictors and parenting measures at 6 and 15 months were different. Preliminary models tested whether ethnicity, region, or geographic isolation moderated associations between risk and parenting. The sample weights and sampling strata were included in the analysis to weight results to represent the selected regions.

Final models are reported in Table 4. Nonsignificant interaction terms were deleted to enhance interpretability of the findings. Effect sizes were computed to illustrate the magnitude of the associations between cumulative social risk and parenting. They were computed as the coefficient for risk times the standard deviation for risk divided by the standard deviation for the outcome variable (see Gutman, Sameroff, & Cole, 2003;NICHD ECCRN & Duncan, 2003, for further details). For interactions, we computed risk coefficients for each level of the interaction (e.g., a separate coefficient for African American and European American families when there was a risk × ethnicity interaction) and used those coefficients for computing effect sizes. Table 4 shows the coefficients and their standard errors from this analysis. The pseudo-R^2 was computed as the difference in the level 2 random intercept variance from the unconditional and final model divided by the variance from the conditional model to provide an index of fit.

As shown in Table 4, the fit of the overall model ranged from modest for number of different words to large for the HOME Learning and Literacy scale. Children who experienced more social risk tended to have less positive and more negative parenting. The cumulative risk index was a negative predictor of positive engagement ($d = -.35$) and a positive predictor of harsh parenting ($d = .29$) in interactions between the mother and the infant, negative predictors of parental warmth ($d = -.32$) and learning and literacy ($d = -.28$) according to the semi-structured interview, and a negative predictor of the vocabulary size ($d = -.21$) in a book-reading interaction. Various aspects of parenting were also related to the child's age and ethnicity, the region, and geographic isolation, but these factors also moderated associations between risk and parenting.

Both age and ethnicity moderated the association between cumulative risk exposure and harsh parenting, even after considering region and geographic isolation. Overall, cumulative risk exposure became a weaker predictor of harsh parenting between 6 and 15 months, and this trend was stronger among African American mothers ($d = .34$ at 6 months and $d = .24$ at 15 months) than among other mothers ($d = .38$ at 6 months and $d = .31$ at 15 months).

Geographic isolation appeared to be a protective factor for parental warmth according to the semi-structured interview. The interaction between social risk and geographic isolation in analysis of parental warmth indicated that cumulative risk was a stronger negative predictor of parental warmth when families were less isolated. We computed effect sizes for risk for families with geographic isolation scores that were one standard deviation above and below the sample mean to illustrate this association. Cumulative risk was a stronger negative predictor of parental warmth on the HOME when families were one standard deviation below the mean on isolation ($d = -.13$) than when families were one standard deviation above the mean on isolation ($d = -.07$).

Region moderated the association between risk and several parenting measures, even after adjusting for ethnicity and isolation. The extent to which the cumulative risk index predicted engaged parenting during interactions with the infant varied as a function of both age and region. A three-way interaction among age, region, and risk indicated that although risk exposure became a stronger negative predictor over time for families in both regions, this trend was slightly stronger in the PA Appalachian region ($d = -.35$ at 6 months and $d = -.58$ at 15 months) than in the NC Black South region ($d = -.43$ at 6 months and $d = -.61$ at 15 months). Similarly, cumulative risk was slightly more negatively related to the HOME Learning and Literacy scores in the NC Black South region ($d = -.13$) than in the PA Appalachian region ($d = -.08$).

Cumulative Social Risk and Cognitive Development at 15 Months

To address the third and fourth research aims, the next set of analyses predicted the child's cognitive development (MDI) at 15 months from cumulative social risk and tested whether the five selected dimensions of parenting appeared to moderate (aim 3) or mediate these associations (aim 4). The hypothesized path from exposure to cumulative social risk at 6 months through less sensitive and stimulating parenting from 6 to 15 months to children's cognitive skills at 15 months was tested. We chose to focus on parenting at 6 months so that our risk and parenting measures were not measured at the same time as infant cognitive skills, but also included the change in parenting from 6 to 15 months to explicitly model the possibility that positive changes in parenting serve as a protective factor. Using one of MacKinnon's (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) suggested approaches to testing mediation, we fit a series of models and tested mediation using the Sobel test. First, we fit a model that predicted cognitive skills from cumulative social risk. Covariates were included to ensure that differences related to region, geographic isolation, and ethnicity were not either confounding or mediating obtained associations between risk exposure and MDI scores. Second, we fit a model that predicted parenting at 6 months, and change in parenting from 6 to 15 months, from cumulative risk and the covariates. Third, the child's MDI score was predicted from cumulative risk at 6 months, parenting at 6 months, and change in parenting from 6 to 15 months, and the covariates.

To address the third aim regarding moderation, preliminary models tested whether parenting interacted with risk to identify possible protective factors and ensure that main effect models were appropriate. The parenting variables were examined first in sets and then all together. The sets reflected the data collection sources — mother – infant interactions, semi-structured interview, and book reading. Results are shown in Table 5.

Missing data were handled by using missing data dummy variables for each predictor (see NICHD ECCRN & Duncan, 2003, for details). The dummy variable had a value of 1 if the predictor was missing and 0 otherwise. By assigning the mean value of the predictor to the individuals with missing data, coefficients were then estimated for each predictor using the data from individuals without missing data (this is analogous to full information maximum likelihood in structural equation modeling).

Table 5 shows the results from these hierarchical regressions of the MDI scores. A preliminary model included main effects of risk, region, ethnicity, and isolation, and interactions between risk and region, ethnicity, and isolation, but the interaction terms were dropped when none statistically contributed. The first model indicated that children's cognitive skills at 15 months were lower when exposed to more social risk ($d = -.13$) given the covariates. The child's MDI scores were also higher if the child lived in the PA Appalachian region. The next set of models added sets of parenting variables to the model described above.

First, we added level and change in rating of positive engagement and harsh parenting from the mother – child interactions at 6 and 15 months. Adding these four parenting variables reduced the association between risk exposure and cognitive outcomes from $B = -2.46$ ($d = -.13$) to $B = -1.25$ ($d = -.07$). Although all four parenting variables contributed as a block, $F(4, 1116) = 5.64$, $p < .001$, engaged parenting at 6 months ($d = .10$), increases in positive parenting ($d = .08$), and decreases in harsh parenting ($d = -.11$) provided independent prediction. Tests of mediation suggested significant indirect paths consistent with mediation from risk exposure to cognitive skills through positive engaged parenting at 6 months, $t(1116) = 2.40$, $p < .01$, and change in positive engaged parenting from 6 to 15 months, $t(1116) = 1.67$, $p < .05$. None of the parenting variables moderated the association between risk and cognitive skills at 15 months.

The next model added the two scales from the HOME semi-structured interview. Adding the HOME scale scores at 15 months and change from 6 to 15 months reduced the association between risk exposure and cognitive outcomes from $B = -2.46$ ($d = -.13$) in Model 1 to $B = -1.63$ ($d = -.09$). The four parenting variables, Learning and Literacy and Parental Warmth at 6 months, and change from 6 to 15 months contributed to predicting cognitive scores at 15 months, $F(4, 1116) = 4.15$, $p < .01$. The Learning and Literacy score at 6 months ($d = .15$) and change in the Learning and Literacy score from 6 to 15 months ($d = .12$) were significant predictors of MDI scores. However, only the Learning and Literacy score at 6 months appeared to mediate the association from risk exposure to cognitive skills, $t(1116) = 3.09$, $p < .001$. No evidence emerged suggesting that level or change on either HOME scale moderated the association between risk exposure and cognitive development.

The fourth model added the number of different words during the book-reading session. Again, the set of parenting measures, number of words at 15 months, and change from 6 to 15 months contributed to predicting cognitive scores, $F(2, 1116) = 5.78$, $p < .01$. Infant cognitive skills were related both to maternal language input (i.e., number of different words) overall and to change in maternal language input from 6 to 15 months ($d = .10$). Maternal language input at 6 months appeared to mediate the association between risk and cognitive scores, $t(1116) = 2.32$, $p < .05$. Accordingly, the association between risk and the MDI scores was somewhat smaller in this model ($d = -.11$) than in the first model without any parenting measures.

The final model included all five parenting measures. The block test of the 6-month assessments of five parenting variables, $F(5, 1158) = 7.41$, $p < .001$, and the 6- to 15-month change in the five parenting variables, $F(5, 1158) = 2.31$, $p < .05$, indicated that both sets of parenting variables significantly contributed to predicting infant MDI scores. The association between risk exposure and MDI was over 75% smaller ($B = .04$, $d = .002$, $p > .05$) than in Model 1 ($B = -2.46$, $d = -.13$, $p < .001$). Examined individually, Sobel tests suggested that HOME Parental Warmth, $t(1158) = 3.30$, $p < .001$, and Learning and Literacy scales, $t(1158) = -3.37$, $p < .001$, served to mediate the association between risk exposure and cognitive development at 15 months. As before, no evidence emerged indicating that parenting moderated the association between risk and infant cognitive skills.

Discussion

The association between higher exposure to social risk factors and lower levels of parenting sensitivity and stimulation and child performance in important developmental areas is one of the most consistent findings in child development (Sameroff & Fiese, 2000; Shonkoff & Phillips, 2000). Overall, families experienced relatively moderate to high levels of social risk in both rural low-income regions studied, the eastern NC portion of the Black South and the central PA portion of the Appalachian Mountains, with higher levels of risk in NC overall. Results from this study provide evidence that severity of exposure to social risk is related to

poorer cognitive development for infants as young as 15 months of age, apparently through specific aspects of parenting, and contribute methodologically and substantively to this literature. The four issues addressed in the analyses are discussed below.

First, methodologically, this study provides further evidence that cumulative risk indices are stronger negative predictors of parenting and child outcomes when they are computed using all of the information in the risk variables. Risk indices are typically computed as the count of risk factors. Each risk factor represents whether the family met some risk criterion on a risk variable, but these risk variables are almost always related in an approximately linear, not stepwise, manner with outcomes of interest such as parenting or child outcomes. For example, outcomes tend to be poorer when mothers have less than a high school education, but the number of years of maternal education is a stronger predictor of parenting and child outcomes than the categorized indictor of high school graduation (Burchinal et al., 2000). In addition, the risk index computed as the sum of risk factors can have only a relatively few possible values (i.e., the maximum is one more than the number of risk factors examined), whereas the mean of the risk variables can assume many more values. Thus, the mean of risk variables will have a more continuous distribution that often will be less skewed. This psychometric property also enhances the ability of the mean of risk variables to predict outcomes. Accordingly, it is not surprising that we found stronger correlations between all parenting and child outcome measures in this study when we used the risk index computed as the mean of the standardized risk variables than as the sum of the risk factors.

Addressing the second goal regarding the association between cumulative risk and parenting, results from this study suggest that some selected characteristics of rural life in the regions studied moderated the association between risk exposure and specific aspects of parenting. Risk exposure was a modest to strong predictor of selected aspects of parenting, but the magnitude of these associations varied somewhat as a function of factors that partly defined these rural low-income areas: region, ethnicity, and geographic isolation. As reported in previous studies, families with more risk factors tended to provide fewer learning and literacy activities (Fuligni et al., 2004; Morrison & Cooney, 2002), be less warm and engaged and harsher when interacting with the infant (Duncan & Brooks-Gunn, 2000; Krishnakumar & Black, 2002; Linver et al., 2002), and use a less diverse vocabulary when talking with the infant (Hart & Risley, 1995). Furthermore, cumulative risk exposure was a slightly stronger negative predictor of engaged parenting and learning and literacy activities in the NC Black South than in the PA Appalachian region. This might reflect the greater variability in risk in the NC region or other aspects of the local culture regarding parenting, but regional differences were so small that these findings might also be spurious. The finding of such small regional differences when we also considered ethnicity and geographic isolation indicated that the regional differences observed in the descriptive analyses may be linked to regional differences in the other factors.

The analyses also indicated that African American mothers were rated as harsher in their interactions with their infants than other mothers but that the association between cumulative risk exposure and harsh parenting was weaker for African American mothers than for other mothers — especially at 15 months. It is possible that these findings reflect cultural differences in parenting in which African American mothers may view harsher parenting styles as more acceptable (Deater-Deckard & Dodge, 1997; Ipsa et al., 2004). Although engaged parenting was related to cognitive development, we did not find a main effect for harsh parenting for the whole sample or an interaction with race. This suggests that reductions in harshness during the period in which children become more actively involved in interactions with parents were related to higher MDI scores.

The negative association between cumulative risk and parental warmth was weaker when families were more isolated. The geography of the PA Appalachian region produces greater

isolation in the mountain hollows where people can live than do the flatlands of the NC coastal plains. The riskiest families in both regions tended to live in public housing in the cities and towns. Living away from these housing units likely protected both the mother and the child from many of the social ills associated with increased unemployment and drug trade.

The results also addressed our third and fourth aims, testing parenting as possible mediators and moderators of pathways from exposure to infant cognitive development. Evidence emerged supporting a pathway from risk severity through maternal sensitivity and warmth, parental learning and literacy activities, and maternal language to child outcomes, with the learning and literacy activities providing the most consistent independent prediction. Our findings extend other studies that have found that the quality of parenting is an important mediator for the association of risk exposure with language and cognitive outcomes (Burchinal et al., 2006; Duncan et al., 1994; Krishnakumar & Black, 2002; Linver et al., 2002; Morrison & Cooney, 2002; NICHD ECCRN, 2005) by examining specific aspects of parenting during infancy. The finding that, even in infancy, learning and literacy activities provide the strongest and most consistent prediction and serve to mediate the negative pathway from risk to cognitive development provides further evidence that such activities are likely important through the early childhood period.

These findings are generally consistent with an extensive literature on the apparent negative impact of the severity of exposure to social risk on children's development, and this study extends these findings to infancy and examines specific aspects of parenting as mediators. Previous studies reported that cognitive development during early and middle childhood and in adolescence was substantially lower when families experienced multiple or severe levels of risk during early or middle childhood (Burchinal et al., 2000, 2006; Gutman et al., 2002, 2003; Masten et al., 1995; Sameroff, Bartko, Baldwin, Baldwin, & Seifer, 1998; Sameroff, Seifer, Baldwin, & Baldwin, 1993). This paper shows that the severity of risk exposure can be detected for infants as young as 15 months. Furthermore, as reported with older children (Bradley et al., 2000; Fuligni et al., 2004), our results suggest that lack of access to learning and literacy activities as well as less parental warmth and positive engagement may account for a large part of why cumulative risk exposure is negatively related to cognitive development.

All aspects of parenting appeared individually to mediate the pathway from risk to infant outcomes, but no evidence emerged indicating that parenting served as a protective factor in this study. Previous studies reported that parenting apparently buffered the negative impact of risk exposure on academic achievement and social skills for preschoolers in rural areas (Brody & Flor, 1998) and predominantly urban areas (Krishnakumar & Black, 2002; Yeung et al., 2002), during the transition to school for African American children in suburban areas (Burchinal et al., 2006), and in middle school (Gutman et al., 2002). Detecting these interactions between risk exposure and parenting with an infant as young as 15 months of age might be impossible, regardless of whether the explanation for the smaller risk effect sizes is plasticity or measurement. We plan to continue to examine the roles of parenting and other social supports as protective factors during preschool and school years in this longitudinal study.

In addition, our findings provide further support to a growing literature that different aspects of early parenting are related to early cognitive development (Bradley et al., 2000; Tamis-LeMonda & Bornstein, 2002) and extend this literature by suggesting that both level and change in parenting during infancy predict infant outcomes. Of particular interest was the finding that increases in maternal engagement, maternal language input, and the overall learning environment, and decreases in maternal harshness, all predicted cognitive skills at 15 months even when statistically accounting for the quality of each of these parenting dimensions at 6 months.

Several limitations must be noted. First, the effect sizes associated with risk tended to be smaller than those reported in previous studies (e.g., $d > .35$). This might reflect some plasticity in early development, indicating that infants are less impacted by exposure to risk at the youngest ages. It also might reflect the greater difficulty in reliably measuring cognitive development in infants because these skills are just emerging at 15 months and thus cannot be measured as accurately as at later ages (McCall, 1977; Neisser et al., 1996). Second, our measure of change in parenting includes the age at which the children were assessed and therefore might reflect a bidirectional effect. It is possible that changes in parenting influenced children's cognitive skills but also that infants with more advanced cognitive skills elicited more advanced parenting.

In conclusion, this study provides evidence that severity of social risk exposure was negatively related to maternal warmth, maternal language input, and cognitive stimulation and positively related to maternal harshness and that these pathways mediated the association between exposure to risk and cognitive development in 15-month-old infants in low-income rural areas. Ethnicity, region, and geographic isolation moderated the association between risk exposure and parenting, but no protective factors were identified for the 15-month outcomes. Continued monitoring of these children and their families will allow us to determine whether protective or vulnerability factors emerge as these infants mature.

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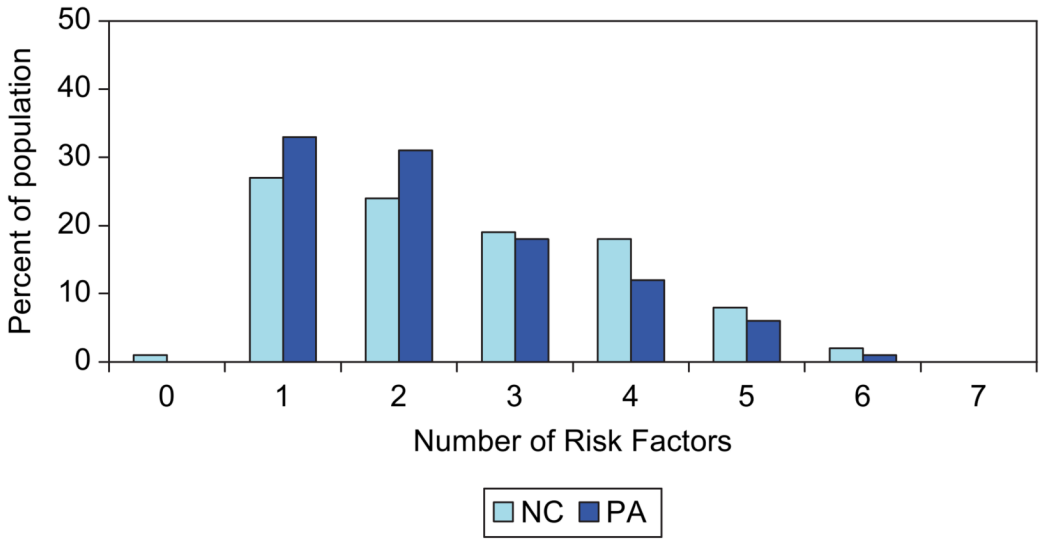

FIGURE 1.
Percentage of Population Experiencing None to All of the Risk Factors by Region.

TABLE 1

Descriptive Statistics by Region[a]

		Region			
		Black South (eastern NC) (*n* = 688–710)		Appalachian Mountains (central PA) (*n* = 488–494)	
		6 months	15 months	6 months	15 months
Child outcomes					
MDI cognitive	*M* (*SE*)		94.23 (.46)		100.09 (.43)
Parenting					
Mother – child interactions					
Positive parenting	*M* (*SE*)	2.93 (.04)	2.76 (.04)	3.19 (.03)	3.08 (.03)
Negative parenting	*M* (*SE*)	2.78 (.02)	2.63 (.03)	2.44 (.03)	2.40 (.03)
HOME					
Parental warmth	*M* (*SE*)	.84 (.01)	.90 (.01)	.88 (.01)	.90 (.01)
Learning and literacy	*M* (*SE*)	.75 (.01)	.81 (.01)	.87 (.01)	.91 (.01)
Book reading					
No. of different words	*M* (*SE*)	63.30 (1.2)	82.71 (1.55)	76.01 (1.33)	80.68 (1.58)
Context					
Geographic isolation	*M* (*SE*)	.14 (.03)		−.01 (.03)	
African American	%	48		6	
Social risk variable					
Maternal education, years	*M* (*SE*)	14.41 (.10)		15.21 (.11)	
Single parent	%	35		17	
Parents unemployed	%	24		15	
Income/poverty threshold	*M* (*SE*)	1.88 (.05)		2.49 (.08)	
No. of children in HH	*M* (*SE*)	2.21 (.05)		2.10 (.05)	
LES stressors	*M* (*SE*)	3.02 (.14)		2.99 (.13)	
Neighborhood safety	*M* (*SE*)	3.12 (.02)		2.98 (.02)	
Risk index	*M* (*SE*)	−.03 (.02)		−.19 (.02)	

[a]Reported are the estimated mean and the estimated standard error of the mean or the percentage. Statistics are statistically representative of the sampled areas within each region.

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TABLE 2

Correlations Among Risk Index, Hypothesized Mediators and Moderators, and Infant Outcomes

	Risk	MCX engage	MCX harsh	HOME warmth	HOME learn	No. of words	MDI	Isolation	Region	Black
Social risk index										
Sum of risk factors	.79***	−.32***	.28***	−.24***	−.25***	−.10***	−.14***	−.20***	−.19***	.42***
Mean of risk variables		−.45***	.39***	−.32***	−.26***	−.21***	−.22***	−.18***	−.21***	.43***
Mother–child interactions										
Engagement			−.49***	.36***	.27***	.49***	.23***	.07*	.24***	−.32***
Harsh				−.21***	−.21***	−.21***	−.23***	−.05	−.23***	.33***
Home										
Parental warmth					.32***	.22***	.17***	.11***	.05	−.15***
Learning & literacy						.13***	.28***	.10***	.29***	−.39***
Book reading										
No. of different words							.11***	−.01	.01	−.08**
Infant Mental Developmental Index (MDI)								.08***	.29***	−.26***
Context										
Isolation									−.03	−.21***
Region (PA = 1)										−.61***

* $p < .05$;

** $p < .01$;

*** $p < .001$.

TABLE 3

Correlations Among Parenting Measures at 6 and 15 Months, Social Risk at 6 Months, and the Infant's Cognitive Skills at 15 Months

	Interactions: Maternal engagement			Interactions: Maternal harshness			Home maternal warmth			Home language and literacy			Reading: No. of different words		
	6 months	15 months	Difference	6 months	15 months	Difference	6 months	15 months	Difference	6 months	15 months	Difference	6 months	15 months	Difference
Parenting															
6 months		.64**	−.44***		.44***	−.56***		.30***	−.67***		.37***	−.51***		.47***	−.37***
15 months			.40***			.50***			.50***			.61***			.65***
Difference															
MDI	.11***	.23***	.05	.13***	−.23***	−.04	.22***	.17***	.00	.22***	.28***	.07*	.16***	.11***	−.02
Risk															
Sum	−.27***	−.32***	−.05	.29***	.28***	−.03	−.28***	−.24***	.08**	−.36***	−.25***	.09*	−.17***	−.10***	.04
Mean	−.39***	−.45***	−.06	.39***	.39***	−.02	−.37***	−.33***	.08***	−.45***	−.35***	.07*	−.26***	−.21***	.01

* $p < .05$;

** $p < .01$;

*** $p < .001$.

TABLE 4

Predicting Parenting at 6 and 15 Months From Cumulative Social Risk and Three Characteristics of the Selected Rural Communities

	Positive engagement	Harsh parenting	Parental warmth	Learning & literacy	No. of different words
Level 2 R^2	.30	.39	.30	.67	.08
	B (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*)
Risk	−.50 (.04)***	.32 (.03)***	−.10 (.01)***	−.11 (.01)***	−12.70 (1.52)***
Black	−.23 (.06)***	.28 (.04)***	−.02 (.01)	−.10 (.01)***	−.56 (2.34)
Risk × Black		−.05 (.06)			
Region	.10 (.05)*	−.11 (.04)**	−.00 (.01)	.06 (.01)***	2.17 (2.00)
Risk × Region	.06 (.07)			.05 (.02)***	
Isolation	−.04 (.03)	.02 (.02)	.01 (.01)	.00 (.01)	−2.94 (1.18)*
Risk × Isolation			.04 (.01)***		
Age	−.16 (.02)***	−.06 (.03)*	.05 (.01)***	.06 (.01)***	12.94 (1.18)***
Age × Risk	−.07 (.04)	.03 (.04)	.02 (.01)	.03 (.01)**	−.23 (1.81)
Age × Black	.05 (.07)	−.04 (.07)	.00 (.02)	−.00 (.02)	−5.88 (3.00)*
Age × Black × Risk		−.24 (.09)*			
Age × Region	.04 (.05)	.10 (.05)	−.04(.02)*	−.02 (.02)	−17.67 (2.36)***
Age × Region × Risk	−.27 (.08)**				
Age × Isolation	.00 (.03)	.04 (.03)	−.02 (.01)	−.01 (.01)	−.82 (1.46)

*$p < .05$;

**$p < .01$;

***$p < .001$.

TABLE 5

Hierarchical Regression Results: Predicting 15-Month Cognitive Development from Risk Severity and Testing Selected Aspects of Parenting as Mediators or Moderators

		MDI cognitive development — 15 months	
		Separate models for sets of parenting measures	Final model
Model 1	R^2	.11***	.16***
Risk index	*B* (*SE*)	−2.46 (.65)***	.04 (.50)
Ethnicity	*B* (*SE*)	−.72 (.91)	2.29 (.76)**
Region	*B* (*SE*)	5.20 (.79)***	.39 (.64)
Isolation	*B* (*SE*)	.79 (.49)	1.10 (.36)**
Model 2	R^2	.13***	
Risk index	*B* (*SE*)	−1.25 (.72)	
Parent-engage 6m	*B* (*SE*)	1.31 (.52)*	−.65 (.46)
Parent-harsh 6m	*B* (*SE*)	−1.14 (.70)	.57 (.56)
Engage: 15-6m	*B* (*SE*)	1.25 (.60)*	.14 (.45)
Harsh: 15-6m	*B* (*SE*)	−1.66 (.63)**	.19 (.49)
Model 3	R^2	.12***	
Risk index	*B* (*SE*)	−1.63 (.72)*	
Home PW 6m	*B* (*SE*)	1.59 (2.30)	6.54 (1.86)***
Home LL 6m	*B* (*SE*)	7.69 (2.39)**	7.01 (1.99)***
PW: 15-6m	*B* (*SE*)	2.51 (1.92)	1.95 (1.38)
LL: 15-6m	*B* (*SE*)	5.15 (1.83)**	3.27 (1.29)*
Model 4	R^2	.12***	
Risk index	*B* (*SE*)	−2.06 (.68)**	
Words 6m	*B* (*SE*)	.03 (.01)**	.01 (.01)
Words 15-6m	*B* (*SE*)	.03 (.01)**	−.00 (.01)

Note. Models 2, 3, and 4 add different types of parenting measures to Model 1.

* $p < .05$;

** $p < .01$;

*** $p < .001$.