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The influence of intellectual stimulation on the cognitive functioning of high-risk preschoolers: Implications for the transmission of risk across generations

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Abstract

The influence of intellectual stimulation on the cognitive functioning of high-risk preschoolers: Implications for the transmission of risk across generations

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The present study explored the role of intellectual stimulation as a potential mediating variable in the relationship between risk status within the parent generation and outcome in the offspring generation. Two main questions were addressed: (a) Within a high-risk sample, to what extent does intellectual stimulation, measured as maternal teaching style and quality of the home environment, influence the cognitive functioning of preschool-age children? (b) Does maternal childhood risk status predict the quality of maternal teaching and home environment? These questions were examined within a subsample of high-risk mothers and their preschool-age children from the Concordia High Risk Project, a twenty-year longitudinal investigation of lower SES individuals identified in childhood as being highly aggressive and/or withdrawn. These individuals have been shown to be at risk for various health and psychosocial difficulties during childhood, adolescence and early adulthood. Recently, evidence of a process of transfer of risk across generations has been gathered. Controlling for maternal education, current SES, and parenting stress, parental intellectual stimulation was shown to predict scores on a standardized measure of children's intellectual functioning. Further, mothers' childhood aggression directly predicted their teaching style while interacting with their offspring, suggesting continuity in problematic interpersonal style. In addition, both childhood aggression and social withdrawal indirectly threatened optimal home environment, by contributing to a pathway of psychosocial difficulties experienced by mothers. The findings are discussed in terms of their implications for the study of pathways through which risk status is transmitted from one generation to the next.

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The influence of intellectual stimulation on the cognitive functioning of high-risk preschoolers: Implications for the transmission of risk across generations

A number of prominent theories of development have addressed the contribution of social interactions to the cognitive growth of young children. These different models vary in their emphasis on adult-child interactions as a major source of intellectual development (Meadows, 1996; Rogoff, 1990). Indeed, some theories consider cognitive development to be primarily attributable to the physical maturation of the brain and largely asocial, whereas other models view children's development as profoundly influenced by social interactions (Meadows, 1996). This contrast in conceptual representations of cognitive development is embodied in the work of Piaget and Vygotsky.

Although Piaget did not completely overlook the role of social interactions in his theory of cognitive development, the bulk of his work focused on the biological nature of cognition. He argued that all children experience the same sequence of development, regardless of differences in their social environment (Meadows, 1996). The major stages of cognitive ability that children go through are mostly determined by the maturation of their brain structures, and these stages are therefore considered to be universal. The only individual differences that can exist are attributable to the speed at which children progress through the stages of development. According to Piaget's view, children are able to profit from social interactions only if they already possess the relevant cognitive structures. Social interactions may help to complete cognitive development, but they do not foster the development of intellectual skills. If children's current cognitive structures

are not mature enough to enable them to learn something new, no instruction provided in the context of social interaction will prove useful. Piagetian theory further suggests that the primary type of social interaction that can be beneficial is conflict with peers. Indeed, being confronted with the different views of someone similar to oneself is thought to prompt reflection and a revision of the child's old ideas and conceptions. Adult-child interactions cannot produce the same effects, since the adult is viewed as more powerful and the child is likely to passively accept the adult's views, without taking an active role in the resolution of the conflict. Thus, the child fails to internalize the new information, and cognitive development is not enhanced (Meadows, 1996; Rogoff, 1990). In sum, Piagetian theory contends that children's cognitive development is largely asocial particularly with respect to adults, and that interpersonal interactions can be beneficial only under certain circumstances.

Vygotsky's ideas regarding the development of intellectual abilities in young children contrast radically with those of Piaget, since he argued that social interactions are crucial for cognitive growth (Meadows, 1996; Rogoff, 1990; Vygotsky, 1978). Children who have only limited cognitive competencies for a particular task can, through interactions with more skilled partners, come to learn the concepts and routines necessary for solving the problem (Meadows, 1996). The skills that are acquired through these interactions are then internalized by the child, and become incorporated in his/her repertoire of cognitive abilities. Vygotsky's theory therefore emphasizes the role of adults in children's cognitive development, as they are thought to guide the child through the achievement of independent problem-solving (Rogoff, 1990).

A large body of empirical work tends to support Vygotsky's assertion regarding the role of adults in children's acquisition of cognitive abilities (Berk & Spuhl, 1995; Gauvain & Rogoff, 1989; Meadows, 1996; Rogoff, 1990). Most of the existing research focuses on language development. For instance, Snow (1995) showed that the extent to which mothers encouraged attention to objects and labeled these objects for their young children was associated with the infants' vocabulary size. Maternal influences on children's lexical and syntactic development have also been demonstrated (see Meadows, 1996, for a review of studies). Moreover, the positive effects of social interactions with more experienced adults such as parents have been documented with respect to young children's memory skills (Ratner, 1984; Fivush, 1988; cited in Rogoff, 1990), planning aptitudes (Gauvain & Rogoff, 1989), ability to use spatial information (Plumert & Nichols-Whitehead, 1996), and problem-solving skills, for example in the case of mathematical problems (Pratt, Green, MacVicar, & Bountrogianni, 1992; Saxe, Guberman, & Gearhart, 1987) and puzzle blocks (Wood & Middleton, 1975; Wood, Wood, & Middleton, 1978). In all these studies, the adult-child interaction facilitated the acquisition of new cognitive skills by young children.

A fundamental question raised by these findings concerns the way in which the adult-child interaction fosters cognitive growth in youngsters. Which aspects of the interaction may be responsible for the acquisition of new abilities by young children? Early studies conducted in the 1960's focused on the specific teaching behaviors that were thought to be conducive of learning in young children (Bee, Van Egeren, Streissguth, Nyman, & Leckie, 1969; Hess & Shipman, 1965). Most of the research focused on

mothers and their preschool-age children. These investigations suggested that effective teachers were those that carefully structured the task for the child, used a large number of clear verbal directives and questions, refrained from being controlling or intrusive, and offered praise and encouragement throughout the task (Bee et al., 1969; Hess & Shipman, 1965; see Moreno, 1991, for a review of studies). In contrast, those mothers who used vague and unclear instructions, who constantly physically intervened in the completion of the task, and who provided less praise and more disapproving comments were said to be ineffective teachers (see Meins, 1997b).

The Scaffolding Concept

Although these early studies provided valuable information regarding optimal teaching strategies, they failed to take into consideration the child's level of success with the task when evaluating the mother's behaviors. It is a well-established fact that members of a dyad necessarily influence each other during the course of an interaction (Birigen & Robinson, 1991). Focusing solely on the mother's specific actions provides no indication of her sensitivity to the child's needs. The work of Vygotsky (1978) proved to be essential in considering the children's level of ability and need for guidance when evaluating maternal teaching. He introduced the concept of "zone of proximal development," which he defined as the "distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (1978, p. 86). Vygotsky (1978) argued that cognitive growth in children

occurs only when adult teaching falls within this zone of proximal development. The effective tutor stimulates the child just above the child's level of current abilities, providing sufficient guidance so that the child is not overwhelmed and is able to succeed at the task (Berk & Spuhl, 1995; McNaughton & Leyland, 1990). The tools that the child acquires during this interaction with a more competent partner are then internalized, increasing the child's capabilities for independent problem solving (Meadows, 1996; Vygotsky, 1978).

Vygotsky's views on the importance of maternal sensitivity to her child's level of ability have been incorporated into the work of Wood and his colleagues who also considered the relationship between the behavior of the mother and that of the child (Wood, Bruner, & Ross, 1976; Wood & Middleton, 1975; Wood et al., 1978). These researchers introduced the term "scaffolding" to illustrate the notion that ideally, the adult's level of instruction should be contingent on the child's previous success or failure (Wood, 1980). If the child is struggling to complete the task, the adult should become more involved, using both verbal instructions and physical demonstrations to help the child get over his or her current difficulties. As the child becomes more competent, the adult should transfer the responsibility for the task to the child, and there should be a progressive reduction of adult control and planning of the task (McNaughton & Leyland, 1990; Meins, 1997a, 1997b; Rogoff, 1990). Thus, Wood et al.'s scaffolding concept emphasizes adult's sensitivity to the child's abilities. The ideal level of adult intervention is considered to be just above the level at which the child is already performing, at the level of potential competence. The discrepancy between actual and potential

performance is referred to as the "region of sensitivity to instruction," implying that instruction below this region is redundant to the child, while instruction beyond this region is premature considering the child's current abilities.

In addition to this contingency principle, Wood and his colleagues argued that effective tutors use encouraging comments to maintain the child's motivation, highlight critical features of the task and emphasize helpful strategies, and make sure that the child is involved when a demonstration is presented so that he or she assimilates the action and becomes able to perform it independently (Meins, 1997a, 1997b).

The importance of adult sensitivity to the child's ability level and instruction within the "zone of proximal development" or "region of sensitivity to instruction" have been demonstrated in a number of empirical studies. Wood and his colleagues (Wood & Middleton, 1975; Wood et al., 1978) asked mothers to teach their 4-year-olds to assemble wooden pyramids that were above these children's current ability levels. Mothers who followed the contingency principle, that is getting more involved when the child experienced problems and handing over more responsibility when the child succeeded, were found to be more effective teachers. Indeed, their children were able to complete more of the pyramid when they were left to work independently following the adult-child interaction. Other researchers using different tasks have reported similar findings (Berk & Spuhl, 1995; Pratt, Kerig, Cowan, & Cowan, 1988; Pratt et al., 1992; Saxe et al., 1987).

The benefits of such adult tutoring do not appear to be limited to the child's independent performance on the task that was introduced during the adult-child

interaction. Indeed, more global influences on the child's cognitive functioning have been demonstrated. Barocas et al. (1991) asked mothers and their 4-year-old children to work together on paper boats. Maternal teaching that was aimed at the child's zone of proximal development was found to be positively associated with the children's subsequent scores on the Wechsler Primary and Preschool Scale of Intelligence (WPPSI; Wechsler, 1967). Such findings provide support for Vygotsky's assertion that the skills learned in the context of adult-child interactions become incorporated into the child's repertoire of abilities, and lead to an overall improvement in cognitive functioning.

The Home Environment

While acknowledging the influence of parental scaffolding on the cognitive development of young children, a number of researchers have shown that the role of parents is not limited to specific behaviors within structured teaching interactions. A large body of evidence points to the home environment provided by parents as another significant contributor to children's cognitive growth (see Gottfried, 1984, for a review of studies). The majority of these investigations have used the Home Observation for Measurement of the Environment Inventory (HOME; Caldwell & Bradley, 1984) as a measure of the stimulation and support available to the child in the home. This scale provides information on such things as the language stimulation provided to the child, the presence of toys and learning materials in the home, and the pride and affection displayed by the caregiver towards the child (a more complete description of the Home Inventory can be found in Bradley & Rock, 1985). Information needed to complete this inventory

is obtained through observation and interview done in the home with the child and the child's primary caregiver (usually the mother).

A large number of studies using the HOME Inventory have reported significant correlations between the quality of the home environment and children's IQ scores (Bradley & Caldwell, 1984a, 1984b; Bradley et al., 1989; Bradley & Rock, 1985; Luster & Dubow, 1992; Molfese, DiLalla, & Lovelace, 1996; Wachs, 1984). For instance, using data from the National Longitudinal Survey of Youth, Luster and Dubow (1992) showed that scores on the HOME Inventory were predictive of verbal abilities as measured by the Peabody Picture Vocabulary Test- Revised (PPVT-R; Dunn & Dunn, 1981) for both preschoolers (ages 3 to 5) and early elementary school children (ages 6 to 8). The relation remained significant even after the effect of maternal IQ was partialled out.

Thus, when the body of research on early home environment is considered along with the literature on scaffolding, it may be argued that young children's cognitive growth is significantly influenced by social interactions in general, and more specifically by parental intellectual stimulation. In fact, the empirical evidence gathered to date can be viewed as supporting Vygotsky's hypothesis regarding the role of adults in promoting the cognitive development of young children.

High-Risk Populations

Because parental instruction and the quality of early home environment have both been shown to be implicated in children's cognitive development, these factors have been studied within several risk populations as potential explanations for some children's poor

competence. Parental distress has been shown to be an important risk factor affecting the intellectual stimulation that caregivers are able to provide to their child. To date, studies have been conducted with parents suffering from depression (Goodman & Brumley, 1990; Harnish, Dodge, & Valente, 1995; Webster-Stratton & Hammond, 1988), schizophrenia (Goodman & Brumley, 1990), as well as individuals considered at risk for child abuse and/or neglect (Diaz, Neal, & Vachio, 1991). For example, Diaz et al. (1991) compared the scaffolding strategies of low-SES mothers with histories of child abuse to those of control mothers. Using selective attention and sequencing tasks, they investigated these mothers' abilities to transfer responsibility to their 3-year-old children. Their results showed that high-risk mothers used more controlling teaching strategies, were less likely to transfer the responsibility of the task to their child, and infrequently praised or encouraged their child when compared to low-risk mothers.

The effects of parental depression on parenting style and child development have been widely studied (Dodge, 1990; McLoyd, 1990). Marked differences in the quality of mother-child interactions, teaching strategies, and home environment have been found between depressed individuals and control subjects. For example, during a semi-structured play session, depressed mothers were found to be less responsive and more hostile toward their child than contrast mothers (Goodman & Brumley, 1990). It was shown that the home environment provided by these depressed mothers, as measured by the HOME Inventory, was significantly less supportive and stimulating than that provided by the control families.

Another risk factor that has been studied in relation to parental instruction and

home environment is the level of stress experienced by the parent. Parenting stress has been shown to affect the caregiver's ability to respond in a sensitive and appropriate manner to the child's needs (Pianta & Egeland, 1990). Sources of stress known to affect parenting abilities and parent-child interactions include daily hassles, isolation, lack of social support, economic hardship, and psychopathology (Adibin, 1995; Crnic & Greenberg, 1990).

Finally, a large body of evidence points to socio-economic factors (SES) as another consistent risk factor associated with inadequate adult scaffolding and poor home environments (Bee et al., 1969; Garrett, Ng'andu, & Ferron, 1994; Laosa, 1978; Moreno, 1991; Radke-Yarrow, Richters, & Wilson, 1988; Wilton & Barbour, 1978). Although there are some disputes regarding how SES should be defined and measured, researchers usually include parental education, parental occupation, and family income as part of their definition. While teaching their children, mothers from low SES backgrounds tend to be more controlling, using more specific and concrete verbal commands (Moreno, 1991). They also have been shown to be less warm and encouraging, and to use more negative physical intervention (Bee et al., 1969; Dodge, Pettit, & Bates, 1994; Laosa, 1980; Meins, 1997b; Radke-Yarrow et al., 1988; Wilton & Barbour, 1978). Poverty is also associated with less cognitive stimulation in the home environment, as evidenced by the presence of fewer learning materials as well as less language stimulation (see McLoyd, 1998). Therefore, the results of various studies focusing on high-risk dyads indicate that consistent individual differences exist in parents' ability to provide intellectual stimulation to their young children. Moreover, these individual differences

can be attributed in part to the parents' personal difficulties and to contextual factors such as socio-economic disadvantage.

The Children's Functioning

In parallel, research within risk samples has also suggested that the children from these high-risk families are likely to exhibit poor outcomes, as measured by their cognitive functioning and early school adjustment. For example, empirical evidence suggests that parental depression represents a significant risk factor for the socio-emotional and cognitive development of young children (Dodge, 1990). Similarly, sources of stress such as daily hassles, stressful life events, and parenting stress have been found to have detrimental effects on children's competence (Crnic & Greenberg, 1990). Using data from the Infant Health and Development Program, Duncan, Brooks-Gunn, and Klebanov (1994) studied the effects of low family income in the first few years of life on children's IQ when they reached age 5. Even after controlling for family structure and maternal education, the authors found that children who came from poor families obtained lower scores on the WWPSI (Wechsler, 1967) when compared to children from middle-class families. Social class differences in young children's scores on general intelligence tests as well as verbal ability tests such as the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981) have also been reported by Olson, Bates, and Kaskie (1992) as well as Smith, Brooks-Gunn, and Klebanov (1997).

In addition to obtaining lower scores on standardized intelligence tests, children from high-risk families have been shown to experience more difficulty adjusting to

school. This is usually evidenced by a greater incidence of low grades and behavioral problems in these children than among children from control families (Patterson, Kupersmidt, & Vaden, 1990; Walker, Greenwood, Hart, & Carta, 1994). For instance, Pagani, Boulerice, and Tremblay (1997) followed a group of elementary school children from kindergarten to age twelve in order to identify certain predictors of academic and behavioral problems in disadvantaged children. They found that by age twelve, children who had experienced poverty for many years were much more likely than controls to have been retained a grade due to very low academic standing. Low SES was also associated with disruptive behavior in school, such as fighting.

In turn, deficits in cognitive functioning and early school adjustment problems are known to be involved in the development of a number of other problems in the course of childhood, adolescence, and early adulthood. First, studies have linked poor school achievement to later dropout from high school (Cairns, Cairns, & Neckerman, 1989; Esminger & Slusarcick, 1992). As well, Baydar, Brooks-Gunn, and Furstenberg (1993), using a sample of disadvantaged African-American teenage mothers and their firstborn children, showed that the results of cognitive and behavioral assessments in early childhood predicted young adulthood literacy measured 15 years later. Children who exhibited delays on standardized tests at ages 4 to 6 were more likely to be considered illiterate as young adults. Further, a number of studies have linked poor school achievement in childhood to later behavioral problems, such as juvenile delinquency (see Tremblay et al., 1992, for a review of studies). Longitudinal studies from childhood to adolescence and adulthood have also shown that poor school adjustment is related to

early parenthood, unemployment, and physical and mental health problems (see Pagani et al., 1997). This body of research underscores the fact that children who come from disadvantaged backgrounds and/or whose parents experience personal difficulties are themselves at risk for a number of problems during the course of childhood, adolescence, and adulthood.

Yet, increasing evidence suggests that early intervention with these high-risk children can reduce the likelihood that they will experience difficulties in school adaptation as well as negative outcomes throughout their lives. For instance, the Perry Preschool Project, initiated in 1962 by David P. Weikart, was designed to prepare 3- and 4-year-old children from poor neighborhoods for future success in school (Hohmann & Weikart, 1995). The basic framework of this preschool program was a "plan-do-review" process, in which teachers provided time for the children to plan their activities, carry them out, and reflect on what they had done. Another key aspect of the program was the inclusion of home visits, which were intended to provide parents with ideas about learning and child development, and to involve them in the education of their offspring. Children who participated in the project were randomly assigned to a treatment group, whose members were enrolled in the preschool program, and to a control group, whose members remained at home and were not enrolled in the preschool program. Over the years, data have been collected on the children's intellectual and psychosocial functioning in order to test the effectiveness of the intervention. These results have showed that the individuals who had been enrolled in the preschool program appear to be more successful in later life. Recent findings indicated that by age 27, they were more likely to have

completed high school, to be earning $2,000 or more per month, to be owning their own homes and cars, and to be involved in stable, long-term relationships. They were also less likely to have been repeatedly arrested for criminal offenses (Hohmann & Weikart, 1995).

Such findings indicate that targeted early interventions can protect high-risk children from a number of negative outcomes. In most cases, however, early intervention programs are not made available to high-risk children. Probably as a result of this, many of these children who come from disadvantaged backgrounds and whose parents experience personal difficulties are themselves confronted with problems throughout the lifespan.

Intergenerational Transmission of Risk

That difficulties are often experienced by both parents and their children suggests the possibility of a transmission of risk across generations. According to the model of risk transmission, children who develop problem dispositions carry them into adulthood (Caspi & Elder, 1998a, 1988b; Elder, Caspi, & Downey, 1986). These tendencies affect marital and parent-child relationships within the family of procreation (intragenerational transfer of risk). For example, the problem dispositions may lead to parenting difficulties such as ineffective disciplinary strategies or insufficient stimulation. In turn, the problematic parenting may be responsible for adjustment problems in the second generation (intergenerational transfer of risk). In this model, parenting practices and family environment are considered crucial mediating factors in the transmission of risk

across generations (Caspi & Elder, 1988a, 1988b; Elder et al., 1986; Patterson & Dishion, 1988).

Longitudinal investigations that follow individuals from one generation to the next represent the best means of studying intergenerational transfer of risk and the mechanisms that underlie it. These studies enable the examination of the continuity and discontinuity of particular behavioral tendencies and contextual factors and, as such, can serve to clarify both risk and resilience processes. Because such designs are costly and demanding, however, only a few such studies exist. These studies have generally provided support for the transmission of risk from parents to offspring (Elder et al., 1986; Patterson & Dishion, 1988; Quinton & Rutter, 1988). Elder et al. (1986) examined data from the Berkeley Guidance Study, a sample of individuals who experienced the Great Depression as adolescents. When these participants became parents, it was shown that their level of personality instability, as indexed by a tendency to be irritable and/or tense-worrisome, was related to marital tension and use of extreme discipline with their children. In turn, the offspring of these individuals developed severe behavioral problems, which persisted throughout childhood and into adulthood. Similarly, Patterson and his colleagues (see Patterson & Dishion, 1988) have presented evidence attesting to the intergenerational transmission of antisocial traits. These authors demonstrated that parents with a history of irritability and explosive behavior used negative disciplinary practices with their children. In turn, their children were likely to exhibit behavioral problems.

Thus, evidence from longitudinal investigations conducted to date tends to

support the notion that individuals exhibiting deeply-rooted problem dispositions are likely to place their offspring at risk for developmental difficulties. Parenting practices appear to represent an essential mechanism underlying this transfer of risk.

The Concordia High Risk Project

The Concordia High Risk Project is a prospective, longitudinal investigation designed to examine the life-course trajectories of individuals identified as highly aggressive, withdrawn, both aggressive and withdrawn, or non-deviant (contrast group) in childhood. Aggression has been defined as the use of words or actions intended to cause harm (Coie & Dodge, 1998), while social withdrawal is usually thought of as extreme anxiety, fear, and sadness (Moskowitz & Schwartzman, 1989). A considerable amount of research has focused on the stability and consequences of aggressive behavior. The majority of these studies, however, concern aggression in males. It has been shown that male aggression is quite stable, predictive of antisocial activity later in life, and can also be transmitted across generations (Cairns, Cairns, Neckerman, Gest, & Gariepy, 1988; Huesmann, Eron, Lefkowitz, & Walder, 1984; Moskowitz, Schwartzman, & Ledingham, 1985; Olweus, 1979). In contrast, fewer studies have documented the stability and sequalae of aggression in females. The available data indicates that aggressive behavior in females is somewhat less stable than in males, and leads to fewer negative consequences when considering outcomes such as juvenile delinquency or antisocial personality disorders (Huesmann et al., 1984). Yet, some authors have suggested that reports of lower incidence of aggression in females may have focused on forms of

aggression that were less salient for women than for men. Recent work by Crick and colleagues has suggested that girls' aggression may be less physical and verbal than male aggression, and may focus more on relational issues (Crick, 1995; Crick & Grotpeter, 1995). Specifically, relational aggression refers to attempts to exclude peers from group participation, hurt another's reputation, and gossip about another's attributes. This type of covert hostility has been shown to be more prevalent among girls than boys, with reasonable stability over time, and significant correlations with other peer and social-cognitive problems (Crick, 1995; see Coie & Dodge, 1998). The finding that different forms of aggression may characterize boys and girls suggests that a variety of outcomes other than delinquency and antisocial behavior need to be considered when examining the continuity of aggression. For instance, Moskowitz and Schwartzman (1989) argued that aggressive girls may be at risk to experience academic difficulties as well as unstable family and social relationships in later life. Increasingly, the consensus appears to be that aggression is a characteristic that is relatively stable and predictive of negative outcomes for both males and females (Coie & Dodge, 1998).

The literature on social withdrawal in children is considerably less developed and consistent than the literature on aggression. Although one prevailing view is that withdrawal is neither stable nor a predictor of later outcomes, Moskowitz, Schwartzman, and Ledingham (1985) found withdrawal to be moderately stable for both boys and girls over a 3-year period, and even to become more pronounced during that time period. It has been suggested that socially withdrawn children may develop problems in their social interactions, leading to loneliness and dissatisfaction (Rubin & Mills, 1991).

It is also possible for a child to be high on both aggression and social withdrawal. Evidence gathered to date within the Concordia High Risk Project suggests that this group may be particularly at risk for severe psychosocial problems throughout the lifespan (Moskowitz & Schwartzman, 1989). For example, these individuals have been found to exhibit poor academic achievement and to experience difficult social relationships (Ledingham & Schwartzman, 1984). As well, some evidence suggests that these individuals are likely to develop psychopathology (Moskowitz & Schwartzman, 1989).

At the time when the Concordia High Risk Project began in 1976, over 4,000 children attending grades 1, 4, or 7 at French-language public schools in low income areas of Montreal were screened. A French translation of the Pupil Evaluation Inventory (PEI; Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976), which is a peer nomination instrument, was used to select and classify 1,770 children into the three risk groups (aggressive, withdrawn, aggressive-withdrawn) and the normative group (Schwartzman, Ledingham, & Serbin, 1985). A unique feature of the Concordia High Risk Project was the inclusion of approximately equal numbers of boys and girls in each of the groups and the use of gender-based norms. That is, the aggressive girls were identified as extreme relative to the behavior of other girls in their classes, not compared to the boys. Research findings have confirmed that this sample is at risk for various health and psychosocial problems, including poor school achievement, psychiatric problems, substance abuse, gynecological problems, and teenage pregnancy (Moskowitz & Schwartzman, 1989; Serbin, Moskowitz, Schwartzman, & Ledingham, 1991; Serbin, Peters, McAffer, &

Schwartzman, 1991).

The original participants are now in early adulthood and many are having children of their own. To date, the studies that have been conducted on these individuals and their offspring have provided some support for parenting difficulties and transmission of risk to the next generation. For example, Serbin, Peters, and Schwartzman (1996) examined the frequency of visits to hospital Emergency Rooms (ER), non-emergency medical visits, the diagnoses that were available for the ER visits, emergency surgical consultations, and emergency hospitalizations made by the offspring of a subsample of adolescent mothers from the original sample. Among the findings, group differences were established for the number of medical and ER visits made by the children. That is, children of women in both the aggressive and aggressive-withdrawn groups consulted with the medical community more often than children in the contrast group. Although the mechanisms underlying the increased risk of these children for childhood injuries and acute illnesses were not clear, the authors concluded that maternal childhood aggression, particularly in combination with social withdrawal, appears to be involved in the transmission of risk to offspring.

Other studies from the Concordia High Risk Project have begun to point to poor parenting practices of the original participants as a possible mechanism underlying the transmission of risk process. Cooperman (1996) assessed the behavior of mothers with their school-age children during a series of interaction tasks that took place in a university laboratory. The tasks were intended to gradually move the mother and child from a relatively stress-free, pleasant interaction to a potentially anxiety-provoking,

confrontational task. The behavior of the mother and the child during these interactions was coded in terms of unresponsiveness and aggressiveness. Maternal supportive behavior towards the child was also assessed. Overall, support was obtained for the intergenerational transmission of risk. Both aggression and social withdrawal in childhood were associated with maternal unresponsiveness during the interaction. Social withdrawal also predicted a less supportive maternal interactional style. Further, both maternal aggression and social withdrawal predicted aggressive child behavior during the tasks (Cooperman, 1996; Serbin et al., 1998)

As well, using a subsample of mothers and their young children aged 12 to 42 months, Bentley, Stack, and Serbin (1998) assessed the quality of the mother-child relationship during a free-play session. Again, mothers' childhood risk status was predictive of poor parenting practices, as mothers who were identified as both aggressive and socially withdrawn in childhood were more likely to display hostile behaviors when interacting with their children.

Thus, it appears that being identified in childhood as aggressive, aggressive-withdrawn, or withdrawn places individuals at risk for various psychosocial problems during their lives. As well, growing data indicates that childhood risk status predicts problematic parenting practices among the participants from the Concordia High Risk Project, and in turn increases the likelihood of developmental difficulties in their offspring. As was discussed by Serbin et al. (1998), there is some speculation surrounding the reasons why childhood risk status leads to ineffective patterns of parenting. One possibility is that childhood behavioral tendencies remain rather stable,

and continue into the family relationships in adulthood. According to this view, childhood aggression should lead to hostile behavior within parent-child interactions, while history of social withdrawal should predict unresponsiveness to the children's needs. It may also be, however, that childhood risk status influences parenting abilities mostly indirectly, through various psychosocial difficulties affecting the lives of the high-risk individuals (e.g., low educational attainment, early pregnancy, lower economic status, and parenting stress). To date, findings from the Concordia High Risk Project have mostly supported the latter view. That is, mothers' childhood problems appear to predispose them to experience a number of psychosocial difficulties (in particular poor educational achievement), which in turn hinder their parenting abilities (Cooperman, 1996; Cooperman, Serbin, Stack, & Schwartzman, 1998; Lehoux, 1995; Serbin et al., 1998). The only clear indication of a continuity is the finding by Cooperman (1996) that social withdrawal in childhood predicted maternal unresponsiveness during mother-child interactions taking place in a university laboratory.

The Present Study

Using a subsample of parents and their offspring from the Concordia High Risk Project, the general objective of the current research project was to examine one particular aspect of parenting, namely the intellectual stimulation provided by high-risk individuals to their preschool-age children. This construct was measured as the teaching style of mothers within a structured interaction task, as well as the overall quality of the home environment made available to the target children. The main goal of the study was

to explore the role of stimulation as a potential mediating variable in the relationship between risk status within one generation and outcome in the subsequent generation.

The design of the study was based on the intergenerational model of risk transmission, which suggests that problem dispositions originating in the childhood of individuals affect their parenting abilities, and that these difficulties in turn have repercussions on the development of their offspring (Caspi & Elder, 1998a, 1988b; Elder et al., 1986). Specifically, two main questions were addressed in this study: (a) Within a high-risk sample, how do teaching style and home environment impact on the cognitive functioning of preschool-age children? (b) Does maternal childhood risk status (i.e., history of aggression and/or social withdrawal) predict the quality of maternal teaching and home environment? If so, what are some of the mechanisms and intervening variables involved? Although the best manner in which to address these questions would have been to test them together, limitations in sample size and power made the testing of the overall model impossible. Instead, two separate studies were designed. These are described below.

Study 1: The Influence of Maternal Teaching Style and Quality of Home Environment on Preschoolers' Cognitive Functioning Within a High-Risk Sample

The goal of the first study was to examine, within a high-risk sample, the influence of maternal scaffolding strategies and quality of the home environment on children's cognitive competence, as indexed by their scores on a standardized test of intelligence. Previous theories and experimental work that addressed parental

contributions to children's cognitive growth had mostly focused on normative samples. Although much evidence exists attesting to the poor intellectual functioning of high-risk children, few studies have directly tested the link between this negative outcome and the parents' teaching style as well as the stimulation made available in the home. The current study was designed to test the influence of these variables, while taking into consideration other historical and concurrent factors that had previously been shown to be related to child IQ. This way, it was possible to determine the unique contribution of parenting variables to the cognitive functioning of young high-risk children.

Specifically, maternal educational attainment was included since it had been linked to developmental outcomes in offspring in a number of studies (Katz et al., 1997; Velez, Johnson, & Cohen, 1989). As well, within the Concordia High Risk Project, maternal education had consistently been found to be a strong predictor of both family risk factors and child development (Bentley et al., 1998; Cooperman, 1996; Lehoux, 1995; Serbin et al., 1998). Researchers usually conceive of maternal education as an index of ability, knowledge about parenting, or socioeconomic status. It is presumed that these factors account for the link between the number of years of education completed by the mother and the child's functioning.

The current socioeconomic status of the family was also measured and included in the model predicting the children's cognitive functioning. The literature has consistently shown the importance of SES variables in explaining the cognitive competence of young children. Indeed, a large number of studies have demonstrated that low family income, by limiting the physical and psychological resources made available to children, is a

strong predictor of low scores on standardized tests of intelligence (Duncan et al., 1994).

Finally, since parental distress is known to represent an important risk factor for the development of young children, measures of the mothers' current psychological status were included. Specifically, depressive symptomatology as well as parenting stress were considered as potential negative predictors of child IQ.

Children's overall cognitive functioning was first examined as an outcome variable. More specific cognitive abilities (i.e., verbal, abstract/visual, quantitative, and short-term memory) were also considered in order to obtain a more detailed understanding of the contribution of maternal teaching and home environment to the cognitive growth of young children.

Hypothesis 1. The first hypothesis focused on the relationship between maternal scaffolding, home environment, and the cognitive functioning of the target children. In general, it was expected that the quality of maternal teaching and home environment would both be positively linked to the intellectual performance of the children. Based on previous research, it was also hypothesized that maternal education and current SES would represent positive predictors of child IQ, while maternal distress would negatively affect the cognitive functioning of the children. Given the scarcity of existing data, the current study served to explore whether, within a high-risk sample, scaffolding strategies and overall quality of the home environment could predict child IQ beyond other powerful factors.

Because few previous studies had used parenting variables to predict the different

cognitive abilities measured by standardized intelligence scales, it was difficult to make specific predictions regarding the contribution of teaching style and home environment. Thus, the current study attempted to answer the question of whether these two parenting variables as well as the other factors included in the model made similar or specific contributions to the various cognitive abilities studied. One particular link that was expected to arise was the relation between scaffolding and verbal abilities. Indeed, a consistent finding in the literature on adult-child interactions has been the positive influence of maternal teaching on children's language development and verbal reasoning (Meadows, 1996; Snow, 1995).

Study 2: Childhood History of Aggression and Social Withdrawal as Predictors of Maternal Teaching Style and Quality of the Home Environment

The second study was intended to explore whether the mothers' childhood history of aggression and/or social withdrawal was involved in the prediction of their teaching style and the quality of the home environment that they provide for their children. Aggression and, to a lesser extent, withdrawal had been shown to represent important risk factors, with implications in many areas of a person's life, including peer relations, educational attainment, occupational status, and family relations (Serbin, Moskowitz, et al., 1991). Previous investigations from the Concordia High Risk Project have suggested that these dimensions were also predictive of problematic parenting behavior (Bentley et al., 1998; Cooperman, 1996; Cooperman et al., 1998). For instance, Serbin, Peters, et al. (1991) showed that maternal childhood aggression and withdrawal were both associated

with an unresponsive parenting style. As well, childhood withdrawal was a negative predictor of the overall quality of the home environment and provision of stimulating play materials. Although no study to date has specifically focused on the provision of intellectual stimulation by aggressive and/or withdrawn mothers, the data documenting parenting difficulties among the participants from the Concordia High Risk Project suggested that maternal scaffolding and home environment would also be affected by the mothers' risk status.

As in the case of the first study, a number of historical and concurrent variables that have been shown to be related to parenting were included in the analyses. The goal was to clarify the pathways through which childhood risk status influences quality of teaching and home environment. A measure of the socioeconomic status of the family of origin of the high-risk mothers was included along with the childhood behavioral tendencies of these women. The rationale for including this variable in the model was to ensure that the behavioral problems identified in the high-risk participants were not simply a function of the difficult living conditions they experienced while growing up. It also allowed us to explore the possibility that childhood poverty represents a risk factor for later parenting abilities. Research has shown that individuals raised in a disadvantaged context are at risk to experience a number of psychosocial difficulties throughout the course of their lives, such as low educational attainment, low occupational status, and psychopathology (Baydar et al., 1993; Pagani et al., 1997). Such difficulties have in turn been found to affect parenting abilities. Thus, the possibility that childhood SES would indirectly affect mothers' parenting abilities was considered in the current

study.

Next, the age of the mother when she gave birth to her first child was considered. Data from longitudinal investigations suggested that high-risk females, especially those considered as highly aggressive in childhood, were more likely than controls to become mothers at a young age (Cairns & Cairns, 1994; Serbin, Peters, et al., 1991; Underwood, Kupersmidt, & Coie, 1996). In turn, some evidence suggests that age at first birth is predictive of parenting abilities. For example, studies on teenage mothers have found that these young mothers tend to be less verbal, sensitive, and responsive to their offspring than older mothers (Culp, Appelbhaum, Osofsky, & Levy, 1988). They also seem to experience more difficulty providing a stimulating home environment for their children (Luster & Dubow, 1992; Moore, Morrison, & Greene, 1997). Yet, some authors have recently argued that because of certain methodological characteristics of these studies, their findings should be interpreted with caution. In particular, many studies compare the parenting practices of poor teenage mothers with those of significantly older, middle-class mothers who may not constitute a reasonable comparison group. When certain background and socioeconomic differences between younger and older mothers such as educational attainment are taken into consideration, the differences in parenting diminish significantly and the influence of age at first birth is less apparent (Coley & Chase-Lansdale, 1998). In the current study, background information on the mothers was included in order to clarify the influence of age at first birth on two measures of parenting.

Finally, maternal educational attainment, current socioeconomic status of the

family, and maternal distress were included in the present study. By including these variables in the current project, it was possible to examine their contribution to the explanation of parental stimulation and home environment within a high-risk sample, relative to the predictive value of childhood aggression and withdrawal. It was also possible to explore the mechanisms through which these different variables influenced the parenting outcomes. For instance, the issue of a direct effect of childhood risk status versus an indirect effect through the other psychosocial and familial risk factors included in the model was of particular interest.

Hypothesis 2. The second hypothesis concerned the influence of the mothers' childhood levels of aggression and social withdrawal on the scaffolding strategies that they used with their preschool-age children. Previous studies from the Concordia High Risk Project have suggested that these behavioral tendencies, in particular aggression and the combination of aggression and social withdrawal, represented important risk factors for inadequate parenting. In the current project, it was expected that the same tendencies would predict less than optimal scaffolding patterns. It was thought that within the teaching interaction, these risk factors would be associated with fewer attempts to stimulate the child above his or her current ability level, less sensitivity to the child's needs, fewer suggestions provided to the child, less praise and encouragement, and greater maternal control of the task. Because the literature on social withdrawal was less consistent, the present study was intended to explore the impact of this problem disposition on maternal behavior within a teaching context.

Based on previous studies (e.g., Serbin et al., 1998), the childhood behavioral tendencies were expected to affect teaching style mostly through their relationship with a number of psychosocial experiences affecting the lives of the high-risk women. The psychosocial variables considered first included the socioeconomic status of the family of origin, which was thought to be a positive predictor of scaffolding strategies. As well, the age of the mother at the birth of her first child, the number of years of education, and the current SES of the family were all expected to be positively linked to effective maternal teaching. In contrast, maternal distress was thought to negatively affect scaffolding strategies.

Hypothesis 3. Predictions concerning the influence of childhood aggression and social withdrawal on the quality of the home environment were similar to those made in relation to scaffolding. That is, high levels of aggression and a combination of aggression and social withdrawal were expected to be associated with lower scores on the HOME Inventory. Furthermore, based on the findings of Serbin, Peters, et al. (1991), childhood withdrawal was expected to be a negative predictor of the quality of the home environment.

Again, a number of psychosocial variables were considered as potential mediators in the relationship between childhood risk status and quality of parenting, as measured by the HOME Inventory. The socioeconomic status of the mothers' family of origin, their educational attainment, their age at the birth of their first child, and the current family SES were all expected to be positively related to the quality of the home environment. In

contrast, maternal distress was thought to negatively predict quality of the home environment.

Additional Predictors

In addition to the hypotheses mentioned above, a few child characteristics were evaluated for their contribution to the prediction of child cognitive outcomes, maternal teaching, and quality of the home environment. Child gender was first considered. Previous research has suggested that compared to their female counterparts, boys may be at an elevated risk for experiencing inadequate parenting, behavior problems, as well as delays in cognitive development (Serbin et al., 1996; Brooks-Gunn & Furstenberg, 1986). Although the mechanisms involved in this gender difference remain somewhat unclear, it appears that both heritable factors and social expectations contribute to placing boys at greater risk than girls for inadequate parenting and early developmental problems. The influence of negative expectations on maternal behavior was illustrated by Cooperman (1996), who showed that mothers tended to display more aggressive behavior when interacting with boys than with girls. This finding emerged although boys were not found to be more aggressive or restless than girls during the interaction. In line with previous findings, in the current study it was anticipated that boys would receive lower scores on a standardized test of intelligence. As well, mothers were expected to be less stimulating and supportive when teaching boys than when teaching girls. The current project also examined the possibility that the quality of the home environment experienced by boys would be inferior to that of girls.

In addition, given the age range of the children included in the sample (i.e., 42-72 months), it was possible to explore potential differences in maternal teaching as a function of child age and involvement in the task. In studies focusing on both normative and risk samples, mothers have been shown to provide more concrete support and encouragement to younger children and those who are less compliant (Fagot & Gauvain, 1997; Gauvain & Fagot, 1995). Similar findings were expected to emerge in the current research project.

General Method

The Participants from the Concordia High Risk Project

Participants for the present study were drawn from a larger pool of individuals who together have formed the Concordia High Risk Project since 1977. At that time, 4,109 francophone school-age children attending grades 1, 4, and 7 were recruited from inner-city, lower socioeconomic areas of Montreal, Quebec. The children were screened using a peer evaluation measure, the Pupil Evaluation Inventory (PEI; Pekarik et al., 1976; see Appendix A). Studies have shown that peer nominations represent a reliable method of rating children's behavior (Lyons, Serbin, & Marchessault, 1988). As well, peer evaluations have been found to be good predictors of problems of adjustment in children (Rolf, 1972; Milich, Landau, & Whitten, 1984). The PEI contains 35 items, which load on three separate factors, aggression, withdrawal, and likeability. For the purposes of the Concordia High Risk Project, only the dimensions of aggression and withdrawal were retained.

Using the PEI, children in 152 classrooms were asked to select four boys and four girls who they felt were best described by each item on the inventory. The total number of nominations that each child received for the aggression and withdrawal dimensions was calculated. Subsequently, these scores were transformed into z-scores, and a percentile rank was assigned. Children who obtained an aggression z-score equal to or exceeding the 95th percentile cutoff ($z = 1.95$) and whose withdrawal z-score fell beneath the 75th percentile ($z = 0.68$) formed the aggressive group. The withdrawn group

consisted of those children whose withdrawal z-scores were equal to or exceeding the 95th percentile and aggression z-scores were below the 75th percentile. Children who obtained z-scores equal to or above the 75th percentile on both the aggression and withdrawal dimensions were categorized as aggressive-withdrawn. Finally, contrast participants were those who obtained z-scores between the 25th and 75th percentiles on both aggression and withdrawal.

Of the 4,109 children who were screened, the final sample included 1,770 children (861 boys and 909 girls). The high-risk groups (children scoring high on one or both dimensions of aggression and withdrawal) included 656 children. The contrast sample, which consisted of children who were not extreme on either of the two dimensions, included 1,114 children. For a more complete description of the original sample and method of screening see Schwartzman et al. (1985).

Sample of the Current Study

The present study was part of a larger research project, the Parent-Child Project, which focused on a subsample of the original sample of the 1,770 subjects making up the Concordia High Risk Project. To be eligible for the Parent-Child Project, subjects had to have a child between the ages of 12 and 72 months at the time of testing and to live within a one-hour distance from the laboratory. Although both male and female original subjects were contacted, most of the testing involved the mother and the child. That is, we tested a group of female original subjects as well as spouses of male original subjects. In total, 175 families took part in the study. These participants were divided into two

cohorts according to the age of the child at testing. Participants with children from 12 to 42 months were part of cohort 1 ($\underline{n} = 91$), while participants with children between 42 and 72 months old were part of cohort 2 ($\underline{n} = 84$). Given that the goal of the current study was to examine stimulation as a potential mediator in the transfer of risk from the parent generation to their preschool-age children, only the subjects who were part of cohort 2 were used in the analyses.

Procedure

Most of the information for the present study was gathered during visits made to the participants' homes. Potential subjects were contacted by telephone in order to schedule two home visits lasting approximately 3 hours each. During this initial contact, participants were informed of the general nature and procedures of the study, but they were not told about the specific hypotheses of the research project. The research team generally consisted of an M.A. level psychologist (examiner), and a research assistant/graduate student (interviewer). These experimenters were blind as to the risk status of the family being assessed.

During the two home visits, a large amount of data was gathered through the use of an intellectual assessment, naturalistic observations, interviews, as well as questionnaires that were filled out by the parents between the first and second visit. At the beginning of the first session, the examiner explained the overall procedure to the mother and asked her to read and sign an informed consent form (see Appendix B). Following this, the Standford-Binet Intelligence Scale (Fourth Edition; Thorndike,

Hagen, & Sattler, 1986) was administered to the child in order to assess his or her current level of intellectual functioning. During that time, the interviewer questioned the mother in order to collect information on the pregnancy and early physical health of the child, the life stresses that have affected the family since the beginning of the pregnancy, as well as the genetic profile of the families of both parents of the target child. During this first home visit, two interaction sessions between the mother and the child were videotaped. The first one was a 15-minute free-play interaction, and the second one included a free-play period, a structured puzzle task, as well as a separation and reunion task. The puzzle task, which is described in detail below, was used in the current study to assess the quality of maternal teaching. The second home visit served to complete the intellectual assessment of the child, as well as the interview with the mother. Another semi-structured interaction between the mother and the child, which was designed to assess the child's reaction to maternal unresponsiveness as well as maternal commands, also took place (A detailed description of the protocol of the study, which includes the specific instructions for the puzzle task, can be found in Appendix C).

The Puzzle Task

Before the beginning of the interaction, the examiner selected an appropriate room in the home for it to take place. A blanket (12.5 cm length x 16 cm width) was placed on the floor. A camera that was fixed on a tripod was used to record the interaction. A microphone attached to the video camera recorded mother and child verbalizations.

Before the interaction began, mothers were given a large plastic bag containing

five wooden puzzles. The puzzles varied in the number and size of their individual puzzle pieces. Mothers were verbally instructed to select a puzzle to complete with their child during a 7-minute interaction. Mothers were also told to select a second puzzle to work on if the first was completed before the end of the interaction. They were asked to limit their activities to the blanket provided. All instructions were provided in French. A beeper signaled the beginning and end of the puzzle task.

Immediately following the interaction, mothers were asked to rate the extent to which the interaction with their child had been natural and representative of their usual interactions. A scale of 1 to 4 (1 = not at all natural, 4 = very natural) was used to rate the interaction. When interactions were rated as a 2 or below, the puzzle task was videotaped again at the next home visit.

Study 1: The influence of Maternal Teaching Style and Quality of Home Environment on Preschoolers' Cognitive Functioning Within a High-Risk Sample

Method

Participants

Of the 84 participating dyads in the second cohort, four were eliminated from the current analyses because of technical difficulties when recording the teaching interaction (e.g., no sound on the tape). The remaining 80 mother-child dyads, including 43 boys and 37 girls, were used for the present analyses. Of those, 51 were comprised of female original subjects together with their offspring. Based on the original classification of mothers by their childhood peers, the present sample consisted of the following groups: aggressive (n = 8), withdrawn (n = 7), aggressive-withdrawn (n = 9), and contrast (n = 27). At the time when they were identified, 12 of these women were in grade 1, 12 were in grade 4, and 27 were in grade 7. The remaining 29 pairs of participants in this study represented the spouses of male original subjects and their child. At the time of original data collection, these men belonged to the following groups: aggressive (n = 4), withdrawn (n = 2), aggressive-withdrawn (n = 3), and contrast (n = 20). Five of these men were attending grade 1, 9 were in grade 4, and the remaining 15 males were in grade 7.

Table 1 presents the demographic characteristics of the current sample of 80 women and their children. These participants ranged in age from 25.35 to 34.06 years (M = 31.02, SD = 2.44). The children ranged in age from 3.56 to 6.12 years (M = 4.93,

Table 1

Means, Standard Deviations, and Ranges of Demographic Information (N = 80)

	Mean	Standard Deviation	Range
Mothers' current age	31.02	2.44	25.35 -34.06
Mothers' age at first child	24.48	2.98	17.35 -30.44
Children's current age	4.93	0.81	3.56 - 6.12
Maternal education	11.77	2.30	6.00 -18.00
Occupational prestige	330.60	99.48	162.00 -589.00

SD = 0.81). In terms of marital status, 37 women were married, 27 were cohabiting, 9 were single, 4 were separated, 1 was single, and 1 was widowed. Educational attainment was also obtained. Years of schooling ranged from 6 to 18 years (M = 11.77, SD = 2.30). It should be noted that in the province of Quebec, high-school graduation is equivalent to eleven years of education. Mothers' occupational prestige ratings ranged from 162 to 589 (M = 330.60, SD = 99.48). The mean prestige rating corresponds to the following types of jobs: hairdresser, cosmetologist (Nock & Rossi, 1979).

In order to assess the representativeness of the current sample, t-tests were carried out, comparing the subjects used in the present analyses to all the participants who took part in the Parent-Child Project (n = 175) and to all subjects from the Concordia High Risk Project who have become parents to date (n = 472). The samples were compared on a number of demographic variables: mothers' years of education, age at the birth of their first child, occupational prestige, income, and number of children. No significant differences were found through these analyses, which suggests that the current sample is representative of the individuals assessed during the Parent-Child data collection as well as all the participants who have had children.

The same variables were also used to compare the women who were original participants from the Concordia High Risk Project and those who represented the spouses of male original subjects. The two groups were found to differ on the measure of current family income, $t = 2.37$, $p < .05$. On average, women who were original subjects had a lower income than women who were the spouses of male participants.

Measures

Demographic Information. A Demographic Information Questionnaire (DIQ; see Appendix D) was used to gather socio-demographic information on the families participating in the study. From this questionnaire, the parents' current age, their age at the birth of their first child, marital status, educational level, current occupation, and income, as well as the number and ages of children in the family were obtained. The DIQ was generally completed over the telephone at the time when the participants were contacted to schedule the home visits.

Maternal Teaching. In order to assess the quality of maternal teaching style, each mother-child interaction during the puzzle task was rated using the Maternal Teaching Observation System (MTOS; Saltaris & Samaha, 1998). The MTOS was designed to study scaffolding patterns in the context of a videotaped play session. Although it was based on previous coding systems (Pratt et al., 1988, 1992), the MTOS mainly represents the original work of the researchers involved in this project. The use of this coding system required that each teaching interaction be viewed twice. During the first viewing, global ratings, which were intended to capture the interactional style of members of the dyad and their contribution to the completion of the task, were made. These included attempts to stimulate the child intellectually, maternal sensitivity to the child's needs, directive style, as well as the child's involvement in the task and his or her level of success. During the second viewing, the occurrence of specific maternal teaching behaviors was recorded after each 15-second interval of the interaction. These behaviors

included suggestions/strategies, non-verbal directives, labels/descriptions, questions, maternal physical intervention in the task, praise, and negative comments and actions (see Appendix E for the operational definitions of the codes included in the MTOS, as well as procedural details).

Quality of the Home Environment. The preschool version of the Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley, 1984) was administered to each participating family as a measure of the support and stimulation offered to the child in the home. This frequently used scale contains 55 yes/no items clustered into eight subscales: (a) toys and learning materials (e.g., child has toys or games that help teach numbers), (b) language stimulation (e.g., child is encouraged to learn the alphabet), (c) physical environment (e.g., building appears safe and free of hazards), (d) responsivity (e.g., parent caresses, kisses, or cuddles child during the visit), (e) stimulation of academic behavior (e.g., child is encouraged to learn to read a few words), (f) modeling (e.g., TV is used judiciously), (g) variety of stimulation (e.g., child has been taken to a museum during the past year), and (h) acceptance (e.g., parent neither slaps nor spanks the child during the visit). An overall score for the quality of the home environment was computed by adding the number of yes responses; the higher the score, the higher the quality of the home environment.

The psychometric properties of the HOME Inventory have been shown to be good. For example, the internal consistency estimate for the preschool version of the HOME was .93 (Luster & Dubow, 1992). Evidence supporting the predictive validity of

this instrument comes from its strong correlations with children's intellectual and language development during the preschool years (Bradley & Rock, 1985). These findings have been replicated using samples from various socio-economic backgrounds, and the effect of home environment usually remains significant even when family SES is partialed out of scores on tests of intellectual functioning (Gottfried, 1984).

Maternal Depressive Symptoms. Depressive symptomatology in mothers was assessed using the depression subscale of the Symptom Checklist (SCL-90; Derogatis, Lipman, & Covi, 1973). This instrument is a 90-item self-report symptom inventory, which captures the level of discomfort caused by a number of symptoms. It is intended to measure symptomatology within a community sample. Individuals were asked to rate the severity of each of ninety psychological or somatic symptoms on a five-point distress scale (from "not-at-all" to "extremely"). The symptom dimensions were Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Paranoid Ideation, and Psychoticism. Three global indices were also obtained using the SCL-90. These were the Global Severity Index (GSI), the Positive Symptom Distress Index (PSDI), and the Positive Symptom Total (PST). The depression subscale, which was used in the present study, includes items related to dysphoric mood, lack of motivation, loss of energy, and feelings of hopelessness. This subscale has been shown to have very good internal consistency (.90) and high convergent validity when administered along with the MMPI to a group of psychiatric outpatients (Derogatis, Rickels, & Rock, 1976).

Current Parenting Stress. The level of stress experienced by the mothers participating in the current study was assessed using the Parenting Stress Index (PSI-III; Adibin, 1990). This self-report instrument was designed to measure the amount of stress experienced by individuals in relation to their parenting roles and responsibilities. The development of this scale was based on the assumption that the total stress a parent experiences is a function of certain salient child characteristics (i.e., level of activity, demandingness), parental characteristics (i.e., isolation, depression, lack of social support), and situational characteristics directly related to the role of being a parent. The kinds of stressors included in this measure include difficult life events such as the death of a family member or loss of job, the parent's judgment of the child's distractability, and the parent's subjective feelings of being trapped by his or her parenting responsibilities. Items can be grouped into two major scales, the child domain and the parent domain. A total score measuring the global parenting stress can also be calculated. This total parenting stress score was used in the current study.

Internal consistency coefficients for each subscale range between .70 and .84, while the reliability coefficients for the two domains and the total stress scale are .90 or above (Adibin, 1995). Test-retest reliability has also been assessed in various studies, and the results of these studies generally indicate correlation coefficients of around .80 over a period of three weeks (Hamilton, 1980; Zakreski, 1983).

A number of investigations have addressed the external validity of the Parenting Stress Index. In general, these studies support the notion that using this scale enables investigators to identify families living under stressful circumstances, for example

families with children suffering from developmental delays and mental retardation (Cameron & Orr, 1989; Orr, Cameron, & Day, 1991), children born prematurely (Zazreski, 1983), as well as children with behavioral problems, such as conduct disorder, aggression, and attention-deficit disorder (Beck, Young, & Tarnowski, 1990). As well, the PSI was able to identify parents who were at risk for child neglect or abuse (Ethier, Lacharite, & Couture, 1993; Mash, Johnston, & Kovitz, 1983) and depressed mothers (Gelfand, Teti, & Fox, 1992).

Children's Cognitive Functioning. A French translation of the Standford-Binet Intelligence Scale (SB-IV; Thorndike et al., 1986) was administered to all participating children. This standardized test was developed to assess the intellectual functioning of individuals aged 2 to 23 years old. A hierarchical model of intelligence was used to guide the construction of this 15-subtest instrument, which postulates a general intelligence factor (g) as well as more specific factors (i.e., verbal reasoning, abstract/visual reasoning, quantitative reasoning, and short-term memory). The specific subtests administered to calculate the total and factor scores depend on the age of the child being assessed. The subtests administered to children aged 2 to 7 years old, and therefore used in the present study, were the following: (a) verbal reasoning: vocabulary, comprehension, absurdities; (b) abstract/visual reasoning: pattern analysis, copying; (c) quantitative reasoning: quantitative; and (d) short-term memory: bead memory, memory for sentences.

In the present study, it was decided that these different area scores would be

considered as outcome variables along with the overall IQ score. The goal was to examine the predictors of general intellectual functioning, as well as to explore the predictors of more specific cognitive abilities. However, the memory for sentences subtest was excluded from the analyses and the short-term memory area score was based on performance on the bead memory subtest only. The review of test scores from the participants highlighted generalized poor performance on the memory for sentences subtest. One likely contributing factor to the children's performance was the fact that the French translation of the SB-IV has been standardized based on norms collected in France. Yet, there are well-established differences in the structure and grammar of the French language as used in France and Quebec, which may have disadvantaged the children in the current study. As a result, including the memory for sentences subtest in the overall and area scores may have led to an underestimation of the children's true ability. Because of this decision to not include this subtest, the short-term memory area score and total score had to be prorated.

Thorndike et al. (1986) indicated that the composite score of the SB-IV and the area scores have excellent reliability; the median internal consistency estimate of the composite score being .97. Although the reliabilities for the subtests are less satisfactory (they range from .73 to .94), they are still adequate. Comparisons of scores obtained on the SB-IV and other individual intelligence tests have provided support for the concurrent validity of this instrument. For instance, using a sample of 175 children (mean age of 7 years) from relatively advantaged backgrounds, Thorndike et al. (1986) showed that the correlation between the composite score of the SB-IV and the global achievement score

of the Kaufman Assessment Battery for Children (K-ABC; Kaufman & Kaufman, 1983) was .89.

Interrater Reliability

In the present study, quality of maternal teaching was assessed based on recordings of mother-child interactions during a structured puzzle task, which were subsequently coded using the Maternal Teaching Observation System. Two coders were trained in the use of the MTOS. The coders were the developers of the coding system: the author and an undergraduate honours student. They were blind to the group membership and demographic characteristics of the dyads observed. Training on the MTOS was done by learning the molecular (global ratings) and microanalytic (frequency of occurrence) codes, and practicing coding several sample videotapes. Interrater agreement was assessed at several points during the training, by computing pearson correlation coefficients between the first and second rater's data. Official coding began only when per category agreement between the two raters was 75% or better.

To assess interrater reliability, 16 of the 80 (20%) mother-dyad interactions, which were randomly selected, were double-coded. The general procedure for coding videotapes was identical to the procedure followed during the training phase. As illustrated by Table 2, per category agreement coefficients ranged from .62 to .98.

Table 2

Interrater Reliability Correlation Coefficients for the Teaching Variables

Variable	Reliability Coefficient
Maternal sensitivity	.88
Maternal cognitive stimulation	.92
Child involvement	.62
Child success	.98
Suggestions/strategies	.80
Non-verbal directives	.96
Labels/descriptions	.80
Questions	.80
Physical intervention	.92
Praise	.82
Negative comments and actions	.88
Directive style	.85

Note: The coefficients represent correlation coefficients. They are all statistically significant at the .01 level.

Results

Data Screening

Before conducting statistical analyses on the data collected, all records were checked for accuracy of data and the presence of missing values. It was discovered that in the case of three variables, namely maternal educational attainment, parenting stress, and home environment, values for 4 cases were missing. Further examination of the data indicated that there was no overlap between the cases for which data was missing. The likelihood of a systematic bias in the data was therefore considered to be small. As a result, it was decided to substitute missing values by the group mean on that variable. Mean substitution is considered to be a conservative approach of dealing with missing data (Tabachnick & Fidell, 1996).

Next, descriptive statistics were conducted to evaluate the normality of the distribution of each variable, to assess the presence of outliers, and to determine if significant skewness and/or kurtosis were present. The income, parenting stress, and home environment variables were found to be somewhat negatively skewed. In all cases, a square root transformation was successful in normalizing the distribution. No univariate or multivariate outliers were found in the data.

Preliminary Analyses

Given the small size of the sample available for the current study, it was deemed necessary to reduce the number of teaching variables to be included in the analyses. The first attempt at data reduction consisted of examining the frequency distributions of all

the teaching variables. Very low frequency variables whose distributions were severely skewed were dropped from the analyses. The variables affected by this decision were maternal directive style as well as negative comments and actions. Next, intercorrelations between the remaining variables were ran in order to assess the extent to which they were related (see Table 3 for a presentation of these correlations). Since this matrix included a number of sizable correlations, it was considered appropriate to perform a factor analysis in order to help distinguish an optimal teaching style. Indeed, Tabachnick and Fidell (1996) indicated that in order to perform a factor analysis, several correlations should exceed .30. This requirement was met in the present study.

Maternal attempts to stimulate her child intellectually was kept as a separate variable because of its presumed theoretical relevance to the concept of scaffolding. Indeed, this molecular code was intended to capture the extent to which the mother made efforts during the puzzle task to stimulate her child above his/her current level of ability, while providing sufficient support and guidance in order to help the child complete the task. A principal components factor analysis was conducted on the remaining teaching variables. One factor was retained (this factor had an eigenvalue of 2.71 and explained 54.1% of the variance). The variables included in the factor described an optimal teaching style, which consisted of maternal sensitivity, provision of suggestions, non-verbal directives, praise, and restraint from physical involvement in the task. See Table 4 for the factor loadings of each of the variables included in the teaching style factor. Thus, the two teaching variables that were considered for inclusion in final analyses were maternal attempts to stimulate her child intellectually and optimal teaching style.

Table 3

Intercorrelations Between Teaching Variables (N = 80)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Maternal sensitivity	--	.24*	.28*	.45**	.40**	.29**	.28*	-.59**	.47**	.60**
2. Child involvement		--	.26*	.08	.04	.08	-.12	-.09	.06	.02
3. Child success			--	.13	.12	-.06	-.09	-.34**	.22 ^{t}	.13
4. Maternal suggestions				--	.28*	.10	.15	-.49**	.38**	.37**
5. Maternal non-verbal suggestions					--	.39**	.10	-.32**	.33**	.23*
6. Maternal labels/descriptions						--	.29**	-.11	.21 ^{t}	.22*
7. Maternal questions							--	-.15	.34**	.57**
8. Maternal physical implication								--	-.50**	-.51**
9. Maternal praise									--	.57**
10. Maternal stimulation										--

Note. ^{t} $p < .10$, * $p < .05$, ** $p < .01$.

Table 4

Factor Loadings of the Variables Included in the Teaching Factor

Variables	Factor Loadings
Maternal sensitivity	.66
Suggestions	.50
Non-verbal directives	.36
Physical implication	-.66
Praise	.53

Other preliminary analyses were ran on the data to assess the presence of multicollinearity or singularity problems (correlation values greater than .90 between two variables). Intercorrelations among the predictors were first examined. As can be seen in Table 5, most correlations are in the small to moderate range (r = .00 to .59). The exception is the correlation between maternal teaching style and cognitive stimulation, with a value of .78. Although this value does not reflect the presence of multicollinearity per se, Tabachnick & Fidell (1996) recommended not including redundant variables in the same analysis because they inflate the likelihood of error and weaken the analysis. As well, the limited sample size imposed limitations on the number of predictors that could be included in final analyses. Consequently, it was decided that one of these two variables would be dropped from subsequent analyses. Because of its theoretical relevance to the concept of scaffolding, the cognitive stimulation variable was retained for further inquiry and the optimal teaching style variable was dropped. Intercorrelations among dependent variables were also examined. Table 6 presents these values. As expected, the correlations between the children's total score and specific abilities were relatively high (.63 to .78). On the SB-IV, the total score is calculated based on the scores on the different areas of intellectual functioning. Although including the overall and the area scores in the analyses was likely to create some redundancy in the findings, it was considered important to keep both sets of scores in order to be able to assess whether the predictors considered made similar or specific contributions to each of the children's abilities. As well, since the variables were not multicollinear or singular, the likelihood of a statistical inflation of error due to the inclusion of these variables was

Table 5

Intercorrelations Between Predictors of Children's Cognitive Functioning (N = 80)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Maternal education	--	.48**	.05	.04	.00	-.15	-.27*	.10	.17	.59**
2. Current family income		--	.02	.12	-.09	-.01	-.18	-.01	.10	.51**
3. Child's age			--	-.03	.08	-.17	-.01	-.40**	-.48**	.00
4. Child involvement				--	.05	.08	.20^{t}	-.20	-.05	.06
5. Child gender					--	-.06	.02	-.04	.05	-.08
6. Parenting stress						--	.56**	.02	.09	-.43**
7. Maternal depression							--	-.12	-.06	-.25*
8. Cognitive stimulation								--	.78**	.26*
9. Teaching style									--	.21^{t}
10. Home environment										--

Note. ^{t} $p < .10$, * $p < .05$, ** $p < .01$.

Table 6

Intercorrelations Between Measures of Children's Cognitive Functioning (N = 80)

	1.	2.	3.	4.	5.
1. Total IQ score	--	.65**	.78**	.76**	.63**
2. Verbal reasoning		--	.44**	.42**	.19^{t}
3. Abstract/visual reasoning			--	.44**	.34**
4. Quantitative reasoning				--	.29**
5. Short-term memory					--

Note. ^{t} $p < .10$, * $p < .05$, ** $p < .01$.

relatively small.

Finally, correlations between the predictors and the outcome variables were examined and are presented in Table 7. When considered along with the other correlation matrices, this table highlights the fact that certain variables that were considered for inclusion in the model were unrelated to the main constructs studied. Given the necessity of reducing the number of predictors in order to avoid inflation of error, a few variables were dropped from further inquiry. First, comparing the two measures of maternal distress (i.e., maternal depression and parenting stress), it was found that maternal depression was not significantly correlated with any of the child functioning outcomes, whereas parenting stress was related. Since there was a rather large overlap between the two variables ($r = .56$), only the parenting stress variable was retained. As well, the correlation matrices illustrated the fact that child gender was unrelated to all of the variables of interest. Therefore, this variable was not used in final analyses.

Design

Statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS; Norussis, 1990). Hierarchical multiple regression analyses were chosen to analyze the data mainly because they allow for the examination of the specific contribution of a given predictor, while partialling out the effect of other independent variables. Using this approach, it was possible to test the variables according to the hypotheses presented, and to examine whether certain critical variables added variance to a prediction equation after other variables have already been entered into the equation.

Table 7

Correlations Between Predictors and Measures of Children's Cognitive Functioning (N = 80)

	Total Score (SB-IV)	Verbal Reasoning	Abstract/ Visual Reasoning	Quantitative Reasoning	Memory Reasoning
1. Maternal education	.33**	.36**	.30**	.24*	.13
2. Current income	.10	.21**	.06	.02	.08
3. Child age	.04	-.02	.04	.08	-.17
4. Child involvement	.04	.01	.04	.10	-.08
5. Child gender	.16	.07	.20^{t}	.16	.00
6. Parenting stress	.39	-.37**	-.41**	-.29*	-.10
7. Maternal depression	.15	-.13	-.14	-.05	-.09
8. Maternal stimulation	.28*	.30**	.21^{t}	.13	.16
9. Teaching style	.18	.19^{t}	.21^{t}	.07	.08
10. Home environment	.46**	.56**	.45**	.33**	.09

Note. ^{t} $p < .10$, * $p < .05$, ** $p < .01$

As well, this type of statistical analysis allowed us to examine whether the effect of certain variables entered early in the equation remained significant even after other variables were entered in the model. From this, it was possible to assess whether these variables have direct effects on the dependent variable, or whether their effect operated mostly through other factors.

Five regression analyses were carried out. In each regression, the predictors included were the same. This consistency enabled direct comparisons between the results of each analysis. Besides cognitive stimulation and home environment, the predictors included educational attainment, current income, and parenting stress. The age of the child at testing as well as his or her involvement during the puzzle task were also entered in the model in order to control for their possible influence on maternal behavior during the teaching interaction.

As an attempt to explore the pathway through which these various variables operate to influence children's functioning, the variables were entered into the regression equations in a chronological order. This strategy enabled to examine whether critical variables from the past of the mothers such as their educational attainment directly predicted child functioning, or whether their influence on child IQ disappeared once current intellectual stimulation was considered. In the first step, maternal educational attainment was entered. Current income was added in the second step. Child age was entered next, followed by child involvement. Finally, parenting stress, cognitive stimulation, and home environment were entered together in the last step. The goal of entering these three variables together in the last step of the equation was to allow them to

compete directly, and to assess the unique predictive power of cognitive stimulation and home environment, while taking into consideration current parenting stress. In the present study, the critical alpha level chosen was .05, but given that the size of the sample studied was relatively small, statistical effects with significance values less than .10 were considered.

Results

The following regressions were run in order to examine the influence of maternal intellectual stimulation on preschoolers' cognitive functioning. For each analysis, maternal cognitive stimulation and quality of the home environment were entered along with other family background variables that were known to predict children's intellectual functioning, as a way to assess the unique contribution of the parenting constructs. Children's overall scores on the Standford-Binet were first examined, followed by their abilities in more specific areas of intellectual functioning.

(1) Overall Intellectual Functioning. Table 8 presents the results of the regression analysis for children's total score on the Standford-Binet. Overall, the multiple R was significantly different from zero, $F(7, 72) = 4.81$, $p < .01$, and all the predictors together accounted for 25 % (Adjusted R^2 value) of the total variance in child IQ. Maternal education was entered in the first step. A main effect was found for this variable, Beta = .32, $p < .01$, and it accounted for 10 % of the variance in IQ. More educated mothers tended to have children who scored higher on the standardized test of

Table 8

Results of the Regression Equation Predicting Preschoolers' Total IQ Scores (N = 80)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Maternal education	.32	.32	3.00**		
				.10	9.00**
Step 2					
Maternal education	.35	.31	2.88**		
Income	-.06	-.06	-.52		
				.00	.27
Step 3					
Maternal education	.35	.31	2.89**		
Income	-.06	-.06	-.51		
Child age	-.05	-.06	-.49		
				.00	.24
Step 4					
Maternal education	.35	.31	2.85**		
Income	-.06	-.05	-.46		
Child age	-.05	-.06	-.50		
Child involvement	.05	.05	.43		
				.00	.19
Step 5					
Maternal education	.16	.15	1.25		
Income	-.05	-.05	-.45		
Child age	-.01	-.01	-.08		
Child involvement	.08	.10	.82		
Parenting stress	-.29	-.29	-2.54*		
Cognitive stimulation	.21	.22	1.87^t		
Home environment	.22	.18	1.55		
				.20	7.31**
	R = .56	R^2Adj = .25	F= 4.81**		

Note. ^{t} $p < .10$, * $p < .05$, ** $p < .01$.

intelligence. Current family income, the child's age at testing, and the child's involvement in the puzzle task, were entered in the second, third, and fourth step, respectively. None of these variables were found to add significantly to the variance in children's overall cognitive functioning. The effect of maternal education remained significant even after these variables were entered into the equation. In the last step, parenting stress, maternal cognitive stimulation, and quality of the home environment were entered together. These variables accounted for an additional 20% of the variance in child IQ. The educational attainment of mothers no longer represented a predictor of children's total IQ when these three predictors were entered in the last step of the regression equation, suggesting that the effect of this variable on child IQ operates through parenting variables. Parenting stress was negatively linked to children's cognitive functioning, Beta = -.29, $p < .05$. The children of women who reported high levels of stress over their parenting responsibilities were more likely than controls to receive lower scores on the Standford-Binet Scale of Intelligence. A trend was also observed for cognitive stimulation as a positive predictor of child IQ, Beta = .21, $p < .10$. Children whose mothers made efforts to stimulate during the puzzle task tended to receive higher scores on the intelligence scale. Quality of the home environment was not a significant predictor of the children's total score on the intelligence test.

(2) Verbal Reasoning. Table 9 presents the results of the regression analysis predicting children's verbal reasoning scores on the SB-IV. Together, the predictors accounted for 30% of the total variance in verbal reasoning ability, and produced a

Table 9

Results of the Regression Equation Predicting Verbal Reasoning Abilities (N = 80)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Maternal education	.36	.36	3.36**		
				.13	11.30**
Step 2					
Maternal education	.33	.30	2.73**		
Income	.06	.06	.52		
				.00	.25
Step 3					
Maternal education	.33	.30	2.73**		
Income	.06	.06	.50		
Child age	-.04	-.04	-.38		
				.00	.14
Step 4					
Maternal education	.33	.30	2.70**		
Income	.06	.06	.52		
Child age	-.04	-.04	-.38		
Child involvement	.03	.03	.28		
				.00	.08
Step 5					
Maternal education	.09	.09	.76		
Income	.05	.05	.41		
Child age	.03	.03	.26		
Child involvement	.06	.07	.62		
Parenting stress	-.22	-.23	-2.01*		
Cognitive stimulation	.23	.24	2.08*		
Home environment	.32	.27	2.34*		
				.23	8.61**
	R = .60	R^2Adj = .30	F = 5.81**		

Note. * $p < .05$, ** $p < .10$.

significant multiple R, F (7,72) = 5.81, p < .01. Maternal education, which was entered alone in the first step, accounted for 13% of the variance, Beta = .36, p < .01. The children of more educated mothers received higher scores on the verbal area than the children of less educated mothers. Current income was entered in the second step, and was not found to add to the variance in children's verbal reasoning. Similarly, age at testing and involvement in the puzzle task were not associated with verbal reasoning abilities. The effect of maternal education was found to remain significant even after these variables were entered into the equation. In the last step, the parenting variables were entered together. This block of predictors accounted for an additional 23% of the variance. Main effects were found for parenting stress, cognitive stimulation, and home environment, Beta's = -.22, .23, and .32, respectively, p's < .05. These results indicate that mothers who reported high levels of stress in relation to their parenting responsibilities were more likely to have children with lower verbal reasoning abilities. In parallel, the children of mothers who cognitively stimulated their children during the puzzle task and who provided a supportive home environment tended to have better verbal reasoning abilities, as indexed by the SB-IV. The maternal education variable became nonsignificant only when these three predictors were entered in the last step of the regression equation.

(3) Abstract/visual Reasoning. In the regression examining children's abstract/visual reasoning abilities, Table 10 indicates that the hierarchical regression accounted for 22% of the total variance. After all the predictors were entered into the

Table 10

Results of the Regression Equation Predicting Abstract/visual Reasoning Abilities (N = 80)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Maternal education	.27	.27	2.47**		
				.07	6.09*
Step 2					
Maternal education	.31	.27	2.50*		
Income	-.09	-.08	-.70		
				.01	.49
Step 3					
Maternal education	.31	.27	2.47*		
Income	-.09	-.08	-.70		
Child age	.03	.03	.24		
				.00	.06
Step 4					
Maternal education	.31	.27	2.45*		
Income	-.08	-.07	-.65		
Child age	.03	.03	.23		
Child involvement	.04	.04	.32		
				.00	.10
Step 5					
Maternal education	.10	.09	.80		
Income	-.08	-.08	-.71		
Child age	.06	.06	.51		
Child involvement	.07	.08	.69		
Parenting stress	-.29	-.29	-2.57*		
Cognitive stimulation	.17	.17	1.48		
Home environment	.25	.20	1.70^{t}		
				.21	7.12**
	R = .54	R^2Adj = .22	F = 4.21**		

Note. ^{t} $p < .10$ * $p < .05$ ** $p < .10$.

equation, the multiple R reached significance, F (7,72) = 4.21, p < .01. Maternal education, entered in the first step, was a positive predictor of the abstract/visual reasoning abilities of young children. It accounted for 7% of the variance, Beta = .27, p < .05. Income, which was entered next, did not increase the amount of explained variance. As well, child age and child involvement were not associated with children's abstract/visual reasoning abilities. The final block of predictors (parenting stress, cognitive stimulation, and home environment) accounted for an additional 21% of the variance in abstract/visual reasoning abilities. A main effect was discovered for parenting stress, Beta = -.29, p < .05. Women who reported high levels of stress concerning their parenting responsibilities were more likely to have children who had weaker abstract/visual reasoning abilities. A trend was also observed for home environment, Beta = .25, p < .10. Children who benefited from more stimulating home environments were likely to score higher on the subscales of the SB-IV measuring abstract/visual abilities. Cognitive stimulation during the puzzle task did not add to the prediction of abstract/visual reasoning ability. Again, maternal education became nonsignificant once the last three predictors were entered into the regression model.

(4) Quantitative Reasoning. Table 11 presents the results of the regression equation predicting children's quantitative reasoning abilities. Overall, the predictors accounted for 10% of the total variance, and produced a significant multiple R, F (7, 72) = 2.21, p < .05. Maternal education was entered in the first step and accounted for 5% of the variance, Beta = .23, p < .05. Children of more educated mothers were

Table 11

Results of the Regression Equation Predicting Quantitative Reasoning Abilities (N = 80)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Maternal education	.23	.23	2.10*		
				.05	4.40*
Step 2					
Maternal education	.28	.25	2.30*		
Income	-.12	-.11	-.95		
				.01	.90
Step 3					
Maternal education	.28	.25	2.26*		
Income	-.12	-.11	-.94		
Child age	.06	.07	.58		
				.00	.34
Step 4					
Maternal education	.28	.25	2.24*		
Income	-.11	-.10	-.83		
Child age	.06	.06	.55		
Child involvement	.10	.10	.88		
				.01	.78
Step 5					
Maternal education	.13	.11	.95		
Income	-.11	-.11	-.90		
Child age	.08	.08	.68		
Child involvement	.12	.13	1.11		
Parenting stress	-.18	-.17	-1.50		
Cognitive stimulation	.11	.10	.85		
Home environment	.20	.15	1.26		
				.10	2.87**
	$R = .42$	$R^2Adj = .10$	$F = 2.21$**		

Note. * $p < .05$, ** $p < .01$.

likely to have better quantitative reasoning abilities than children of less educated women. Current income, child age, and child involvement in the task were entered in separate steps, and they were not found to add to the variance in quantitative reasoning. In the last step, parenting stress, cognitive stimulation, and home environment were entered together. They accounted for an additional 10% of the variance in quantitative reasoning. No main effects were however discovered. Maternal education became non-significant only after the last block of predictors was entered in the model.

(5) Short-Term Memory. As shown in Table 12, the predictors entered into the regression equation predicting short-term memory abilities did not produce a significant Multiple R. The total variance explained by the model was .01, and none of the variables emerged as significant predictors.

Summary of Findings

With the exception of children's short-term memory abilities, the results of the first study suggested that within a high-risk sample, parental intellectual stimulation, measured as the quality of direct maternal cognitive stimulation and overall home environment, was involved in the prediction of preschoolers' cognitive functioning. These findings emerged even when controlling for the effect of other factors that are normally found to impact on child IQ, namely maternal education, current SES, and parenting stress. In this study, maternal education represented a positive predictor of child functioning. Current SES, child age, and child involvement were unrelated to child

Table 12

Results of the Regression Equation Predicting Short-term Memory Abilities (N = 80)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Maternal education	.13	.13	1.140		
				.02	1.31
Step 2					
Maternal education	.12	.10	.90		
Income	.03	.03	.23		
				.00	.05
Step 3					
Maternal education	.12	.11	.98		
Income	.03	.03	.23		
Child age	-.17	-.18	-1.56		
				.00	.34
Step 4					
Maternal education	.13	.11	.99		
Income	.02	.02	.15		
Child age	-.17	-.17	-1.53		
Child involvement	-.07	-.07	-.63		
				.00	.39
Step 5					
Maternal education	.14	.11	.94		
Income	.06	.06	.47		
Child age	-.15	-.14	-1.18		
Child involvement	-.06	-.06	-.50		
Parenting stress	-.15	-.13	-1.15		
Cognitive stimulation	.12	.11	.93		
Home environment	.12	.08	.70		
				.03	.66
	R = .28	R^2Adj = -.10	F = .87		

IQ. Finally, the level of parenting stress reported by mothers was consistently negatively predictive of children's cognitive abilities.

Examining the children's cognitive abilities separately allowed to make important distinctions between the relative contribution of maternal cognitive stimulation and home environment to the intellectual performance of the children taking part in this research project. In particular, maternal cognitive stimulation in a specific context was related to children's overall functioning as well as their verbal abilities, while the quality of the home environment was revealed as a predictor of the children's verbal and abstract/visual abilities. None of the parenting variables examined in the current study were useful in explaining quantitative and short-term memory abilities.

Study 2: Childhood History of Aggression and Social Withdrawal as Predictors of Maternal Teaching Style and Quality of the Home Environment

The findings of Study 1 illustrated that within a high-risk sample, parenting variables represented an important predictor of the cognitive functioning of young children. The next step in gaining an understanding of the mechanisms underlying the transfer of risk across generations was to assess whether maternal childhood risk status was related to parenting abilities, specifically the intellectual stimulation provided to offspring. This question was the focus of the second study, which is described below.

Method

Participants

For this study, only the women who were original participants of the Concordia High Risk Project were included. The total sample size was 51 mothers together with their preschool-aged offspring. Because of limitations due to the small sample size, the four risk classifications (i.e., aggressive, withdrawn, aggressive-withdrawn, and control) were not used as separate groups in the present study. Instead, mothers' childhood scores on the dimensions of aggression and withdrawal were used as predictors, and these variables were treated as continuous variables. The *z*-scores for aggression and withdrawal of the women in the current sample were found to be normally distributed.

In terms of demographic characteristics, mothers included in this sample ranged in age from 26.05 to 34.03 years (M = 30.83, SD = 2.5). Their children, 26 boys and 25 girls, ranged in age from 3.56 years to 6.12 years (M = 4.93, SD = .82). In terms of marital status, 26 were married, 12 were cohabiting, 8 were single, 2 were separated, 1 was divorced, and 1 was widowed. As an indication of the socio-economic status of these women, educational attainment and occupational prestige were obtained. Years of education ranged from 6 to 17 years (M = 11.5, SD = 2.17). Mothers' occupational prestige ratings ranged from 240 to 589 (M = 328.72, SD = 101.91). The mean occupational prestige corresponds to jobs such as cashier or sales clerk. These demographic characteristics are presented in Table 13.

In order to assess the representativeness of this sample of female original subjects compared to all women of the Concordia High Risk Project who have children (n = 303), a number of t-test analyses were carried out. The women were compared on their childhood levels of aggression and withdrawal, their education, age at first child, number of children, current income, and occupational prestige. No significant differences were uncovered through these analyses.

Measures

Most of the measures used for this study were already described in the context of the first study. The exception was the socio-economic status of the family of origin of the participants, which was measured using the Household Prestige Scale (Nock & Rossi,

Table 13

Means, Standard Deviations, and Ranges of Demographic Information (N = 51)

	Mean	Standard Deviation	Range
Mothers' current age	30.83	2.50	26.05 - 34.03
Mothers' age at first child	23.99	3.17	17.35 - 30.44
Children's current age	4.93	0.82	3.56 - 6.12
Maternal education	11.50	2.17	6.00 - 17.00
Occupational prestige	328.72	101.91	240.00 - 589.00

1979). This instrument uses the occupational status information available on adult members of the household in order to compute the prestige code. This measure has been shown to exhibit good test-retest reliability ($r = .87$) (Nock & Rossi, 1979).

Results

Data Screening

Prior to data analysis, all the variables in the current study were screened for accuracy of data entry and presence of missing values. The variable measuring the childhood socio-economic status of the family of origin included six missing values. As well, two values were missing on the parenting stress and home environment variables. Examination of the data allowed us to establish that there was no overlap between the cases for which data was missing; therefore, it was concluded that there was little chance of a systematic bias being present in the data. Cases with missing values were replaced by the mean of the group on that particular variable. Next, a descriptive analysis of the data was performed on all variables in order to determine if transformations were necessary to correct for skewness and/or kurtosis of the distributions, as well as to assess the presence of univariate and multivariate outliers. The income, parenting stress, and home environment variables were somewhat negatively skewed; a square root transformation was successful in normalizing the distribution.

Preliminary Analyses

The limited size of the sample available for this second study imposed restrictions

on the number of predictors that could be included in the regressions predicting cognitive stimulation and home environment. Since the primary goal of this study was to assess the relationship between maternal risk status and scaffolding strategies during the puzzle task as well as quality of the home environment, childhood levels of aggression and withdrawal were included. Further, it was considered important to examine the interaction between aggression and social withdrawal, since previous studies from the Concordia High Risk Project suggested that individuals with high levels of both childhood aggression and social withdrawal may be most at risk for psychosocial difficulties and transmission of problems to offspring.

Another major focus of the study was to examine potential pathways through which the childhood behavioral tendencies influenced current provision of intellectual stimulation. Consequently, a number of markers of psychosocial adjustment were considered for inclusion. Specifically, the socio-economic status of the family of origin of the mothers was used as an indication of the resources available during the upbringing of the high-risk participants. The influence of maternal educational attainment was also considered given the well-established link between this variable and parenting abilities. Further, the age of the mother when she had her first child was considered because women who become parents at an early age have been found to be less nurturing and to have lower quality interactions with their children (Culp et al., 1988). In terms of current factors that were expected to be relevant to parenting, parenting stress was included because of its frequently demonstrated link with quality of parenting.

Finally, two control variables were included in the analyses. In the regression

predicting maternal cognitive stimulation, child age was considered to be important given the age range of the participants included in the current sample (42 to 72 months). It was deemed likely that the interactional style of the mothers would vary according to the developmental stage of the child. In the regression predicting home environment, the current economic status of the family was included as a control variable, since previous studies had shown that financial resources affect the stimulation and support provided to the child in the home (Gottfried, 1984).

Patterns of correlations among the predictors and the outcome variables were examined and are presented in Tables 14 and 15. The correlation between the two dependent variables, cognitive stimulation and home environment, was significant ($r = .32$, $p < .05$). Due to the limited sample size, including all the potential predictors in the final analyses would have increased the likelihood of error. In an effort to reduce the number of predictors, a series of preliminary regression analyses were conducted. The results of these analyses indicated that both the interaction between aggression and withdrawal and the age of the mother at first child did not predict intellectual stimulation. These variables were therefore not included in the final analyses.

Design

As an attempt to explore the pathways through which the various predictors included in the model interacted to impact on parenting abilities, variables were entered in a chronological order. This strategy was helpful in addressing the question of whether mothers' childhood risk status had a direct impact on cognitive stimulation and home

Table 14

Intercorrelations Between Predictors of Intellectual Stimulation (N = 51)

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Childhood aggression	--	.06	.83**	-.06	-.23	-.41**	.31*	-.11	.08
2. Childhood withdrawal		--	.56**	-.04	-.16	-.27^{t}	.17	-.24^{t}	.10
3. Aggression x Withdrawal			--	-.03	-.33*	-.47**	.34*	-.23	.11
4. Childhood SES				--	.02	.34*	.06	.12	-.21
5. Age at first birth					--	.41**	-.05	.17	-.25^{t}
6. Maternal education						--	-.14	.40**	-.10
7. Parenting stress							--	-.10	-.08
8. Current family income								--	-.08
9. Child's age									--

Note. ^{t} $p < .10$, * $p < .05$, ** $p < .01$.

Table 15

Correlations Between Predictors and Measures of Intellectual Stimulation (N = 51)

	Cognitive Stimulation	Home Environment
1. Childhood aggression	-.32*	-.36*
2. Childhood withdrawal	.02	-.33*
3. Aggression x Withdrawal	-.23	-.46**
4. Childhood SES	.30*	.08
5. Age at first child	-.09	.40**
6. Maternal education	.19	.60**
7. Parenting stress	-.01	.45**
8.Current family income	.01	.39**
9. Child age	-.38**	.14

Note. * $p < .05$, ** $p < .01$.

environment, or whether its effect was mediated by other factors that were measured later in the women's lives, such as educational attainment or current parenting stress. Childhood aggression, social withdrawal, and SES of the family of origin were entered together in the first step. These variables were entered in the first block before the other predictors for two major reasons. First, they were obtained several years prior to the other variables included in the model. As well, as outlined by Tabachnick and Fidell (1989), independent variables that are presumed to be logically or causally prior are given priority of entry. Maternal educational attainment was entered next. In the final step, parenting stress was entered along with the control variable, namely child age in the case of maternal cognitive stimulation and SES in the case of home environment.

Results

The following regressions were run in order to assess the contribution of childhood risk status on mothers' current ability to stimulate their preschool-age children during a structured teaching interaction as well as in the context of the home environment. Possible mediating variables were included in the analyses in order to examine pathways through which risk status influenced parenting behavior.

(1) Maternal Cognitive Stimulation. In the regression examining mothers' cognitive stimulation during the puzzle task, Table 16 indicates that the total variance accounted for by the hierarchical regression was 18%. Together, the predictors combined to produce a significant multiple R, $F(6, 44) = 2.78$, $p < .05$. The first block of

Table 16

Results of Hierarchical Regression Analysis Predicting Cognitive Stimulation (N = 51)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Aggression	-.31	-.32	-2.30*		
Withdrawal	.05	.05	.35		
Childhood SES	.26	.28	1.98^t		
				.17	3.28*
Step 2					
Aggression	-.31	-.29	-2.10*		
Withdrawal	.05	.05	.32		
Childhood SES	.27	.26	1.86^t		
Maternal education	.00	.00	-.03		
				.00	.00
Step 3					
Aggression	-.30	-.29	-2.02*		
Withdrawal	.07	.08	.52		
Childhood SES	.20	.21	1.44		
Maternal education	.00	.00	.00		
Child age	-.32	-.35	-2.43*		
Parenting stress	.03	.04	.24		
				.10	3.09*
	R = .52	R^2Adj = .18	F = 2.78*		

Note. $^t p < .10$, * $p < .05$, ** $p < .01$

predictors, which included childhood aggression, social withdrawal, and SES of the family of origin accounted for 17% of the variance. Childhood levels of aggression emerged as a significant predictor of cognitive stimulation, Beta = -.31, $p < .05$. Mothers identified as highly aggressive in childhood were less likely to stimulate their child intellectually during the structured puzzle task. Although it did not reach statistical significance, SES of the family of origin was positively related to maternal cognitive stimulation, Beta = .26, $p < .10$. That is, women who came from more advantaged backgrounds were more likely to provide cognitive stimulation to their preschool-age children. Childhood levels of social withdrawal did not emerge as a significant predictor of cognitive stimulation. Maternal education was entered in the second step. This variable did not add to the variance in cognitive stimulation. History of aggression and childhood SES still contributed to levels of cognitive stimulation even when controlling for the effect of maternal educational attainment. Child age and parenting stress were entered together in the last step. Child age emerged as a significant predictor of cognitive stimulation, Beta = -.32, $p < .05$. Mothers of younger children were more likely to provide cognitive stimulation than mothers of older children. Parenting stress, however, did not add to the variance in maternal cognitive stimulation. When all the variables were entered in the regression equation, childhood aggression still significantly predicted provision of cognitive stimulation, while SES of the family of origin no longer contributed to the prediction of maternal cognitive stimulation.

(2) Quality of Home Environment. Table 17 presents the results of the

Table 17

Results of Hierarchical Regression Analysis Predicting Home Environment (N = 51)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Aggression	-.34	-.35	-2.59*		
Withdrawal	-.30	.33	-2.36*		
Childhood SES	.04	.05	.33		
				.22	4.44*
Step 2					
Aggression	-.14	-.16	-1.11		
Withdrawal	-.17	-.21	-1.45		
Childhood SES	.12	.14	.96		
Maternal education	.53	.50	3.90**		
				.19	15.18**
Step 3					
Aggression	-.05	-.06	-.40		
Withdrawal	-.11	-.15	-1.00		
Childhood SES	.09	.12	.80		
Maternal education	.48	.47	3.52**		
Current Family income	.14	.17	1.17		
Parenting stress	-.31	-.38	-2.72**		
				.10	4.41*
	R = .72	R^2Adj = .45	F = 7.69**		

Note. * $p < .05$, ** $p < .01$

hierarchical regression equation predicting quality of the home environment. Together, the predictors accounted for 45% of the total variance in home environment, and produced a significant multiple R, F (6, 44) = 7.69, p < .01. The first block of predictors, which included childhood levels of aggression and social withdrawal, as well as the SES of the family of origin, accounted for 22% of the variance in home environment. Both aggression and social withdrawal were negatively related to quality of home environment, Beta's = -.34 and -30, p's < .05, respectively. Mothers with childhood histories of aggression or social withdrawal were less likely to provide a good home environment for their children. The SES of the family of origin did not contribute to the prediction of home environment. Maternal education was entered in the second step, and it accounted for an additional 19% of the variance, Beta = .52, p < .01. More educated mothers provided a better home environment for their children than less educated women. Once maternal education was entered in the model, levels of aggression and social withdrawal no longer predicted quality of home environment. The final block of predictors, which included income and parenting stress, accounted for an additional 10% of the variance. Parenting stress emerged as a significant predictor of home environment, Beta = -.31, p < .01. Mothers who reported experiencing high levels of stress in relation to their parenting responsibilities were less likely to provide a good home environment to their children. Current income did not add to the explained variance in home environment. Interestingly, the effect of maternal education remained significant even when all other predictors were entered into the equation.

Summary of Findings

The findings of the second study highlight the importance of considering the psychosocial history of mothers when trying to explain their current ability to stimulate their offspring. Indeed, although they were measured more than twenty years apart, childhood behavioral tendencies were predictive of both cognitive stimulation in a teaching task and overall quality of the home environment. Interestingly, the results indicated the presence of a direct effect of childhood risk status on maternal behavior during a structured teaching interaction. In contrast, the influence of risk status on provision of a good home environment appeared to operate through its relationship with psychosocial experiences affecting the life-course of high-risk women, namely levels of education and parenting stress.

General Discussion

The goal of the current research project was to examine the intellectual stimulation provided by high-risk parents to their preschool-age children as a potential mediating variable in the transmission of risk across generations. The model of intergenerational transfer of risk suggests that problem dispositions developed in childhood affect adult relationships. For example, it is thought that high-risk individuals are likely to exhibit parenting difficulties, which may in turn affect the development of their offspring (Caspi & Elder, 1988a, 1988b; Elder et al., 1986). The results of previous studies conducted within the Concordia High Risk Project suggested that individuals with a childhood history of aggression and/or social withdrawal were at risk for experiencing a number of psychosocial difficulties throughout their lives, and tended to exhibit problematic parenting behaviors such as unresponsiveness and hostility (Bentley et al., 1998; Cooperman, 1996). It was also shown that the offspring of these high-risk individuals were likely to experience problems of development, such as behavioral maladjustment (Cooperman, 1996; Serbin et al., 1996; Serbin et al., 1998).

No study to date has specifically focused on the intellectual stimulation provided by the participants of the Concordia High Risk Project to their preschool-age children. By measuring the quality of maternal teaching and home environment, the present study served to explore whether these factors were involved in the prediction of the cognitive development of young children. The contribution of the mothers' childhood history of aggression and social withdrawal to their parenting skills measured about twenty years

later was also explored. These research questions were addressed while taking into consideration other socio-demographic and family risk factors, in order to examine the processes through which risk for psychosocial problems may be transmitted from one generation to the next.

In general, support was obtained for the notion that within a high-risk sample, the quality of parenting influences children's cognitive functioning. Cognitive stimulation and home environment both contributed to the explanation of children's cognitive functioning, although differences in the predictive power of these two variables emerged when considering the various cognitive abilities of the children. Intellectual stimulation was a predictor of child IQ even when controlling for the effect of other important socio-demographic predictors of cognitive functioning such as maternal education, current SES, and parenting stress. Some association was also found between mothers' childhood risk status and their ability to stimulate their children intellectually as well as provide them with a good home environment. That is, mothers' childhood level of aggression emerged as a significant negative predictor of both cognitive stimulation provided during a structured puzzle task and home environment. Childhood withdrawal was negatively related to the quality of home environment. An interesting distinction emerged between the pathways through which childhood risk status influenced current maternal use of scaffolding techniques and home environment. Indeed, it appeared that childhood problem dispositions had a direct impact on maternal behavior during the interaction, while their influence on the quality of the home environment may have operated through low educational attainment and current parenting stress. This distinction highlights the

possibility that transmission of risk from one generation to the next simultaneously occurs through direct and indirect pathways.

The amount of explained variance in both child IQ and parenting style was relatively good, especially considering the fact that the predictive power of psychosocial predictors is known to be limited. As well, the fact that current parenting could even be predicted from mothers' childhood psychosocial problems was impressive, given the time lag between the identification of the behavioral tendencies and the collection of the intellectual stimulation variables.

Study 1: The Influence of Maternal Teaching Style and Quality of Home Environment on Preschoolers' Cognitive Functioning Within a High-Risk Sample

The purpose of the first study was to examine the extent to which parental stimulation, in the form of scaffolding and enriched home environment, influenced the cognitive functioning of young high-risk children. The study was designed in order to assess whether the parenting variables predicted child functioning beyond other factors that have been shown to be related to child IQ, such as maternal education, current SES, and parental stress. In order to gain a complete understanding of the factors predicting child IQ, the overall cognitive functioning of the children was first examined, followed by their scores on different areas of intellectual performance (i.e., verbal, abstract/visual, quantitative, and short-term memory).

With the exception of short-term memory abilities, the block of parenting variables, which included maternal cognitive stimulation, home environment, and

parenting stress, emerged as a significant predictor of cognitive functioning for each of the outcome variables. This finding occurred when the effect of maternal education, current income, as well as child age and involvement in the puzzle task was partialled out of the scores on the Standford-Binet scale. Such results indicate that contrary to the arguments of some researchers (e.g., Moreno, 1991), the cognitive functioning of high-risk children is not solely explained by socio-demographic variables such as maternal education and socio-economic status. Instead, parenting constructs represent important predictors of their development.

Cognitive Stimulation. In line with predictions, maternal cognitive stimulation emerged as a positive predictor of child functioning. Specifically, this variable was linked to children's overall IQ and in particular verbal abilities. The measure of cognitive stimulation used in the present study was intended to capture the essential elements of the definition of the concepts of scaffolding (Wood, 1980) and the zone of proximal development (Vygotsky, 1978). That is, mothers were considered to provide optimal cognitive stimulation when they were encouraging their child to work just above his or her current level of ability, while providing sufficient guidance so that the child did not become overwhelmed and was able to succeed at the task. The fact that this variable emerged as a significant predictor of children's development in the present study, in particular the children's overall IQ, was consistent with the results of previous investigations, which have also illustrated the positive effects of parental tutoring on children's independent problem-solving and cognitive growth in general (Barocas et al.,

1991; Berk & Spuhl, 1995; Meadows, 1996; Pratt et al., 1992). It is thought that young children incorporate the skills learned in the context of adult-child interactions into their repertoire of abilities, which leads to an overall improvement in cognitive functioning. The specific influence of cognitive stimulation on children's verbal skills also parallels previous work, which demonstrated the particular influence of parental scaffolding on the language development of toddlers and preschoolers from various backgrounds (Meadows, 1996; Snow, 1995).

Although the link was in the expected direction, stimulation was not a significant predictor of children's specific abilities other than verbal reasoning. This finding was contrary to previous results, which have shown the positive effects of scaffolding on a great number of skills such as planning abilities, memory skills, problem-solving skills (Gauvain & Rogoff, 1989; Rogoff, 1990). A first consideration in the interpretation of these findings concerns the reliability of both the quantitative and short-term memory area scores used in the current analyses. Both scores were based on the children's performance on only one subtest. Sattler (1988) indicated that the reliability of individual subtests on the Standford-Binet Intelligence Scale is lower than that of composite scores, and warned against inferring definite conclusions based on single subtests. In the present study, it is possible that the lack of conclusive results regarding the prediction of quantitative and short-term memory abilities stems from the unreliability of these outcome measures.

It is also important to recognize that the evaluation of maternal cognitive stimulation in the present research project was based on a single observation of mother-

child interactions within a highly structured teaching context. Although the behavior displayed by the mother during this interaction was probably reflective of her style in other situations, it was difficult to estimate the extent to which tutoring and scaffolding strategies were part of the normal, day-to-day interactions of the mother-child dyads. In other words, the current study allowed for the examination of the quality of maternal scaffolding, but it did not provide information as to its frequency. Consequently, it is possible that the overall influence of cognitive stimulation may be limited due to the fact that it rarely takes place in some families.

Home Environment. Next, the results of the current study supported the hypothesis that the quality of the home environment was positively related to children's cognitive functioning, in particular their verbal and abstract/visual abilities. This finding was expected given that previous studies had shown that children who benefit from support and stimulation in their home environment tend to function better than children who do not receive such support (Bradley & Caldwell, 1984; Duncan et al., 1994; Gottfried, 1984; Luster & Dubow, 1992). In addition to the physical characteristics of the home environment (i.e., safety of the house, presence of toys and learning materials), other aspects of the home that are thought to contribute to the cognitive growth of young children include the language stimulation and the affection provided to the child.

The fact that the quality of home environment did not emerge as a significant predictor of children's overall intelligence scores was rather surprising. Previous research findings had consistently supported the link between home environment and child IQ

(Luster & Dubow, 1992; Molfese et al., 1996). Looking at the patterns of correlations between the various predictors, one possible explanation for this unexpected result was the fact that the quality of the home environment was strongly related to maternal education, current income, and parenting stress. Since the effect of these variables on total IQ was partialed out prior to the entry of home environment into the regression equation, the remaining variance that could be uniquely explained by the home variable was limited. This interpretation implies that although the quality of the home environment may be important in determining children's overall cognitive functioning, what may be even more important is the general psychosocial adjustment of the mother. That is, less educated mothers may experience more difficulties ensuring a comfortable life situation for themselves and their offspring, and may experience more stress as a result. This state of mind may in turn affect the stimulation and support they provide to their children, and ultimately the offspring's functioning.

Parental Distress. Based on previous work, parenting stress was considered along with cognitive stimulation and the quality of the home environment as a variable that was expected to directly impact on children's functioning. The findings of the current study were consistent with other investigations in that the levels of stress reported by mothers were negatively related to the children's overall score on the SB-IV, as well as their performance on the verbal and abstract/visual area scores. It has been argued that mothers who perceive sources of stress or hassles in their family life become irritable when interacting with their children. They may also be less available and engage in fewer

stimulating interactions with their children. In turn, these disruptions in the parent-child relationship may affect the social, behavioral, and cognitive development of their children (Crnic & Greenberg, 1990; Garmezy & Rutter, 1983; Lehoux, 1995).

Yet, it is important to consider the possibility that the direction of causality goes from the child to the mother. That is, it is likely that children experiencing problems in their early development represent a source of stress for their parents. Since the measures of perceived parenting stress and child cognitive functioning were collected at the same point in time, there is no way to determine with certainty the direction of the causality between these variables.

It should be noted that preliminary analyses indicated that unlike parenting stress, maternal depression was not related to the parenting and child outcome variables in the current study. The measure used in the analyses, the SCL-90, was primarily designed to assess depressive symptoms in community samples, and does not provide complete diagnostic information on the presence of clinical depression. As such, the absence of strong links between this measure and the various outcomes examined in the present study may indicate that it is more severe depression that affects parenting abilities and child functioning. In fact, most studies demonstrating a relationship between these variables have focused on samples of clinically depressed mothers and their offspring (Dodge, 1990). In the present study, a community sample was examined and mothers were not generally rated as being clinically depressed.

Maternal Education. In terms of the socio-demographic variables that were

considered, maternal education was found to represent a significant predictor in all areas of child cognitive functioning except short-term memory abilities. Children whose mothers had completed a greater number of years of education were likely to receive higher scores on the Standford-Binet scale of intelligence. Such a finding was expected, given that a large body of evidence points to maternal education as an important predictor of child intellectual and language development (Auerbach, Lerner, Barasch, & Palti, 1992; Bentley, 1997; Kinard & Reinherz, 1987; Werner & Smith, 1982). Thus, the present findings provided further support for this literature.

Several potential explanations have been proposed in order to account for the powerful and consistent impact of maternal education on child functioning. First, it may be argued that the educational attainment of mothers partly reflects their intelligence, and that the link with the children's functioning is primarily attributable to heritable factors. Although it is likely that mothers who were able to complete more schooling were more competent than mothers who left school earlier, it must be acknowledged that factors other than ability determine educational attainment (i.e., financial resources, career goals, family values regarding education, unexpected pregnancies). A better assessment of the intellectual functioning of the mothers from this sample would have been to obtain their performance on a standardized test of intelligence. Since such a measure was not available, no firm conclusion can be drawn regarding the contribution of heritable factors in the link between maternal education and child functioning.

An alternative explanation may be that more educated mothers may have greater knowledge about child rearing and better developed parenting skills, and that as a result

they behave in ways that promote the functioning of their offspring (Bentley et al., 1998; Cooperman, 1996; Hart & Risley, 1995; Hoff-Ginsberg, 1991; Molfese et al., 1996). According to this view, parenting serves to mediate the relationship between maternal education and child development. The results of the current study seem to support this suggestion. Indeed, whenever maternal education was a contributing factor in the prediction of intellectual functioning, the effect of this variable became nonsignificant once the block of parenting variables was entered into the regression equation. This suggests that maternal education contributes to child functioning by promoting the quality of the stimulation and home environment provided to the child, as well as by limiting the levels of stress experienced by the mother. In turn, these proximal variables probably affect child functioning directly.

Current Family Income. Contrary to expectations, current family income did not emerge as a significant predictor of the intellectual functioning of the target children in the present study. This result was surprising given that a large body of research exists supporting the effect of socio-economic status on the development of children (Duncan et al., 1994; Harris & Marmer, 1996; Olson et al., 1992; Smith et al., 1997). This link is usually explained in terms of the influence of economic factors on parenting practices as well as the availability of resources promoting the development of children (i.e., nutrition, health care, learning instruments; Cooperman & Serbin, 1998).

One potential reason for the lack of influence of income in the present study may be the fact that maternal education and family income were rather strongly related. Since

education was entered before income in the regression equations, it was likely that the variance in child IQ that could be explained by socio-demographic variables was already accounted for by education. According to this view, although mothers who completed less schooling were also likely to have a lower income as adults, it was their limited education that contributed most strongly to the developmental problems of their offspring.

It was also possible that the measure of SES that was used in the present study was too gross to distinguish clearly the influence of economic factors on child functioning. A current trend in the study of poverty is not to use income as the sole measure of economic status, but rather to adopt a more global, comprehensive perspective on the issue of poverty (McLyod, 1998). Increasingly, researchers are incorporating an assessment of the needs of the families in their designs, and are examining the allocation of resources to these different needs instead of simply assessing the total amount of money available. It is thought that in the context of limited financial resources, some parents may be better able than others to offer their children appropriate stimulation and support. In fact, mediating factors such as stimulation in the home environment have received much attention in the literature on the development of children raised in poverty. For example, verbal interactions between the mother and the child as well as level of parent emotional support and availability have all been shown to predict child functioning among poor families (McLyod, 1998).

A final potential explanation for the lack of effects of SES on child functioning may be insufficient variability (i.e., restricted range) in financial resources among the

families taking part in the study. Although less than one third of the families included in the sample were living below Canada's poverty cutoff line, most could be considered as falling into the categories of working poor or lower middle-class. In comparison, most studies examining the influence of poverty on child development have been published in the United States, and have focused on samples of inner-city, highly disadvantaged families. In Canada, many services are guaranteed to all families as part of the social "safety net." Therefore, the effects of severe disadvantage may be more difficult to assess in Canada than in the United States and the comparison may be difficult to make.

Child Predictors. Two child variables that were considered, child age and involvement in the puzzle task were unrelated to cognitive functioning. This suggests that the scores received by the children on the standardized test of intelligence were not affected by their age or level of compliance, but rather represent a reliable assessment of their competence. As well, child gender was a child variable that was found to be unrelated to both parenting variables and child IQ scores. This finding was unexpected given that the results of previous studies have indicated that among high-risk samples, boys were more likely than girls to experience inadequate parenting and developmental problems (Brooks-Gunn & Furstenberg, 1986; Cooperman, 1996; Serbin et al., 1996). Given that compared to other samples, the children studied in the current investigation were rather young, one possible explanation may be that the differential risk for boys and girls manifests itself only when children become older.

Taken together, the results of the first study serve to illustrate the fact that

although a mother's psychosocial history and current adjustment contribute to the competence of high-risk preschoolers, the quality of parental stimulation still represents a unique and important predictor of child functioning. These findings may serve as an argument in favor of attempts to strengthen parenting skills and competencies through training and educational programs. Studies of disadvantaged and high-risk preschoolers have shown that the social and cognitive development of these children can be promoted through parent training programs. For example, Webster-Stratton (1998) developed a parent-training program intended to supplement the Head Start Program, a well-established intervention designed to prevent school difficulties among high-risk, disadvantaged American children. The parent-training supplement focused on teaching positive discipline strategies and effective parenting skills to the parents of Head Start preschoolers. Results showed that the training program led to significant short- and long-term improvements in parenting competence among the intervention mothers as compared with the control mothers. These women were found to use fewer critical remarks and commands, less harsh discipline, and to be more positive and competent when interacting with their children. In turn, the children in the intervention groups were found to be more competent both at home and at school when observed at post-treatment and at a one-year follow-up.

Other parent training programs have specifically targeted the teaching skills of parents from various risk backgrounds. It has been shown that such interventions lead to better scaffolding strategies among high-risk mothers with great benefits for their children (Larsen & Haupt, 1997). Such findings are generally interpreted as evidence of the value

of early intervention programs among low SES families. These recommendations to allocate resources to parenting programs, however, should not be taken as a rationale for decreased efforts towards improving the living conditions of disadvantaged families. Indeed, the results of some studies indicate that the effectiveness of training programs for parents rests in part on the other basic needs of the family being met (Larsen & Haupt, 1997).

Study 2: Childhood History of Aggression and Social Withdrawal as Predictors of Cognitive Stimulation and Quality of the Home Environment

The purpose of the second study was to assess the contribution of maternal childhood risk status (i.e., history of aggression and/or social withdrawal) to the ability of high-risk mothers to stimulate their offspring. Determining whether the childhood behavioral tendencies had direct effects on cognitive stimulation and home environment, or whether their impact was mediated by other risk factors that had occurred later in the women's lives, was of particular interest.

Cognitive Stimulation. As expected, mothers' childhood aggression emerged as a significant predictor of cognitive stimulation. Mothers who were rated by their childhood peers as highly aggressive tended to provide less cognitive stimulation to their children in a structured teaching context. That is, they were less likely to encourage their child to perform tasks independently that were just above their current level of ability. As well, they failed to offer much guidance to ensure that the child would be able to master the

task and generalize from it. This lack of stimulation was often accompanied by a tendency to appear more disengaged and unresponsive, less warm, and by a failure to use various helpful teaching strategies normally adopted by mothers in a structured play context. Such findings of maternal disengagement parallel those presented by Cooperman (1996). In this study of high-risk mothers and their school-age offspring, childhood aggression was predictive of unresponsive and ignoring maternal behaviors during interactions taking place in a laboratory setting.

In the current study, aggression was found to have a direct influence on provision of cognitive stimulation. That is, even when all other risk factors were entered into the model, levels of aggression were still significantly predicting maternal behavior during the teaching task. In contrast, it had been hypothesized that childhood risk status would be related to current scaffolding through various psychosocial risk factors such as educational attainment and economic status. The current findings suggested that childhood aggression in fact represents a fundamental disposition that affects the interpersonal style of high-risk individuals throughout their lives, and that manifests itself in the context of parent-child interactions.

This result has implications for the discussion on the stability and consequences of aggression among women. As previously mentioned, compared to the large amount of research on male aggression, less is known about the long-term outcomes of female aggression. Some researchers have suggested that throughout the course of their lives, females are more likely to manifest their aggression in the context of family and social relationships (Moskowitz & Schwartzman, 1989). Current views on female aggression in

fact suggest that women are not very likely to use overt and physical forms of aggression, but rather display relational aggression or social ostracism (Cairns, Cairns, Neckerman, Ferguson, & Gariepy, 1989; Crick & Grotpeter, 1995). Interestingly, in the present study the mothers were not found to use frequent negative physical interventions or to display a directive style when interacting with their offspring, which would have represented a clear expression of physical aggression. Instead, the mothers were shown to be less likely to help their children learn how to complete the task. They appeared more disengaged and less warm than other mothers. They also tended to complete a part of the puzzle by themselves, leaving the child to work without assistance or support. In doing so, they gave the impression that teaching their child was not worth the effort. This passive aggressive attitude may be seen as hostile and antagonistic, and to some extent may be reflective of their deeply rooted aggressive tendencies.

According to this interpretation, the aggressive behavior identified in the childhood of these women remained rather stable, but evolved in its manifestation. This way of understanding the participants' aggression is in line with the concept of "heterotypic continuity," which suggests that personal dispositions may continue over a long period of time, although their outward expression may adapt to changing life circumstances (Caspi, 1998; Kagan, 1969, 1980; Moss & Susman, 1980). Thus, in the context of parent-child interactions, mothers' aggressive tendencies may manifest themselves in a covert form that is somewhat different from their childhood behavior problems. This is not to say, however, that in other contexts these women would not display overt or physical aggression, more similar to the behaviors identified by their

childhood peers (i.e., when interacting with their spouse and other adults in general). If this were the case, it would indicate that childhood aggression remained rather stable, through a process of "homotypic" continuity (Kagan, 1969, 1980).

It is important to note that the effect of childhood aggression on scaffolding abilities was not simply a function of the background of disadvantage from which these women came from. Indeed, although childhood SES was positively related to cognitive stimulation, it explained only a small proportion of its variance. This finding suggests that it was mostly the behavioral tendencies that affected parenting skills, not socio-economic disadvantage per se.

Based on previous findings from the Concordia High Risk Project, it was anticipated that women who were both aggressive and socially withdrawn in childhood would also exhibit difficulties in stimulating their children intellectually. Results failed to support this prediction. In fact, social withdrawal was unrelated to provision of cognitive stimulation. It may be that social withdrawal is a less stable behavioral tendency than aggression, and that it ceases to affect the quality of interpersonal relationships beyond a certain point in the women's lives. Alternatively, the difficulties in social interactions experienced by these women when they were children may have led to internal problems such as anxiety and dysphoric mood, which have less apparent repercussions on the parent-child relationship.

When controlling for the effect of childhood risk status, maternal educational attainment was not found to predict the quality of cognitive stimulation provided by the high-risk mothers. This result was unexpected and contradicted the conclusions of

previous studies, which indicated that mothers' years of schooling was one of the best predictors of the stimulation a child receives (Auerbach et al., 1992). These studies, however, rarely controlled for the impact of basic behavioral tendencies when trying to explain maternal scaffolding abilities. The current findings showed that the problem dispositions and educational attainment were related. They also suggested that, by adopting a longitudinal perspective and considering different markers of psychosocial functioning, it was possible to show that childhood aggression may be a more fundamental predictor of cognitive stimulation than maternal education. If this finding is replicated in other studies, it would serve as support for considering multiple historical predictors in the study of parenting skills.

Similarly, preliminary analyses showed that the age of the mother when she gave birth to her first child did not uniquely contribute to the prediction of maternal stimulation. This finding supports the argument recently presented by Coley and Chase-Lansdale, 1998, who suggested that age at first birth may be less significant than previously believed when other psychosocial variables are considered. It was also noteworthy that only a few of the women in this sample became mothers during their teenage years. A total of six women had their first child before the age of 20, and the mean age at first birth was 23 years old. Therefore, the relationship between age at first birth and maternal stimulation may be attenuated due to the characteristics of this particular sample.

Another unexpected finding of the present study was the fact that the level of parenting stress reported by mothers was unrelated to their ability to stimulate their child

during the puzzle task. The literature on scaffolding suggests that mothers who experience high levels of distress appear less sensitive and positive when interacting with their offspring (Goodman & Brumley, 1990; Webster-Stratton & Hammond, 1988). Although parenting stress and cognitive stimulation were related in the present study, it appeared that parenting stress did not uniquely explain a significant portion of the variance. Again, more fundamental characteristics of the mother, in particular her aggressive interpersonal style, seemed to be more useful than current adjustment when trying to predict current scaffolding strategies.

The age of the child was related to the amount of cognitive stimulation provided by the mother within the teaching context. In line with predictions, mothers with younger children tended to make more efforts to stimulate their child than mothers of older children. This finding was consistent with previous studies (Fagot & Gauvain, 1997; Gauvain & Fagot, 1995), which showed a developmental progression in the level of support and encouragement that mothers offered to their child. The decreased assistance with increasing age is thought to parallel the growing competence and independent problem-solving skills of young children. Yet, an alternative explanation of this finding may be that within high-risk dyads, the quality of the mother-child relationship tends to deteriorate as the child's age increases (Hammen, Brirge, & Stansbury, 1990. Based on transactional models of development (Belsky, 1984; Sameroff & Seifer, 1983), it has been argued that the mother and the child mutually influence each other during interactions and over time. That is, the child's difficult behavior, arising partly in reaction to the caregiver, may contribute to the level of stress and negative affect that the

mother experiences. In turn, maternal negativity and irritability may influence the child's behaviors and functioning, and this may contribute to increasingly negative interactions between the mother and the child across time (Hammen et al., 1990). Because the design of the current study was cross-sectional, however, it was impossible to measure the progression of the quality of the relationship across the early years of the children. Therefore, conclusions about the increased competence of children or the deterioration of the mother-child relationship over time cannot be drawn with certainty from this study.

Home Environment. Both the women who were aggressive and those who were socially withdrawn during childhood were found to provide a home environment for their children that was less supportive and stimulating than women who did not present such behavioral tendencies as children. These findings were expected and consistent with the results of previous studies from the Concordia High Risk Project (Cooperman et al., 1998; Serbin, Peters, et al., 1991), which indicated that both childhood aggression and social withdrawal were negative predictors of the quality of the home environment. The socio-economic status of the mothers' family of origin was not found to be related to the quality of the home environment. It appears, then, that it is not the fact of being raised under difficult circumstances that mostly places these individuals at risk for ineffective parenting, but rather the problematic behavioral tendencies that they develop over the course of childhood.

The possibility that mothers who were identified in childhood as being both

aggressive and socially withdrawn would be most at risk for exhibiting difficulties in providing a good home environment to their offspring was examined. Such a pattern did not emerge, suggesting that the additive risk in terms of childhood behavioral problems was not a factor in determining the quality of the home environment. An alternative explanation may be that since the interaction term had to be entered last in the regression equation, there was little variance left in home environment that could be explained by this variable. Thus, the lack of effect may be mainly attributable to insufficient statistical power.

Regardless of this finding, the results from this study and other investigations from the Concordia High Risk Project indicated that childhood patterns of atypical social behavior have important implications for the quality of home environment provided by these high-risk individuals. In contrast to cognitive stimulation, however, the effect of childhood behavioral tendencies on current home environment was not a direct one, but rather operated through other psychosocial difficulties occurring later in the women's lives.

In line with predictions, maternal educational attainment emerged as one significant mediating variable in the link between childhood risk status and quality of the home environment. Interestingly, once maternal education was entered into the regression equation, the effect of childhood aggression and social withdrawal on quality of home environment became nonsignificant. It appeared that these behavioral tendencies worked through low educational attainment to influence the home environment. Other studies from the Concordia High Risk Project have indicated that childhood risk status was

predictive of fewer years of schooling (Cooperman et al., 1998; Lehoux, 1995; Serbin et al., 1998). In particular, childhood aggression and social withdrawal, in combination with low achievement scores, have been shown to contribute to a high risk for high school dropout (Serbin et al., 1998), which in turn represents a risk factor for parenting difficulties.

As expected, mothers' education was shown to be a positive predictor of quality of home environment. This variable was found to have a strong and direct effect on scores received on the HOME Inventory. That is, even after entering current income and parenting stress into the regression equation, maternal education was still predicting the quality of the home environment. Given that educational attainment is known to be linked to socioeconomic status, it is likely that mothers who have completed more schooling have a greater degree of financial security. In turn, they may be able to provide better stimulation for their children in the home environment through stimulating toys, books, and play activities that will foster the development of the child (Cooperman & Serbin, 1998). It is also likely that a direct link exists between schooling and knowledge about parenting practices.

Contrary to expectations, both the age of the mother at first birth and the current family income did not emerge as significant predictors of quality of home environment. Most likely, this finding can be explained in terms of the patterns of correlations between the predictors and outcome variables included in the present study. Indeed, in the current analyses, maternal education was entered before age at first birth and income, and what was assessed was the contribution of these variables beyond maternal education. Given

that education was a strong predictor of home environment, and that age at first birth and current SES had some variance in common with education, it was not surprising that the unique variance explained by the two variables was small and did not reach statistical significance.

As was predicted, parenting stress did emerge as a significant predictor of the quality of the home environment. Mothers who reported high levels of stress related to their parenting responsibilities were less likely to provide a good home environment for their preschool-age children. Parents who are experiencing stress may be less available or more distracted to ensure a good home environment for their children. However, because the parenting stress measure and HOME inventory were collected at the same point in time, inferences about causality cannot be made. It may be possible that not being able to provide optimal support and stimulation in the home environment because of financial restrictions or preoccupation with daily hassles and personal problems leads mothers to be critical of their parenting abilities, and to experience high levels of stress.

Thus, the findings that were just discussed indicate that childhood risk status does affect the mothers' ability to provide a supportive and stimulating home environment for their preschool-age offspring. It does so indirectly, by contributing to a pathway of psychosocial difficulties experienced by the mothers (i.e., low educational attainment, greater parenting stress). In contrast, the mothers' childhood problem dispositions, specifically their aggressive tendencies, appeared to have a direct effect on their ability to provide intellectual stimulation within a structured teaching context.

This interesting distinction has not yet been made in the literature on the transfer

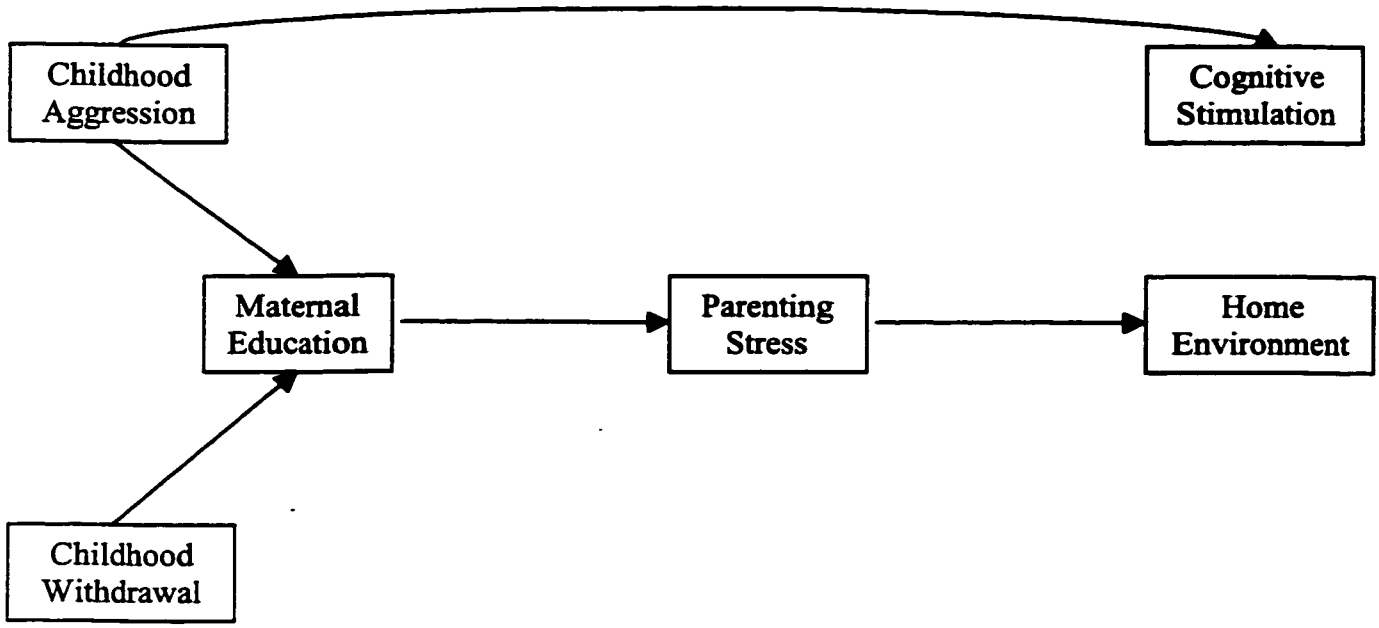
of risk across generations. What seems to be suggested by these findings is that there are two ways through which high-risk mothers may place their offspring at risk for developmental difficulties (see Figure 1 for an illustration of these links). First, their problematic behavior in childhood seems to place restrictions on their future education and socioeconomic status, and to impede on the emotional and financial resources they can offer their children in the home environment. In parallel, their difficult childhood behavior tendencies appear to evolve into a deeply rooted interpersonal style, which affects their behavior and attitude when directly interacting with their offspring. Given that the results of the first study suggested that the intellectual stimulation provided in the context of both mother-child interactions and the home environment made a contribution to children's development, implications for intervention are rather clear. Indeed, the findings of this research project suggest that the potentially most parsimonious and effective way of preventing the cycle of disadvantage would be to target the problematic behavioral tendencies in childhood as well as the early schooling experience. By resolving these difficulties at an early stage in the person's life, it may be possible to prevent both the direct and indirect consequences that they seem to create for high-risk individuals and their offspring.

Limitations of the Present Study

A number of caveats need to be considered when evaluating the results of the current study. As was previously mentioned, the small sample size imposed limitations on the number of predictors that could be included in the analyses. As a result, the

Figure 1

Relationship Between Mothers' Childhood Risk Status and Current Provision of Intellectual Stimulation



model, by which childhood risk status affects parenting, which in turn is related to the functioning of the second generation, could not be tested as a whole. In order to be able to draw conclusions from the current findings about the intergenerational transfer of risk, path analysis would have been necessary. Since this was not an option, no firm conclusions can be established regarding the relation between the mothers' histories of aggression and/or social withdrawal and the children's cognitive functioning.

It is also likely that the small sample size limited the statistical power of the analyses conducted, which could explain the fact that a few of the hypothesized effects did not reach statistical significance. Given that the size of the effect of psychosocial predictors is generally known to be modest, a large sample is required in order to assess the value of these variables. Thus, although the non-significant effects were all in the expected direction, replication is necessary in order to confirm the findings of the present study.

A further limitation of the current research project is that several of the variables studied (i.e., parenting stress, cognitive stimulation, quality of the home environment, child cognitive functioning) were measured at the same point in time. Because of the non-independence of concurrent predictors, no inference regarding the directionality of the observed links can be drawn.

Finally, it needs to be emphasized that the current study focused on a single aspect of parenting, namely intellectual stimulation, as a potential mediating variable in the transfer of risk from one generation to the next. As such, the findings are somewhat limited in their generalizability, and one should remain cautious when trying to draw

conclusions regarding the parenting skills of participants from the Concordia High Risk Project and the development of their offspring.

Directions for Future Research

The current research project was helpful in identifying pathways through which high-risk individuals can place their preschool-age children at risk for developmental problems. It is hypothesized that the early difficulties identified at this time among some of the children will have various implications for these children's future adjustment. In coming years, it will prove important to follow these children as they enter the school system, in order to see whether the hypothesized risk manifests itself in this context, in terms of low academic achievement and/or behavioral problems.

School adaptation is considered to represent a meaningful index of children's adjustment, and has been shown to constitute a good predictor of later outcomes (Baydar et al., 1993; Cairns et al., 1989, Pagani et al., 1997). An important focus of future studies should be to examine the contribution of parenting variables to the school functioning of the target children. Specifically, it would be interesting to assess the values and attitudes of parents from the Concordia High Risk Project regarding their children's education. As well, the extent to which these high-risk parents become personally involved and monitor the schooling experience of their children should be considered. Empirical evidence gathered within normative samples supports the notion that such parenting variables influence children's school functioning (Larsen & Haupt, 1997; Scott-Jones, 1995). An interesting line of inquiry that could be pursued is an examination of the values and

behaviors of high-risk parents from the Concordia High Risk Project with regards to their offspring's education. These variables may act as mediators in the link between the risk status of parents and the adjustment of school-age children, much like cognitive stimulation and home environment seem to do in the case of preschool-age children.

While continuing to examine parenting as a pathway through which risk is transmitted across generations, future studies should also attempt to use the data available to design intervention programs for high-risk parents and their offspring. These interventions should be aimed at enhancing the ability of high-risk individuals to stimulate their children intellectually, as well as ensuring that these parents incorporate frequent teaching activities in their daily routines. These programs should also aim to help parents adopt optimal disciplinary strategies as well as a warm and supportive attitude when interacting with their offspring. Together, these factors may help in reducing the risk that the problem dispositions identified in parents translate into adjustment difficulties among their offspring.

Concluding Comments

The findings of the current research project indicate that young children can be placed at risk for developmental difficulties as a result of the psychosocial history of their mothers. Although the focus of this study was the children's cognitive growth, other investigations conducted within the Concordia High Risk Project suggest that the health and the socio-emotional development of the children are also threatened. When considered together, these data underscore the importance of childhood behavioral

tendencies as predictors of difficulties in the lives of those who exhibit them as well as in the lives of their offspring. This knowledge about the long-term consequences of childhood aggression and social withdrawal should serve as an impetus for the early identification of individuals manifesting these problematic tendencies. Indeed, by intervening at an early age, it may possible to prevent the negative outcomes that seem to affect these individuals as well as the people close to them.

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Appendix A

The Pupil Evaluation Inventory

Aggression items

3. Those who can't sit still.

4. Those who try to get other people into trouble.

7. Those who act stuck-up and think they are better than everyone else.

8. Those who play the clown and get others to laugh.

9. Those who start a fight over nothing.

12. Those who tell other children what to do.

15. Those who always mess around and get into trouble.

16. Those who make fun of people.

18. Those who do strange things.

20. Those who bother people when they're trying to work.

21. Those who get mad when they don't get their way.

22. Those who don't pay attention to the teacher.

23. Those who are rude to the teacher.

26. Those who act like a baby.

27. Those who are mean and cruel to other children.

29. Those who give dirty looks.

30. Those who want to show off in front of the class.

31. Those who say they can beat everybody up.

33. Those who exaggerate and make up stories.

34. Those who complain nothing seems to make them happy.

Withdrawal items

5. Those who are too shy to make friends easily.

6. Those whose feelings are too easily hurt.

10. Those who never seem to be having a good time.

11. Those who are upset when called on to answer questions in class.

13. Those who are usually chosen last to join in group activities.

17. Those who have very few friends.

24. Those who are unhappy or sad.

28. Those who often don't want to play.

32. Those who aren't noticed much.

Likeability items

2. Those who help others.

14. Those who are liked by everyone.

19. Those who are your best friends.

25. Those who are especially nice.

35. Those who always seem to understand things.

Appendix B

Maternal consent form

"L'INDIVIDU DANS SON MILIEU: Les parents et leurs enfants"

Directeurs du projet: - Lisa A. Serbin, Ph.D.
- Dale M. Stack, Ph.D.
- Alex E. Schwartzman, Ph.D.

FORMULAIRE DE CONSENTEMENT

Je,_____, m'engage volontairement avec mon enfant, _____, à participer à l'étude "L'individu dans son milieu: Les parents et leur enfant" de l'Université Concordia. Les buts du projet m'ont été expliqués. L'étude comprend une série de questionnaires, une évaluation du fonctionnement intellectuel de mon enfant, des entrevues qui pourront être enregistrées, ainsi que trois périodes de jeux lors desquelles nous serons observé(e)s et filmé(e)s. L'étude comporte deux sessions d'une durée maximale de 3 heures chacune et une rémunération totale de $60.00 me sera allouée aussitôt que les questionnaires seront remis. En signe de courtoisie, les résultats sommaires de l'évaluation de mon enfant me seront communiqués par la poste. De plus, les chercheurs seront prêts à effectuer une ou deux visites additionnelles, au besoin, pour terminer l'évaluation, discuter de résultats problématiques, ou m'offrir un service de référence.

Je comprends que toutes les informations que nous fournissons, qu'elles soient écrites, enregistrées ou filmées, sont strictement confidentielles et qu'elles ne serviront qu'à des fins de recherche. Dans toutes les circonstances, je suis assuré(e) que l'anonymat sera conservé. Cependant, selon la loi sur la protection de la jeunesse, toute information indiquant de l'abus physique ou sexuel devra être divulguée à l'Office de la Protection de la Jeunesse.

Je comprends aussi que je suis libre de cesser notre participation à n'importe quel moment. Comme le projet "L'individu dans son milieu" est à long terme, je comprends que je pourrais être appelé(e) dans l'avenir pour participer à d'autres étapes de ce projet. Je me réserve le droit de décider, à ce moment, de donner suite ou non à la demande de participation.

Signature:_____

Nom:_____ Date:_____

Assistant(e) de recherche:_____

Appendix C

Detailed Description of the Protocol for the Parent-Child Data Collection

Parent-Child Data Collection
Full Protocol

DAY 1 PROTOCOL:

1- Examiner:
- takes care of introductions,
- reminds mother that Interviewer cannot interact with child until Series 2 has been filmed,
- builds rapport with child,
- summarizes study and explains general Day 1 procedures to Ss,
- makes sure mother has read and signed consent form,
- for Cohort 2 Ss, explains that saliva sampling is optional and, if mother consents, obtains a sample from both of them **immediately before standard testing** (record the time at which all samples were taken on the saliva form).

Interviewer:
- chooses the most appropriate room for interaction series,
- sets up camera and materials for Series 1 in the standard order (see toy lay-out sheet),
- removes all other unecessary materials, if possible,
- unplugs that room's telephone if present,
- and attempts to remain as invisible to the child as possible until Series 2.

2- Examiner: - begins administering Bayley II or SB4.

Interviewer: - **a)** if mother does not need to stay with child (for SB4): Interviewer begins administration of the demographic, health battery, and general impressions of temperament questionnaires;
- **or b)** if mother needs to stay with her child, the Interviewer can supervise siblings, score data, or read a good book!!!

BREAK - For Cohort 2 Ss, the 2nd saliva sample is taken from both mother and child within 10 min. following standard testing. Examiner asks mother to come, if she's with Interviewer.
- Make sure you ask Ss if they need to go to the bathroom or get a change of diaper.
- If needed, Interviewer informs Examiner of interaction setup location.)

3- Before bringing Ss to the interaction room, the Examiner gives mother the following Series 1 instructions.

SERIES 1

"Maintenant, on aimerait vous voir jouer ensemble. Comme tu sais, on va enregistrer ça sur vidéo. Donc, pour être sûr que vous restiez tous(tes) les deux bien en vue pendant qu'on filme, c'est très important que vous restiez assis(es) tous(tes) les deux sur le tapis qu'on a mis par terre. Moi, je vais quitter la pièce et je vais revenir vérifier la caméra une ou deux fois pour être bien sûr qu'elle fonctionne bien. Alors, la première chose qu'on aimerait que tu fasses est simplement de jouer avec (ENFANT) comme vous le faites d'habitude pendant environ 15 minutes et essayez d'être le plus naturels possible. Vous pouvez prendre les jouets qu'on a mis sur le tapis si vous voulez, mais vous n'êtes pas obligés. Puis, quand tu entendras l'alarme sonner, tu pourras arrêter de jouer. As-tu des questions?"

Examiner then gets Ss settled on the carpet and instructs child (if s/he can understand such instructions) to remain within its limits; e.g.:

"Maintenant, (CHILD), tu vas jouer avec maman, mais j'aimerais que tu restes sur le tapis. Fais comme si le tapis était ton carré de sable et que c'est défendu de sortir du carré de sable..." etc.

Before getting out of view, Examiner tells mother they can begin. Examiner is responsible for timing all 3 Series and should position herself close enough to the interaction area so she can still hear Ss and thus know when to start and stop the timer. No camera person will be present during filming. The camera should be positioned on the tripod so as to encompass the carpet tightly. The Examiner should periodically check the position of the camera so that dyad is being properly filmed. [If there is an interruption of filming during the **first** half of the series (e.g., bathroom), reset the timer to 15 min. and start over. If the interruption occurs in the **second** half of the series **and** lasts less than 2 min., just pause and restart timer when the interaction resumes; but if the trip takes **more** than 2 min., Series 1 will have to be repeated at the end of Day 2.]

At the end of Series 1, Examiner takes saliva samples from both Ss (Cohort 2 only) and administers "Maternal perceptions" questionnaire. If mother reports a score of 1 or 2, thus indicating that either her or her child's behavior was not natural, Series 1 should be repeated on Day 2.

BREAK (±5 min.)
- Bathroom check
- The Examiner or the Interviewer repositions materials for Series 2 and, if needed, prepares the barrier so it will safely prevent a 12-42 mo. child from leaving interaction room during separation episode.

4- While the Examiner supervises the child, she asks mother to join with the Interviewer. The Interviewer will then give mother the following Series 2 instructions so as not to be

heard by child. (If child becomes upset about his/her mother's departure, Examiner will give her the instructions in the child's presence.)

SERIES 2

FREE PLAY (4 MIN)

"La prochaine période de jeux va aussi être filmé mais va avoir 4 parties: En premier, tu va recommencer à jouer avec (ENFANT) comme tantôt, avec ou sans les jouets, mais juste pour une couple de minutes jusqu'à ce que tu entendes l'alarme sonner, comme tantôt."

PUZZLES (7 MIN, 4 MIN for 12-42 cohort)

"A ce moment-là, pousse les jouets de côté et choisis un casse-tête à faire avec (ENFANT). (FOR OLDER COHORT, EXPLAIN TO MOTHER THE LABELLED BAGS OF PUZZLE PIECES AND THEIR CORRESPONDING BOARDS. PRESS BEEPER WHEN THEY BEGIN WORKING ON THE PUZZLE). Si vous finissez ce casse-tête-là, vous pouvez travailler sur un autre. Après quelques minutes, l'alarme va sonner de nouveau et je (or INTERVIEWER) vais entrer dans la pièce."

SEPARATION AND REUNION (2+4=6 MIN)

"A ce moment-là, tu sortiras de la pièce pour laisser (ENFANT) jouer tout seul avec les jouets. Et pour être sûr qu'il/elle ne te suivra pas quand tu va sortir, je vais placer une barrière en travers la porte/arche. Bien sûr, si (ENFANT) devient trop dérangé par ton absence, ou si tu te sens mal à l'aise, tu pourras le/la rejoindre. Sinon, après une couple de minutes, (EXAMINER) va te dire que c'est le temps d'aller rejoindre (ENFANT) sur le tapis. Puis, tu passera 3-4 minutes de plus avec lui/elle et on te laissera savoir quand tout est fini."

Interviewer comes in at the beep and waits next to the door until mother has left. Then s/he puts the barrier in place (for 12-42 mo. cohort) or closes the door and then goes behind the camera to keep child in view during both the separation and reunion episodes. Examiner presses "start" when mother exits the room. Then, after 2 minutes, she signals mother to join her child.

"Donc, pour résumer, commencez par jouer ensemble comme vous le faites d'habitude; puis, quand tu entendras l'alarme, pousse les jouets de côté et choisis un casse-tête. Quand tu me verras entrer, sors de la pièce jusqu'à ce qu'on te dise te rejoindre (ENFANT). J'ai une petite liste qui pourra t'aider à te souvenir des étapes, et je vais la placer juste ici. As-tu des questions? J'aimerais juste te rappeler encore de rester sur le tapis pour que vous puissiez rester bien en vue. J'aimerais aussi quand tu sortiras que tu restes invisible pour (ENFANT), mais assez près de (EXAMINER) pour entendre son signal, OK?"

At the end of Series 2, Interviewer administers "Maternal perceptions" questionnaire. If mother reports a score of 1 or 2, Series 2 should be repeated on Day 2. Interviewer also administers Day 1 Touch Questionnaire.

5- At the end of Day 1, Interviewer gives instructions for mother and father questionnaire packages, for cortisol sampling, and makes the appointment for Day 2.

N.B. If child needs to nap during Day 1, Interviewer can take that opportunity to continue interviews with mother.
Fill out the Cortisol and VideoTape log sheet. Clean Bayley II and toys, if needed.

DAY 2 PROTOCOL:

1- Examiner reconnects with child and gives Day 2 general instructions.

2- Examiner finishes Bayley II or SB4. If mother does not need to stay with child, Interviewer answers any questions she might have about the questionnaires and finishes interviewing her. But if mother still needs to stay with child, Interviewer can set up Series 3 materials and check parental packages for missing data or clinical concerns (e.g., SCID screeners, SCL-90).

BREAK - Series 3 setup, if not done already
- Bathroom check

3- While Examiner supervises child away from interaction room, she tells mother to go to the interaction room to meet Interviewer who gives her the following Series 3 instructions so as not to be heard by child. If child becomes upset about mother's departure, the Examiner gives her the instructions in the child's presence.

Série 3

FREE PLAY (4 MIN)

"C'est la dernière fois qu'on va vous filmer, et il y a 4 choses qu'on aimerait que vous fassiez ensemble. D'abord, comme l'autre jour, on aimerais que tu joues avec (ENFANT) comme vous le faites d'habitude, avec ou sans les jouets, jusqu'à ce que tu entendes l'alarme sonner.

COMMAND TASK (3 MIN) - NOT DONE FOR 12-24 MO. CHILDREN

A ce moment-là, vous arrêterez de jouer pour faire quelque chose de complètement différent. Pour les 2-3 prochaines minutes, j'aimerais que tu demandes à (ENFANT) de faire quelques petites tâches pour toi. Tiens, voilà une liste de tâches que tu peux utiliser (GIVE HER THE LIST). Comme tu peux voir, il y en a qui sont plus difficiles que d'autres; c'est parce qu'on visite différentes familles avec des enfants d'âges différents. Celles du début sont plus faciles que celles de la fin (READ FIRST 3 AND LAST 3). On aimerais que tu prennes au moins 4 ou 5 des tâches de la liste. Tu peux en prendre plus si tu veux et tu peux même inventer tes propres tâches, mais pourvu que (ENFANT) n'ait pas à quitter le tapis. La liste sera placé tout près du tapis. (PRESS BEEPER WHEN MOTHER BEGINS INTRODUCING TASK)

INTERFERENCE TASK (3 MIN)

Quand tu entendras l'alarme sonner, vous arrêterez pour faire autre chose encore. On aimerais voir comment (ENFANT) réagit quand tu es très occupée. Tu sais comment c'est des fois quand tu es au téléphone ou bien en train de faire à manger et que c'est pas possible de lui donner toute l'attention qu'il/elle demande. Pour observer ça, on aimerais que tu remplisses le questionnaire qui est juste en-dessous (SHOW HER). Et pendant que tu le remplis, on aimerait que tu te retournes un peu pour lui faire comprendre que ce que tu fais est trés important. Si tu termine ce questionnaire avant l'alarme, tu pourras lire ces magazines-là (SHOW HER). (ENFANT) pourra continuer à jouer avec les jouets pendant ce temps-là; mais assure-toi encore qu'il/elle reste assis(e) sur le tapis. Tu continueras de travailler sur le questionnaire ou de lire jusqu'à ce que tu entendes une autre alarme. (PRESS BEEPER WHEN MOTHER BEGINS QUESTIONNAIRE)

FREE PLAY (4 MIN)

A ce moment-là, mets tout ça de côté et recommence à jouer avec (ENFANT) comme vous le faites d'habitude jusqu'à ce l'alarme te dise que c'est fini. N'oublie pas de rester à l'intérieur des limites du tapis pour que la caméra puisse vous garder tous les deux bien en vue.

Donc, en résumé, commencez par jouer avec (ENFANT) comme vous le faites d'habitude; ensuite, quand tu entends la 1ère alarme, prends la liste et fais-lui faire des tâches; puis, à la 2e alarme, commence à travailler sur le questionnaire jusqu'à ce que tu entendes la 3e alarme. A ce moment-là, tu recommences simplement à jouer avec (ENFANT). Comme la dernière fois, on a une petite liste qui va t'aider à te rappeler des étapes. As-tu des question?"

At the end of Series 3, Interviewer administers "Maternal perceptions" and finishes "Touch" questionnaires.

BREAK

4- Examiner administers the remaining HOME interview items (**both HOME versions are completed for 37-42 mo. children**), and investigates any clinical concerns that might have arisen through other questionnaires. Examiner and Interviewer then decide who will administer the "Parenting Practices Interview" (AUDIOTAPED), the SCID modules (if required), and the Peabody to the child. When Examiner is done with her interviews, the Interviewer joins her for the wrap-up which includes the "Needs Assessment Questionnaire" (AUDIOTAPED).

Fill out the Cortisol and VideoTape log sheet. Clean Bayley II and toys between each visit, if needed.

Appendix D

Demographic Information Questionnaire (DIQ)

Mai 1996

N° d'identification _____
Date: _____

L'INDIVIDU DANS SON MILIEU
Renseignements sociodémographiques

Tous ces renseignements sont traités de façon totalement confidentielle

1. **Sexe** ❑ M ❑ F

2. **Âge** _____ ans Date de naissance ___ ___ ___
AN MO JR

3. **État civil**

***Note*:** "Conjoints de fait": désigne deux personnes qui vivent ensemble comme si elles étaient mariées. Il s'agit de ton état actuel; même si tu es légalement divorcé(e) ou autre, mais que tu vis avec un(e) conjoint(e) présentement, inscris conjoint de fait.

❑ Célibataire
❑ Conjoint de fait
❑ Marié(e)
❑ Séparé(e)
❑ Divorcé(e)
❑ Veuf/veuve

Depuis quelle date?
___ ___ ___
AN MO JR

4. **Nombre d'enfants** _____
Si enceinte (ou conjointe enceinte), bébé attendu pour: ___ ___
AN MO

Pour chaque enfant:
1 - Inscrire le nom, le sexe, la date de naissance
2 - Encercler
"TE" si c'est ton enfant (tu es le parent biologique)
"EC" si l'enfant du conjoint (le conjoint actuel est le parent biologique)
"EA" si c'est un enfant adopté /**"FA"** en foyer d'accueil et qui vit chez toi
Si "TE" et "EC" sont vrais, encercler les deux.
3 - Indiquer si l'enfant vit avec toi, **OUI** ou **NON** ou **GP** (garde partagée)
4 - Inscrire l'année scolaire (si applicable) ainsi que si l'enfant fréquente une classe ou une école spéciale.

1) NOM _____ ___ ___ ___
AN MO JR

SEXE ❑ M ❑ F

L'enfant est: TE EC EA / FA
Vit avec toi: OUI ❑ NON ❑ GP ❑

Année scolaire: _____ Classe spéciale: _____

2) NOM _____ ___ ___ ___
AN MO JR

SEXE ❑ M ❑ F

L'enfant est: TE EC EA / FA
Vit avec toi: OUI ❑ NON ❑ GP ❑

Année scolaire: _____ Classe spéciale: _____

3) NOM _____ ___ ___ ___
AN MO JR

SEXE ❑ M ❑ F

L'enfant est: TE EC EA / FA
Vit avec toi: OUI ❑ NON ❑ GP ❑

Année scolaire: _____ Classe spéciale: _____

4) NOM _____ ___ ___ ___
AN MO JR

SEXE ❑ M ❑ F

L'enfant est: TE EC EA / FA
Vit avec toi: OUI ❑ NON ❑ GP ❑

Année scolaire: _____ Classe spéciale: _____

5. **Ta scolarité** complétée (dernière année terminée): _____
En quoi? (spécialisation/général): _____

Étudies-tu présentement? OUI : Temps plein ❑ partiel ❑ NON ❑
Si oui, quel diplôme postules-tu _____ pour quand?
____/____/____/

6. **As-tu un emploi** (rappel: renseignements gardés confidentiels)?

OUI ❑

Occupation: _____

Tes tâches: _____
_____
_____

Combien d'heures/sem.? _____

Salaire de l'heure _____ $

Depuis quand es-tu à cet emploi? inscrire la date date: ____/____/

NON ❑

As-tu déjà eu un emploi?

Oui ❑ Non ❑

Pendant combien de temps? ____ an(s) ____ mois

Quand as-tu arrêté de travailler? ____/____/
AN MO

Au cours des 12 derniers mois, as-tu bénéficié de:

Oui ❑ Non ❑ l'Assurance chomâge?
Oui ❑ Non ❑ Prestations d'aide sociale?
Oui ❑ Non ❑ la CSST? (préciser:_____)

7. **Informations sur le conjoint (renseignements gardés confidentiels):**

a) Son nom:_____ Date de naissance ____ ____ ____
AN MO JR

Son occupation:_____

Ses tâches:_____

Son salaire: _____ $/ heure
Nombre d'heures _____ / semaine

Il/Elle travaille là depuis: date ____ ____
AN MO

b) Au cours des 12 derniers mois, a-t-il/elle bénéficié de:

Oui ❑ Non ❑ l'Assurance chomâge?
Oui ❑ Non ❑ Prestations d'aide sociale?
Oui ❑ Non ❑ la CSST?
(préciser:_____)

c) Sa scolarité complétée (dernière année terminée):_____

En quoi? (spécialisation/général):_____

Étudie-t-il (elle) présentement? OUI : Temps plein ❑ partiel ❑
NON ❑

Si oui, diplôme postulé?_____ pour quand? (date) ____/____/

8. **Informations sur le père (si n'habite pas avec la mère)**

a) Son nom:_____ Date de naissance ____ ____ ____
AN MO JR

Son occupation:_____

Ses tâches:_____

Son salaire: _____ $/ heure
Nombre d'heures _____ / semaine

Il/Elle travaille là depuis: date ____ ____
AN MO

b) Au cours des 12 derniers mois, a-t-il/elle bénéficié de:

Oui ❑ Non ❑ l'Assurance chomâge?
Oui ❑ Non ❑ Prestations d'aide sociale?
Oui ❑ Non ❑ la CSST?
(préciser:_____)

c) Sa scolarité complétée (dernière année terminée):_____

En quoi? (spécialisation/général):_____

Étudie-t-il (elle) présentement? OUI : Temps plein ❑ partiel ❑
NON ❑

Si oui, diplôme postulé?_____ pour quand? (date) ____/____/

9. **Disponibilité pour le test parent-enfant**

- ❑ Le matin
- ❑ L'après-midi
- ❑ La semaine
- ❑ La fin de semaine

S.V.P. Vérifier l'adresse et les numéros de téléphone.

_____ _____
No Rue app.

_____ _____ _____
Ville Code postal

Téléphones☎: Personnel: (_____) _____ - _____
Travail: (_____) _____ - _____
Parents: (_____) _____ - _____
Autre _____: (_____) _____ - _____

Ton numéro de téléphone personnel est à quel nom dans l'annuaire téléphonique: Nom complet et lien avec toi:

_____

Adresse des parents:

_____

_____

Appendix E

The Maternal Teaching Observation System:
A coding system for rating the quality of maternal teaching style

The Maternal Teaching Observation System (MTOS)

This manual contains the operational definitions of the constructs included in the Maternal Teaching Observation System (MTOS). This coding system was designed to study the quality of maternal teaching in the context of a puzzle task involving women and their offspring, aged 42 to 72 months.

The use of this coding system requires that each teaching interaction be viewed twice. During the first viewing, a number of global ratings related to the interaction styles of each member of the dyad as well as their contribution to the completion of the puzzle are made. Following this, the occurrence of specific maternal teaching behaviors is recorded after each 15-second interval of the interaction.

Global Ratings

This series of codes consists of overall impressions and summation ratings evaluating the mother's and child's behavior during the teaching interaction.

I. Maternal structuring of the task

This code refers to an overall impression of the extent to which the mother sets up the physical environment surrounding the task with the goal of structuring the activity for her child and facilitating the completion of the puzzle. The mother is given a score of one for performing each of five structuring actions. A global rating of maternal structuring of the task is obtained by summing the mother's scores on each of the five codes. The structuring actions considered are the following:

Codes:

1. The mother gets the child's attention on the puzzle. For example, she suggests that the task will be enjoyable, and that she is excited about playing with the puzzles herself.

2. If necessary, the mother makes room to be able to play with the puzzle, by putting other toys aside.

3. The mother sets up the physical environment to promote involvement of both partners. For instance, she sits besides her child and puts the puzzle in front of them.

4. The mother takes out all the puzzle pieces from the puzzle bag.

5. The mother puts all the puzzle pieces face up.

II. Maternal involvement

This code refers to an overall impression of the extent to which the mother is involved in the task, and displays interest in working with her child. Does she appear sensitive to the child's needs, providing guidance when required? Does she physically and verbally interact with her child? This code is used following each one-minute interval of the interaction. If the mother is considered to be involved, she receives a score of one, whereas a score of zero is assigned when the mother appears disengaged. A global rating of maternal involvement is computed by summing the scores given to the mother throughout the puzzle task.

Codes:

1. Involved: this code is employed when the mother makes use of frequent eye contact, and often verbally interacts with her child. Further, she closely monitors her child's performance and behaves accordingly. If the child is struggling with the puzzle, she gets more involved. If however, the child is successfully completing the task, the mother allows the child to work independently.

2. Disengaged: this code is used when eye contact and verbal interactions initiated by the mother are rare. The mother is either detached from the situation or preoccupied with the completion of the puzzle, at the expense of helping the child master the task. She fails to respond to the child's questions or requests for assistance. The mother's attitude suggests that the child's learning experience is not of primary concern.

III. Maternal directive style

This code represents a global impression of the extent to which the mother's teaching style is directive and controlling. Does she use many commands while interacting with her child? Does she fail to provide explanations and rationales for her instructions? This code is used following each one-minute interval of the interaction. A global rating is computed by summing the scores given to the mother at each of the intervals.

Codes:

1. Very directive: this code is used when the mother consistently orders her child instead of making use of suggestions. She systematically neglects to provide rationales for her instructions. She exerts complete control over the puzzle task.

2. Somewhat directive: this code is employed when the mother uses commands during the teaching task, but not consistently. She usually attempts to explain to her child how her instructions will facilitate the completion of the puzzle.

3. Not at all directive: This code is used when the mother employs very few commands, instead making suggestions to the child regarding the completion of the task. Her suggestions are accompanied by rationales and explanations.

IV. Maternal cognitive stimulation

This code reflects an overall impression of the extent to which the mother stimulates her child intellectually. Does she encourage independent thinking by her child, transferring to him/her a large part of the responsibility for the completion of the task? Does she use the puzzle to attempt to teach new things to her child? This code is used following each one-minute interval of the interaction.

Codes:

1. High cognitive stimulation: this code is used when the mother is consistently stimulating her offspring. She encourages the child to think about the steps needed in order to complete the puzzle, by asking many questions and (when possible) letting the child take over the responsibility for the completion of the task. The mother attempts to stimulate the child above his/her current level of ability, while providing sufficient guidance in order to ensure that the child is successful.

2. Moderate cognitive stimulation: this code serves to describe a mother who attempts to stimulate her child, but does so inconsistently. When she questions her child or attempts to teach him/her something, she usually underestimates the child's current level of ability and knowledge.

3. Low cognitive stimulation: this code is employed when the mother's cognitive demands toward her child are minimal. She does not encourage independent mastery of the task, and neglects to attempt to teach new things to her child.

V. Child success

This code represents a global rating of the extent to which the child is successful in completing the task independently, without requiring constant maternal intervention. This code is used following each one-minute interval of the teaching interaction. A total score is obtained by summing the scores attributed to the child throughout the puzzle task.

Codes:

1. Totally successful: this code is used when the child is able to perform the task with minimal maternal assistance. It appears obvious that the child knows how to complete the puzzle. The child works in a systematic, as opposed to trial-and-error fashion, and rarely hesitates or guesses.

2. Moderately successful: this code is employed when the child sometimes hesitates or seems to be guessing. He or she uses the mother's guidance, but is also able to place some pieces independently.

3. Unsuccessful: this code is used when the child requires a lot of guidance from the mother in order to complete the puzzle. The mother practically has to take over the puzzle task.

VI. Child Involvement

This category represents a global impression of the extent to which the child is involved in the task, focused, and compliant. Does the child remain attentive throughout the teaching interaction? This code is used following each one-minute interval. A total score is obtained by summing the scores obtained by the child at each of the intervals.

Codes:

1. Involved: this code is used when the child remains focused on the task and compliant toward his/her mother's instructions and guidance throughout the time period.

2. Sometimes distracted: this code is employed when the child is distracted at one point during the one-minute interval. The episode of distraction should not last more than 30 seconds.

3. Uninvolved/noncompliant: this code is used when the child is distracted for a period of more than 30 seconds during the one-minute interval.

Specific Teaching Behaviors

Within this category of codes, the focus is on the specific actions performed by the mother during the teaching interaction. After each 15-second interval, record the presence of any of the following specific teaching behaviors. If a behavior spans two intervals, it must be recorded in the interval in which it begins. A total score on each of the specific teaching behaviors is obtained by summing the scores given to the mother at each of the intervals.

1. Suggestions/Strategies: this code is used when the mother makes suggestions related to what should be done next in order to complete the task (Ex: "Tu devrais commencer par le contour, ce sera plus facile après"). This code also refers to instances where the mother invites the child to notice certain characteristics of the puzzle such as shape and color that will help the child decide what to do next (Ex: "Regarde les formes attentivement"). Finally, this code is used when the mother invites the child to observe a demonstration of the appropriate behavior.

2. Non-verbal directives: this code is used when the mother physically indicates where a piece of the puzzle goes, usually by pointing. As well, the mother indicates what piece is needed next by moving it within her child's reach. Not coded when used to describe/label some part of the puzzle (use the code "Labels and Descriptions").

3. Labels and Descriptions: this code is used anytime the mother labels some part of the puzzle. She reconstructs the picture in order to help the child see what is needed at a certain spot (Ex: "Le petit garçon joue au ballon").

4. Questions: this code is used when the mother asks a question of her child that is intended to help the child think of what to do in order to complete the task (Ex: "De quoi avons-nous besoin ici?"). The mother may also use questions to stimulate the child intellectually or to teach the child something (Ex: C'est une vache; quel bruit fait la vache?). Not coded when it's a strategy/suggestion formulated as a question (use the code "Suggestions/Strategies").

5. Puts a puzzle piece: this code is used when the mother actively participates in the completion of the puzzle by placing a piece herself. Not coded when the mother simply moves a piece that the child already put down.

6. Verbal praise: this code is used when the mother provides encouragement or praise. Positive affect is evident from the tone of the comment.

7. Negative intervention: this code includes two different types of intervention:

A. Negative verbal intervention: this code is used when the mother comments on the child's performance in a negative way, using a disapproving tone or displaying negative expectations. Not used when the mother provides a kind of didactic feedback where she simply tells the child that he/she made a mistake.

B. Negative physical intervention: this code is used when the mother obstructs the child's activities. She takes a piece out of the child's hands or attempts to do so, without giving the child the opportunity to try to put it down on the puzzle.