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The influence of child temperament on cognitive competence in a high-risk
intergenerational sample: Risk or protective factor?

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A Thesis

in

The Department

of

Psychology

Presented in Partial Fulfillment of the Requirements
For the Degree of Masters of Arts at
Concordia University
Montreal, Quebec, Canada

July 2000

Canada

Abstract

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This study examined the role of child temperament in the relationship between
parental risk status and cognitive competence. Three main questions were addressed: 1)
Does parental risk status predict child temperament? 2) Does child temperament act as a
mediating variable between parental risk status and cognitive functioning? Importantly,
does temperament operate as a risk or protective factor? and 3) What is the nature of the
relationship between child temperament and cognitive functioning? These questions were
explored within a subsample of high-risk mothers and their infant and preschool-age
offspring from the Concordia Longitudinal Risk Project. This longitudinal investigation,
which started in 1977, identified lower SES individuals as being highly aggressive and/or
withdrawn in childhood. Many of these individuals now have children of their own,
which provides a unique opportunity to investigate the trajectories of risk and resilience
across generations. Contrary to expectations, parental risk status was not a significant
predictor of child temperament in either infants or preschoolers. In the infant subsample,
child temperament operated as a risk factor for lower cognitive performance and worked
directly to influence IQ, even after controlling for current psychosocial variables. In the
preschool subsample, child temperament operated indirectly, through the home
environment and parental social support, in predicting children's intelligence scores. The
findings are discussed in terms of their implications for taking a developmental approach
when studying child outcomes, and the processes by which children's cognitive
competence is placed at risk.

Acknowledgements

The past two years have been such a challenging and rewarding experience for me, and this thesis would not have been possible without the assistance of many people. First, I would like to thank my supervisor, Lisa Serbin, for sharing her vast knowledge of high-risk populations and for her help with conceptualizing and interpreting my findings. I would also like to thank the members of the High Risk Lab for their assistance, especially Claude Senneville, who was invaluable in data analysis. A special thank-you to Christina Saltaris and Jessica Cooperman for their advice, ideas, editing and most of all, their supportive friendship. I also want to acknowledge my coding partner, Rosa Natale, who spend countless hours in front of a television set with me and helped to refine my coding system.

Many thanks to Alex Schwartzman and Michel Dugas for their helpful contributions to my proposal, and for reviewing my thesis.

I would also like to extend a huge thank-you to my friends and family, especially my Mom, Dad and brother Jeff for taking an interest in everything I do, and providing endless love and support.

Last but not least, I am eternally grateful to Paul Basevitz, my future husband, for his unconditional love, friendship, support and encouragement..... and for putting up with me, despite my sometimes "difficult" temperament.

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Traditionally, studies within the field of developmental psychopathology have

either focused on risk or resilience, and while emphasizing one set of variables have often

excluded others. The risk approach attempts to identify person-centered factors or aspects

of an individual's environment that are associated with an increased likelihood of

psychological dysfunction and/or physical illness (Nollan, Arthur, Pecora, Hawkins &

Dillon, 1999). Risk is associated with exposure to life demands and stressors, and also

involves personal deficits that become clinically relevant when challenged by

precipitating conditions. Some well-known risk factors include parental psychopathology,

family discord, child's temperamental characteristics, substance abuse and low

socioeconomic status (Jensen, Bloedau, Degroot, Ussery, & Davis, 1990). Conversely,

the resilience approach involves identifying personal or environmental resources that are

related to sustaining good mental and physical health during stressful life periods.

Resilience is defined as the capacity of individuals, families, groups and communities to

cope successfully in the face of significant adversity or risk (Cicchetti & Garmezy, 1993;

Egeland, Carlson & Sroufe, 1993). This capacity changes over time, is enhanced by

protective factors in the individual and the environment, and contributes to the

maintenance and enrichment of health (Health Canada, 1998). Examples of protective

factors are family social support, marital harmony, adequate income levels and an

easygoing disposition (Cowen & Work, 1988; Holahan & Moos, 1987; Rende & Plomin,

1993). It is important to examine both risk and resilience across the life span in order to

elucidate the role that various biological, psychological and environmental factors play in

promoting or inhibiting positive adaptation.

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Temperament in the first few years of life has been proposed as a predictor and/or precursor of many developmental outcomes, including externalizing and internalizing behaviour problems as well as adaptive functioning in childhood. In other words, child temperament can act as either a risk or protective factor.

Definitions of temperament

There are different conceptualizations of temperament although the majority of theorists agree that it has biological underpinnings, can be observed as early as infancy, and is stable across the life-span. In a landmark roundtable discussion on temperament (Goldsmith, Buss, Plomin, Rothbart, Thomas, Chess, Hinde, & McCall, 1987), Alexander Thomas and Stella Chess characterized temperament as the way in which an individual behaves, which is apparent in the early infancy period. Environmental factors influence the expression and nature of temperament throughout the course of development. Temperament is believed to interact with other psychological attributes in a transactional system over time, and is differentiated from motivations, abilities and personality. Additionally, temperament is a characteristic of a child that mediates the influence of the environment and the expression of temperament is affected by the social context (Goldsmith et al., 1987). Thomas and Chess define temperament on a solely descriptive level, without any speculation as to what causes individual differences in temperament (Strelau, 1998).

Thomas and Chess (1977) described 9 dimensions of temperament including rhythmicity of biological functions, activity level, approach to or withdrawal from new stimuli, adaptability, sensory threshold, mood, intensity of mood expression, distractibility and persistence. Based on a factor analysis of these dimensions, infants

have been characterized as having an "easy" or "difficult" temperament. A child with an observable "difficult" temperament shows slow adaptability to change, high activity level, negative mood, a tendency to withdraw from novel situations and stimuli, biological functions that are irregular and intense emotional reactivity. In comparison, a child labeled as having an "easy" temperament has a tendency towards approach instead of withdrawal, positive mood, quick adaptability, regularity, and mild or moderate emotional reactivity. Many studies have found that a difficult temperament operates as a risk factor for behavioural problems, lower cognitive performance on intelligence tests and later psychopathology, while an easy temperament works to buffer these negative outcomes (Collins, Maccoby, Steinberg, Hetherington & Bornstein, 2000; Kyrios & Prior, 1990; Luthar & Zigler, 1991; Prior, 1992; Rothbark & Ahadi, 1994; Tschann, Kaiser, Chesney, Alkon, & Boyce, 1996; Werner, 1993).

Thomas and Chess consider the interaction between individual characteristics and the social environment to be the main cause of normal and abnormal development. In their interactional theory of temperament, the concept of "goodness of fit" became a crucial construct to help explain why some children with a difficult temperament develop psychosocial problems while others do not (Strelau, 1998). Thomas and Chess (1977) postulated that temperament should never be examined in isolation, but always in relation to the fit between the individual's style of behaving and the external environment. Beginning in infancy, children with difficult temperaments present challenging discipline and management issues for parents. When there is agreement between the child and the parent's way of interacting, there is a strong possibility of optimal development. A "poorness of fit" results when parents respond in ways that make it hard for children to

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adapt. If this occurs, then there is an increased likelihood that a behaviour problem will evolve. Prior (1992) pointed out that on its own, temperament is not a risk factor for poor adjustment. It asserts its impact in combination with other significant environment, relationship and biological variables. There are many factors which mediate the influence of temperament on child functioning. These include parental psychological functioning and personality, child rearing practices, stress and social support. For example, social support has been found to buffer the effect of a difficult temperament on children's adaptation to divorce (Prior, 1992).

Correlates of temperament

Biological. The majority of temperament definitions emphasize biological theories of development. Research indicates that genetics do play a role in determining individual differences in temperament (Plomin & Rowe, 1977; Segal, 1990). Furthermore, temperamental traits have been demonstrated to be among the first stable behavioural characteristics evident from birth (Buss & Plomin, 1984; Kohnstamm, Bates & Rothbart, 1989). Carey (1986) described three main categories of clinical conditions that may affect temperament. These included: 1) genetic, chromosomal and other congenital abnormalities, 2) pregnancy and perinatal stress, and 3) postnatal insults to the nervous system. Research in this area has not revealed many conclusive answers with regards to what type of factors influence temperament. Carey (1986) stated that it is important to consider not only biological and genetic origins of temperament, but also the psychosocial environment in order to gain a broader understanding of where temperament comes from.

Psychosocial. Little research has been conducted to determine the psychosocial correlates of temperament in infancy and preschool-age children. So far, the available findings have been mixed regarding the influence of maternal personality characteristics. Anette Enger undertook a longitudinal study to assess the antecedents of perceived difficult temperament. She found that maternal personality problems measured at 4 months after delivery, such as depression, inhibition, neuroticism and emotional irritability, were related to perceived child difficultness at 18 months of age. As well, marital conflict, lack of communication and lack of social support were also related to perceived difficult child characteristics (Kohnstamm, 1984). In a study of 4-month-old infants, Sameroff, Seifer and Elias (1982) discovered significant correlations relating high maternal anxiety to aspects of difficult child temperament (i.e. low rhythmicity, poor adaptability, low approach and negative mood). One explanation was that mothers who were highly anxious may have rated their children more negatively on the temperament questionnaire used in the study. Lerner and Galambos (1985) found that mothers who were dissatisfied with their roles showed more rejection of their children, and consequently had more difficult children. Conversely, Thomas and Chess (1977) reported that over the years they have not detected any significant personality qualities in mothers of children with difficult as opposed to easy temperaments.

There are also ambiguous findings concerning environmental correlates of difficult temperament. In cross-sectional studies, temperament has not been associated with socioeconomic status (Maziade, Boudreault, Thivierge, Caperaa, & Cote, 1984). Yet, other research has found dissimilar results. Sameroff, Seifer and Elias (1982) discovered that children of lower-SES mothers had more difficult temperaments.

Maternal education has rarely been considered as a correlate of difficult temperament but may be an important variable, seeing as it plays a critical role in children's cognitive functioning, psychopathology and academic competence (Auerbach, Lerner, Barasch, & Palti, 1992).

Gender differences appear to influence the expression of a difficult temperament. Sex differences in temperament are apparent from preschool age on and increase in magnitude as children get older. Studies have discovered that boys have a higher activity level and display greater negative emotionality than girls (Auerbach et al., 1992; Caspi, Henry, McGee, Moffitt, & Silva, 1995; Earls & Jung, 1987). For example, Maziade et al. (1985) found that 7-year-old boys in the general population were overrepresented in the temperamentally difficult group, which suggests that boys may be at a higher risk for developing a difficult temperament compared to girls. Overall, it appears that gender is an important factor to consider when examining child temperament.

Even though maternal personality characteristics, environmental factors and gender appear to play a role in influencing a child's temperament, there is still ambiguity with regards to what constitutes a stable psychosocial correlate of temperament.

Measurement of temperament

Maternal reports. Child temperament is most frequently assessed through maternal reports. Some critics have claimed that mother ratings of temperament are biased because they can be seen as a projection of parental personality, or as a social percept (Allen & Prior, 1995; Bates, 1980; Bates & Bayles, 1984; Kohnstamm, Bates, & Rothbart, 1989; Lancaster, Prior & Adler, 1989). For example, Vaughn, Bradley, Joffe, Seifer and Barglow (1987) found that the Carey Infant Temperament Questionnaire

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lacked discriminant validity, because the maternal responses given reflected more of the mother's personality than that of her child. Infants who were categorized as difficult through maternal reports had mothers who were more anxious, suspicious and impulsive before the birth of their child than mothers of easy infants. Therefore, these authors concluded that this particular questionnaire has limited use in identifying infants with a difficult temperament. Even so, maternal ratings have provided a rich source of information about children's day-to-day functioning. Several studies have found modest correlations between mother reports of temperament and objective observer ratings ($\underline{r}$ = .14-.36), which offers some validation for the concept of temperament (Bates & Bayles, 1984). In order to provide a more complete picture of a child's temperament, it is also useful to employ observational measures.

Observational methods. Thomas and Chess (1977) have stressed the importance of using naturalistic observations, in order to ensure that studies on temperament have high external validity. One method for assessing temperament is through home observations, which is mainly used for infants and children not exceeding kindergarten age. Home observations are based on the assumption that the home is the most natural and influential environment for children until they reach school-age. Parent-child interactions are necessary for the behavioural expression of the child's temperament. On average, interrater agreement on temperament characteristics based on home observations is approximately .80 (Strelau, 1998). Seifer, Sameroff, Barrett and Krafchuk (1994) conducted a study examining both observers and mothers rating of 50 infants during home visits, once a week for 8 weeks. They found that the observer-mother correspondence was low and ranged from .07 to .30. The authors concluded that parent

reports do not provide much information about actual infant behaviour, and recommended the use of direct observations to measure child temperament. Therefore, naturalistic observations appear to be an objective method which provides ecological validity.

The disadvantage of utilizing a naturalistic setting is minimal control of the situation in which children's behaviour is recorded. Additionally, coding behaviour during observations is biased by the observer's limited ability to capture the entire range of relevant behaviour. Nonetheless, the accurate measurement of temperament is crucial, considering that it is a powerful predictor of many developmental outcomes.

Temperament as a predictor of cognitive functioning

There appears to be an association between child temperament and cognitive competence. Maziade, Cote, Boutin, Bernier and Thivierge (1987) argued that it is important to examine the interplay between temperament, IQ and family variables in infancy and preschool years, in order to shed light on the interactions between environment and child characteristics. Furthermore, both temperament and IQ can be studied as risk and protective factors, and the investigation of these factors can help us to understand the future appearance of disorders.

Infants. Studies have found that a decrease in infants' cognitive performance, as measured by the Bayley Mental Scales, was significantly associated with characteristics such as low adaptability, low persistence, withdrawal from new stimulation and low rhythmicity (Ross, 1987; Roth, Eisenberg, & Sell, 1984). From these data, it was unclear whether a causal relationship existed between temperamental characteristics and cognitive functioning. Wachs and Gandour (1983) conducted a study with 6-month-old

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infants, which examined the temperament-cognitive development relationship, along with interactions with the physical and social environment. The outcome measure was the infant's performance on the Infant Psychological Development Scale, which assesses sensorimotor intelligence. The authors found a direct relation between temperament and numerous aspects of sensorimotor intelligence. Furthermore, infants with easy temperament were more adaptively responsive to both physical and social environments than infants with difficult temperament. Fagen, Singer, Ohr and Fleckenstein (1987) carried out a study examining the connection between infant temperament, as assessed by the Rothbart Infant Behavior Questionnaire, and the Bayley Scales of Infant Development (BSID) at 4, 8, and 12 months of age. They found that activity level was positively related to the mental development index (MDI) at every age tested, which is somewhat contradictory given that a high activity level has been associated with difficult temperament. In general, they discovered that only 10% of the variance in BSID scores at 4 and 8 months could be accounted for by variance in temperament, and concluded that temperament was a minor factor influencing test performance.

Preschoolers. With regards to children who are preschool-age and older, the findings concerning the prediction of intelligence from temperament have been mixed. Thomas and Chess (1977) were unable to find a connection between temperament and IQ in over 500 children in grades 3 through 6. Conversely, in a longitudinal study on temperament and IQ in children from infancy to 5 years, Maziade et al. (1987) demonstrated an indirect relationship. Specifically, using the categories of easy, difficult and average temperament in infancy, the authors found that at age 4.5 years the children's intelligence, as measured by the WISC, was significantly correlated with temperament in

the middle and upper social classes. Interestingly, children characterized by a difficult temperament had higher IQ's. Maziade et al. (1987) concluded that in order to shape the child's style in a more desirable way, parents likely paid more attention to these children. Consequently, children with difficult temperaments may receive more parental stimulation than easy children, who are more readily left to themselves. An alternative explanation is that characteristics of a difficult temperament, such as high activity level, may be positively related to IQ.

It may also be that upper-class parents are different from lower-class parents in their manner of intellectual stimulation. Studies have found that upper and middle class parents provide more stimulation (Dodge, Pettit & Bates, 1994; Tulkin & Kagan, 1972). Therefore, an environment which provides opportunities for stimulation may be an important mediator in the relationship between temperament and IQ. Gauvain and Fagot (1995) discovered that children who were rated as having a difficult temperament on the Toddler Temperament Scale received more cognitive assistance from their mothers, as well as greater maternal involvement in challenging aspects of a joint problem-solving task. The data suggest that although the temperament trait of difficultness may be considered undesirable at one time in a child's life, it may offer advantages at another. Moreover, a difficult temperament may work to benefit children in middle to high SES samples, because it appears to facilitate parental stimulation. It is possible that parents in upper-class families see their difficult child as a challenge, rather than a source of irritation, and possess both the resources and the education to manage them in a constructive fashion.

The relationship between temperament and intelligence may differ depending on whether it is measured in infants or preschool-aged children. Often these two groups utilize dissimilar intelligence measures, and examine different aspects of cognitive development. Many researchers argue that temperament is only predictive of later functioning from age 3 onwards (Bates, 1980; Chess & Thomas, 1984; Daniels, Plomin, & Greenhalgh, 1984). Furthermore, Strelau (1998) asserted that the pattern of difficult temperament may be age-specific, so that what constitutes a difficult temperament in infancy may be different for preschool-age children. Therefore, it seems to be developmentally appropriate to examine infants and preschoolers separately to determine how temperament operates to predict intelligence.

Temperament in high-risk samples

In the general population, temperament can operate as a risk or protective factor for a variety of child outcomes. It is imperative to understand the nature of the relationship between temperament and competence in high-risk samples, because these populations may be particularly vulnerable to the negative effects of a difficult temperament.

Temperament as a protective factor. One of the factors that predicts competence in children at risk for psychosocial problems is an easy temperament, because it facilitates responsive parenting and leads to more adaptive parent-child interactions (Rutter, 1985). In Werner and Smith's (1992) Kauai Longitudinal Study, which followed 505 high-risk men and women from the perinatal period to early adulthood, they examined the impact of various biological and psychosocial risk factors and stressors on individual development. One key finding was that in infancy and early childhood,

temperamental characteristics discriminated between the resilient children and their non-resilient peers. More specifically, characteristics such as alertness, autonomy, positive social orientation and a tendency to seek out novel experiences by age 2 differentiated high-risk children who were resilient from those who developed serious learning and/or behaviour problems by age 10.

Smith and Prior (1995) also found that a positive temperament (low emotional reactivity and high social engagement) most successfully discriminated high-risk children displaying resilience on behavioural and social competence at home and at school. Furthermore, in other studies of children living under high-risk conditions of poverty and environmental stress, positive child temperament has been found to reduce the risk for psychiatric disorders and improve the likelihood of adaptive functioning (Wyman et al. 1999; Wyman, Cowen, Work, & Parker, 1991). Consequently, positive temperamental characteristics appear to be an important protective factor for children who are at-risk for a variety of psychosocial difficulties. It could be hypothesized that children with easy temperaments are protected from adverse outcomes because they are able to internally regulate themselves, despite an unstable and maladaptive external environment. On the other hand, temperamentally difficult children are placed at further risk in an inconsistent environment because they lack the personal resources to stabilize themselves.

Temperament as a risk factor. A difficult temperament appears to function as a risk factor in high-risk populations. In a study of low income families, Ahuja et al. (1999) found that infants reported to be more irritable demonstrated lowered emotional regulation. Parents who structure the external environment may help to regulate their child's temperamental reactivity. Therefore, children who do not possess adequate self-

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regulation, and who do not have parents that organize their surroundings may be at particularly high risk for future problems. Harrington, Black, Starr and Dubowitz (1998) conducted a study examining perceived child temperament, neglect and family context in a sample of 121 low-income mothers with a child under 30 months of age. They discovered that maternal reports of more difficult child temperament predicted emotional neglect. In this particular sample, difficult temperament seemed to function as a risk factor for child maltreatment.

In studies of at-risk children who have mentally ill parents, temperament has been found to be a vulnerability factor for maladjustment. Rutter (1987) described a four-year longitudinal family illness study, where children with adverse temperamental features were more likely to be the target of parental hostility, criticism and irritability than other children. These depressed parents appeared to scapegoat the children with difficult temperaments, and had little external support on which to rely. Taken together, these studies highlight the fact that while an easy temperament operates as a protective factor in high-risk populations, a difficult temperament may place children at additional risk for maladaptive outcomes.

Intergenerational transmission of risk

Children with problem dispositions are likely to carry them into adulthood (Caspi & Elder, 1988; Elder, Caspi, & Downey, 1986). This type of disposition can be one of the factors that leads to marital discord, family conflict and negative parent-child relationships. The next generation of children may subsequently experience adjustment problems. Therefore, it is crucial to consider the relationship between parental childhood disposition, their own children's temperament and child outcome. Difficult children may

elicit more negative reactions from parents and receive less stimulation in low-SES and high-risk samples. Easy children, on the other hand, may have more positive outcomes regardless of family context because they do not require as much attention or assistance. Lee and Bates (1985) found that 2-year-old children rated as difficult were more likely to have conflictual interactions with their mothers than easy or average children. Furthermore, mothers of such children were likely to use more intrusive control strategies, which may be indicative of an overall negative quality of the mother-child relationship. This coercive interaction style may have resulted from a "poorness of fit" between the mother's behavioural tendencies and her child's difficult temperament. Consequently, temperament may act as a mediator in the transfer of risk across generations. One way to examine the intergenerational transfer of risk is through longitudinal studies that can help clarify processes of risk and resilience (see Loeber & Farrington, 1994, for a review of studies). Due the expense and time involved in longitudinal research, only a limited number of these particular studies exist (Wierson & Forehand, 1994). Overall, they have tended to provide support for the transmission of risk from parents to offspring. Elder et al. (1986) conducted a longitudinal study examining the intergenerational transmission of risk across four generations. One interesting finding was that from the first to second generation, unstable personalities were reproduced through marital tension and parent hostility. Furthermore, unstable parents in the second generation were found to have a higher probability of having difficult children in the third generation, based on aversive family processes. Longitudinal studies, therefore, can provide valuable insight into the developmental processes that occur within families across time.

The Concordia Longitudinal Risk Project

The Concordia Longitudinal Risk Project is a prospective, longitudinal investigation designed to assess the developmental trajectories of individuals identified as highly aggressive, withdrawn, both aggressive and withdrawn, or low on both dimensions (contrast group) in childhood. The project started in 1977 with 4,109 school children screened in grades 1, 4, or 7 (Ledingham, 1981; Schwartzman, Ledingham, & Serbin, 1985). All of the children attended French language public schools in low-income areas of Montreal. The children were screened for aggression, social withdrawal and aggression/ withdrawal using a French translation of a peer nomination instrument called the Pupil Evaluation Inventory (PEI; Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976). A normative comparison group was selected concurrently. One unique feature of the study was that it included approximately equal numbers of boys and girls in each of the groups, and relied on gender-based norms. Specifically, the aggressive girls were compared to other girls in their classes, not to boys. In order to more fully understand the potential pathways of individuals who display aggression and social withdrawal in childhood, it is useful to review the literature on these behavioural tendencies.

Aggression. Aggression has been defined in terms of both "confrontive" forms (i.e. physical and verbal acts such as kicking and arguing) and "nonconfrontive" forms (i.e. indirect acts such as harming a peer's relationship and gossiping). Children who display confrontive forms of aggression are at risk for early relationship problems because they tend to alienate others (Ladd & Burgess, 1999). This type of aggression is most often seen in boys, and has been demonstrated to be stable over time and predictive of antisocial behaviour later in life (Keenan, Shaw, Delliquardri, Giovannelli & Walsh,

1998; Moskowitz, Schwartzman, & Ledingham, 1985; Olweus, 1979). Fewer studies have addressed aggressive behaviour in girls. The available information indicates that there is moderate stability for aggression in girls and less negative outcomes than boys, in the domains of antisocial personality disorders and criminal behaviour (Serbin, Moskowitz, Schwartzman, & Ledingham, 1991). One potential reason for the lower incidence of aggression in females versus males may be the types of aggression that are examined. Specifically, earlier studies compared girls and boys on confrontive forms of aggression which are more salient for boys. Girls are more likely to engage in nonconfrontive aggression, which is also known as relational aggression. Relational aggression can be defined as attempts to hurt another's reputation, gossip about others and exclude peers from group activities (Crick, 1995; Crick & Grotpeter, 1995). Serbin, Peters, McAffer and Schwartzman (1991) discovered that a childhood pattern of aggression in girls predicted poor school achievement, early sexual activity and adolescent pregnancy. Overall, aggression has been found to be relatively stable across time and predictive of negative outcomes for both males and females.

Social withdrawal. Social withdrawal encompasses the constructs of behavioural inhibition, passive withdrawal and shyness. Even though withdrawal may lead to negative outcomes, less is known about its consequences relative to aggression. Evidence suggests that social withdrawal predicts internalizing problems, such as low self-esteem, anxiety and depression. Children who prefer not to interact with others are less likely to learn social skills that are essential to relationship formation, and may consequently experience problems in their social interactions (Ladd & Burgess, 1999). Despite the fact that some researchers have argued that withdrawal is not a stable behavioural

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characteristic, studies that have followed children sampled from the community have disconfirmed this and asserted that it may be a risk factor for later psychosocial problems (Moskowitz et al., 1985).

Aggression and social withdrawal. Little is known about the risks posed by children with characteristics of both aggression and withdrawal. Research conducted on these children has shown that they exhibit higher levels of academic failure and peer rejection (Ledingham & Schwartzman, 1984). Ladd and Burgess (1999) found that aggressive/withdrawn children displayed a pattern of relationship difficulties that was more diverse and enduring than both aggression and withdrawn groups individually. Specifically, these children were less liked by classmates, had fewer friendships, higher levels of victimization and were found to be more lonely. Consequently, this group may be particularly at risk to develop severe mental health problems.

Prior findings from the Concordia Longitudinal Risk Project. Previous research has determined that many of the individuals in the Concordia Longitudinal Risk Project are at risk for a variety of health and psychosocial difficulties, including substance abuse, psychiatric problems, gynecological problems, early pregnancy and low school achievement (Moskowitz & Schwartzman, 1989; Serbin, Moskowitz, Schwartzman & Ledingham, 1991; Serbin, Peters, McAffer & Schwartzman, 1991). Many of the original participants are now having children of their own. Studies of these individuals and their children have revealed some evidence for parenting problems and the transmission of risk to the next generation. For example, both mother's childhood aggression and social withdrawal was associated with maternal unresponsiveness during mother-child interactions and developmental lags in their offspring (Cooperman, 1996; Serbin, Peters

et al., 1991). Furthermore, both maternal aggression and withdrawal predicted aggressive child behaviour during the interactions.

Bentley, Stack and Serbin (1998) conducted a study using a subsample of 42 mother-child dyads, with children aged 12 to 42 months. They assessed the quality of the mother-child relationship during a free-play session, and found that mother's childhood risk status predicted poor parenting practices. Specifically, mothers who were classified as both aggressive and socially withdrawn were more likely to show hostile behaviours when playing with their children. Other research has found that mother's childhood aggression was predictive of lower intelligence as well as externalizing behaviour problems in the second generation (Stack et al., 1999). Saltaris (1999) discovered that maternal aggression predicted less cognitive stimulation during a puzzle task with children aged 42-72 months. Mother's childhood withdrawal, on the other hand, was indirectly related to a lack of proper stimulation materials in the home. Taken together, these findings reveal that being identified as aggressive, withdrawn, or aggressive-withdrawn places individuals at risk for a variety of psychosocial problems during the course of their lives. These childhood behavioural tendencies appear to remain fairly stable and affect parent-child relationships in the second generation. They may also set the stage for poorer home environments based on low educational attainment, early pregnancy, lower socioeconomic status and parenting stress.

The Present Study

Although there is some research indicating that both parental risk status and child temperament affect children's cognitive functioning, no study to date has specifically addressed the role of observed child temperament in the relationship between parental

risk status and cognitive competence in a high-risk intergenerational sample. The main goal of the study was to determine whether temperament functions as a risk or protective factor in the prediction of intellectual functioning, and to explore the role of temperament as a mediating variable. Three main questions that were addressed included: 1) Does parental risk status predict child temperament? 2) If so, does child temperament act as a mediating variable between parental risk status and cognitive development? Importantly, does temperament operate as a risk or protective factor? and 3) What is the nature of the relationship between child temperament and intellectual functioning?

The construct of child temperament was measured by behavioural observations during mother-child interactions, and as such is considered to be the behavioural style of the child. The children's cognitive functioning was studied as an outcome variable, in order to ascertain whether parents' childhood levels of aggression and/or social withdrawal and child temperament could predict children's competence.

Prediction of child temperament and cognitive functioning from parental risk status

Rationale for predictors. The first and second questions that were investigated in this study concerned the prediction of child temperament and cognitive functioning from parents' childhood history of aggression and/or social withdrawal. Aggression and withdrawal have been demonstrated to be risk factors for a variety of problems over the life course including poor academic achievement, peer rejection, and negative parent-child relationships (Ladd & Burgess, 1999). Within the Concordia Longitudinal Risk Project, studies have shown that these behavioural tendencies were also suggestive of poor parenting behaviour (Bentley et al., 1998; Cooperman, 1996; Saltaris, 1999). Furthermore, prior investigations from the project have demonstrated that parental risk

status can have a detrimental influence on child functioning in the second generation, including cognitive performance (Stack et al., 1999). Although no study has specifically focused on child temperament, the existing information suggest that childrens' behavioural style would also be influenced by parents' childhood histories of aggression and/or withdrawal.

Other variables included in the analyses consisted of historical and concurrent predictors that were hypothesized to relate to child temperament and cognitive functioning. The interest was in determining the pathway from parental risk status to child functioning, with child temperament as an outcome variable as well as a potential mediator. Current socioeconomic status and maternal stress have been demonstrated to have some connection with temperament, even though many of the results have been ambiguous (Kohnstamm, 1986; Sameroff et al., 1982). Maternal education was thought to be an important variable to explore considering its strong influence on other aspects of children's development. Also, child sex has been found to relate to differences in temperament so it was a necessary variable to include (Prior, 1992).

The same variables that were used to predict temperament were also employed in the prediction of cognitive functioning. The only difference was the inclusion of temperament as a predictor, given the multitude of findings that support a relationship between these two constructs (Fagen et al., 1987; Maziade et al., 1987; Olson, Bates & Kaskie, 1992; Palisin, 1986; Roth et al., 1984; Strelau, 1998).

Maternal education has consistently been found to relate to children's IQ (Auerbach et al., 1992; Bee et al., 1982; Velez, Johnson & Cohen, 1989). In general, mothers with higher levels of education have children with higher IQ's. Rowe, Jacobson

and Van den Oord (1999) noted that although parental education may be related to children's IQ through shared genes, it can also be considered a measure of "environmental quality" because of its connection with the availability of intellectual stimulation and financial resources within the family. Current family income was also utilized to predict children's intellectual abilities. Studies have indicated that high-SES families may stimulate their children differently than low-SES families (Maziade et al., 1987; Tulkin & Kagan, 1972). Furthermore, research has depicted a strong relationship between low family income and low scores on standardized tests of intelligence (Duncan, Brooks-Gunn & Klebanov, 1994).

Maternal distress was also included based on its relationship to child outcome. Specifically, the higher maternal stress, the greater likelihood of child psychopathology and poor cognitive performance (Bee et al., 1982; Halohan & Moos, 1987). As well, gender differences have been reported in factors related to child competence (Auerbach et al., 1992), and consequently child sex was included as a predictor variable.

Child temperament was first examined as an outcome variable. The temperament factor that was utilized was a continuous variable that ranged from an easy disposition at the low end to a difficult disposition at the high end.

Hypothesis 1. The first hypothesis focused on the relationship between parental risk status and child temperament. There have been no studies to date that have used risk status to predict child temperament, so it was difficult to make specific predictions. Therefore, the current study attempted to explore the question of whether parent's childhood history of aggression and withdrawal was related to child temperament. In general, it was expected that high levels of parent's childhood aggression/social

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withdrawal would positively predict child temperament in the second generation. It was speculated that this relationship might work through the continuity of problem dispositions in the parent generation, of which aggression has been shown to be quite stable (Ladd & Burgess, 1999). Therefore, the link between parental risk status and child temperament was thought to be stronger for childhood aggression than social withdrawal. A number of psychosocial variables were considered as potential mediators in the relationship between parental childhood risk status and child temperament. Maternal educational attainment and current family income were expected to be negatively related to temperament. Conversely, maternal distress was expected to positively predict difficult temperament.

Hypothesis 2. If support was provided for the first hypothesis, in that risk status predicted child temperament, then it was expected that temperament would act as a mediator in the relationship between parental risk status and children's cognitive functioning. As well, it was hypothesized that temperament would operate as a risk factor in the prediction of IQ, based on prior research. Specifically, child temperament was expected to have a negative relationship with IQ, such that children with difficult temperaments would possess lower scores on the intelligence tests. Aggression and social withdrawal were also thought to have negative relationships with cognitive competence. It was hypothesized that maternal educational and income would be positively related to children's intelligence, while maternal stress was expected to have a negative relationship with children's IQ. The current study also sought to determine whether child temperament could predict IQ over and above other important demographic and psychosocial factors.

Relationship between temperament and cognitive functioning

Rationale for predictors. The third question that was investigated addressed the nature of the relationship between temperament and cognitive functioning. Of particular interest was whether there would be a direct effect of temperament on cognitive performance, versus an indirect effect through concurrent psychosocial factors. Included variables represented aspects of the external environment, which may combine with children's temperamental characteristics to produce a "goodness" or "poorness" of fit. Prior studies within the Concordia Longitudinal Risk Project have discovered that the HOME Inventory, a measure of stimulation and support provided in the home, was predictive of preschoolers verbal reasoning abilities (Saltaris, 1999). Furthermore, the importance of the quality of the home environment for children's cognitive development has been repeatedly demonstrated (Gottfried, 1984). The home environment is, in part, a reflection of parent-related characteristics. Parental social support has also been shown to be associated with cognitive outcomes in children. Bee et al. (1982) discovered that social support was equivalent to maternal education in predicting IQ. Additionally, social support has been demonstrated to be an important mediator in the relationship between temperament and behaviour disorders (Maziade et al., 1986). Collins et al. (2000) asserted that in general, statistical associations between early temperamental traits and later adjustment are modest, suggesting that environmental factors may moderate these relationships.

Hypothesis 3. The third hypothesis focused on the specific relationship between child temperament and cognitive competence. Previous research on the connection between temperament and IQ have been mixed, with some studies finding a direct

relationship while others discovering an indirect pathway (Olson et al., 1992; Wachs & Gandour, 1983). It was hypothesized that temperament would operate indirectly through social support and the home environment, in the prediction of intellectual functioning in the second generation. Specifically, the HOME Inventory and social support index were expected to have a positive relationship with IQ. Temperament, on the other hand, was thought to be negatively related to IQ.

Additional Hypotheses

In addition to the hypotheses previously mentioned, two child characteristics were examined for their contribution to the prediction of child outcomes. One was child gender because prior research has demonstrated that being a boy may be a risk factor for temperamental difficultness and later behaviour problems (Caspi et al., 1995; Earls & Jung, 1987). It was expected that there would be a main effect of child gender, such that boys would display more difficult temperaments and decreased cognitive competence.

As well, it was possible to explore differences in temperament and child outcomes as a function of child age, given that the children in this sample ranged from 12-72 months. Halpern and Brand (1999) claimed that temperamental differences among children are reflected in their emotional reactions to stressful situations and in their ability to self-regulate. It is important to note that an association between self-regulation and emotion modulation likely emerges in the third year of life or later (Kopp, 1982). With increasing age, there is a shift from external sources of control to internal child factors. It was predicted that the younger cohort of children would show more problematic temperaments, because they may not have reached a maturity level where they could properly regulate themselves internally. Additionally, evidence from the

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Concordia Longitudinal Risk Project has suggested that the infant subsample was characterized by a higher degree of perinatal problems and early illnesses, compared with the preschool subsample. This may also contribute to the younger cohort displaying more temperamental difficultness.

Method

Participants

The participants for the current study were taken from the original pool of 1,774

subjects (864 boys and 910 girls) making up the Concordia Longitudinal High Risk

Project. The Concordia Longitudinal Risk Project started in 1977 with the screening of 4,

109 school children attending grades 1, 4, and 7. The children were selected from a

community sample based in French-speaking public schools in inner-city, low

socioeconomic areas of Montreal, Quebec.

Using a peer evaluation measure, the Pupil Evaluation Inventory (PEI: Pekarik et

al., 1976; see Appendix A), the children were screened for aggression and social

withdrawal. A normative comparison group was also identified at that time. Children in

152 classrooms were requested to select four boys and four girls who they felt were best

described by each item on the PEI. Calculations were made detailing the total number of

nominations that each child received for the aggression and withdrawal dimensions.

Following this, these scores were transformed into z-scores, and a percentile rank was

assigned. Children who received an aggression z-score equal to or exceeding the 95th

percentile cutoff (z = 1.95) and whose withdrawal z-score was below the 75th percentile

(z = 0.68) composed the aggressive group. The withdrawn group was made up of

individuals whose withdrawal z-scores were equal to or greater than the 95th percentile

and aggression z-scores were below the 75th percentile. Children who received z-scores

equal to or above the 75th percentile on both the aggression and withdrawal dimensions

were categorized as aggressive-withdrawn. As well, the contrast group consisted of

children who obtained z-scores between the 25th and 75th percentiles on both aggression and withdrawal.

Out of the 4, 109 children who were screened, the final sample comprised 1, 770 children. The high-risk groups (children who scored high on one or both dimensions of aggression and withdrawal) included 656 children. The contrast group included 1,114 children who were not extreme on either of the two dimensions.

The present study focused on a subsample of the original group of 1,770 subjects. Participants were selected on the basis of having a child between the ages of 12-72 months at the time of testing and their residence being in reasonably close proximity to the laboratory. The majority of the testing involved the mother and child, even though both male and female original subjects were contacted. In total, 175 mother-child pairs were studied, including 95 girls and 80 boys. These participants were divided into two age cohorts based on the age of the child at testing. Cohort 1 (n = 91) consisted of children from 12 to 42 months, while cohort 2 (n = 84) included children between 42 and 72 months old. Based on the parent's original risk classification, the sample consisted of the following four groups: aggressive (n=30), withdrawn (n=24), aggressive-withdrawn (n=24), and contrast (n=97). As a result of the fact that the analyses were conducted separately for each cohort, the four risk classifications were not used as separate groups due to the moderate sample size. Instead, parents' childhood aggression and withdrawal were treated as continuous variables for the purposes of this study. The continuous approach has been the preferred option for analyses in the past and has yielded informative results. The distribution of aggression and social z scores followed a normal distribution in the present sample.

Of the 175 dyads in both cohorts, 11 were eliminated from the current analyses

due to technical difficulties when recording the task interactions (i.e. no sound on the

tape). A further four subjects were removed due to missing data which will be discussed

further in the results section. The remaining 160 mother-child dyads, including 71 boys

and 89 girls, were used for the present analyses. Of those, 105 were made of up female

original subjects together with their offspring. At the time of the original data collection,

these women belonged to the following groups: aggressive ($\underline{n}$ = 17), withdrawn ($\underline{n}$ = 17),

aggressive-withdrawn ($\underline{n}$ = 18), and contrast ($\underline{n}$ = 53). Twenty-eight of these women were

in Grade 1, 28 were in Grade 4 and 49 were in Grade 7. The remaining participants were

comprised of the spouses of the original male subjects and their child. Based on the

original risk classification, the sample of men consisted of the following groups:

aggressive ($\underline{n}$ = 10), withdrawn ($\underline{n}$ = 5), aggressive-withdrawn ($\underline{n}$ = 3), and contrast ($\underline{n}$ =

37). At the time when they were identified, 8 of these men were in Grade 1, 19 were in

Grade 4, and 28 were in Grade 7.

Table 1 presents the demographic characteristics of the current sample of 160

women and their children. These participants ranged in age from 25.35 to 34.52 years ($\underline{M}$

= 30.72, $\underline{SD}$ = 2.52). The children ranged in age from 1.09 to 6.12 years ($\underline{M}$ = 3.53, $\underline{SD}$ =

1.53). In terms of marital status, 43 of the women were married, 38 were cohabitating, 12

were single, 3 were divorced, 8 were separated, and 1 was widowed. In terms of

education, the mothers had between 4 and 18 years of schooling ($\underline{M}$ = 11.76, $\underline{SD}$ = 2.25).

It is important to note that in the province of Quebec, high-school graduate is

commensurate to eleven years of education. Twenty-four percent of the mothers failed to

complete high school. Mothers' occupational prestige ratings ranged from 154 to 694

Table 1

Means, Standard Deviations, and Ranges of Demographic Information (N = 160)

	Mean	Standard Deviation	Range
Mothers' current age	30.72	2.52	25.35-34.52
Mothers' age at first child	25.19	3.32	16.42-32.40
Children's current age	3.53	1.53	1.09-6.92
Maternal education	11.76	2.25	4.00-18.00
Occupational prestige	331.42	106.98	154.00-694.00

($\underline{M}$ = 331.42, $\underline{SD}$ = 106.98). 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 performed, comparing the subjects used in the present analyses to all the participants from the Concordia Longitudinal Risk Project who have become parents to date ($\underline{n}$ = 472). The samples were compared on a number of demographic variables including mothers' years of education, age at the birth of their first child, income, occupational prestige, and number of children. The only variable on which the two groups significantly differed was the number of children, $\underline{t}$ = -4.23, $\underline{p}$ < .05. On average, parents in the current sample had more children than other participants in the Concordia Longitudinal Risk Project who have become parents. The higher birth rate was an artifact based on the stipulation that parents in the study had to be on their second or third child in order to be included.

Procedure

The data for the present investigation was collected during two visits made to the participants' homes. Potential participants were contacted by phone in order to arrange two home visits lasting approximately 3 hours each. During this initial contact, subjects were informed of the general nature and procedures of the study, but they were not made aware of the specific hypotheses of the research project. The research team consisted of an M.A. level psychologist and a research assistant/graduate student. The psychologist carried out the testing, whereas the research assistant conducted interviews with the mother to gather information on the family. The examiners were kept blind as to the risk status of the family being interviewed.

A large amount of information was gathered during the two home visits, through the utilization of an intellectual assessment, naturalistic observations, questionnaires and interviews. At the start of the first session, the examiner detailed the overall procedure to the mother and asked her to read and sign an informed consent form (see Appendix B). After this, either the Bayley Scales of Infant Development (Second Edition: Bayley, 1993) or the Standford-Binet Intelligence Scale (Fourth Edition: Thorndike, Hagan, & Sattler, 1986) were administered to the child in order to assess their current intellectual functioning, depending on their age cohort. At that time, the interviewer asked the mother a variety of questions in order to collect data 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 both parents of the target child. In the first home visit, two interaction sessions between the mother and child were videotaped. The intellectual assessment and interview with the mother were completed in the second home visit. Additionally, a variety of mother-child interactions were also videotaped during this session. Three of these interactions, which are described in detail below, were used for the purposes of the present study. The temperamental characteristics of these children were studied during three separate tasks which included: a four minute unstructured free play; a three minute interference task where the mother is asked to complete a questionnaire and not directly attend to her child; and a final four minutes of unstructured free play. During both home visits, mothers completed a variety of questionnaires assessing their child's physical health and temperament as well as their own typical behaviour (A detailed description of the protocol for both home visits can be found in Appendix C).

<u>The Free Play and Interference Tasks</u>

Before the start of the free play 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, and toys were spread out in a standardized format. The toys consisted of a telephone, a doll, a tea set, three books and some building blocks. Toys were carefully selected for their appropriateness and appeal to the age group being assessed. Mother-child interactions were videotaped using a Sony Video 8AF camera, which was situated on a tripod during the observations. A microphone attached to the video camera recorded the verbalizations of the mother-child dyad. A beeper indicated the beginning and end of each free play interaction as well as the interference task. During the free play sessions, mothers were instructed to play with their child as they normally would at home for four minutes. The interference task required them to fill out a questionnaire and not directly to their child, while the toys were left out for the child to play with if desired. Mothers were also asked to limit their play activities to the blanket provided. All instructions were given in French.

Following the interaction, the mothers were asked to rate how natural they felt their interaction with their child had been on scale of 1 to 4 (1 = not at all natural, 4 = very natural).

<u>Measures</u>

<u>Demographic Information</u>

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, data was obtained regarding the mother's current age, age at the birth

of her first child, marital status, educational level, occupational status, current income, as well as the number and ages of children in her family. The DIQ was administered over the phone at the time that the home visit was being arranged.

Maternal education and income were used as predictors in the present study since they have been found to be correlated with child outcome measures (Auerbach et al., 1992; Cooperman, 1996; Saltaris, 1999).

Temperamental Characteristics

The temperamental characteristics of the children in this study were determined during videotaped mother-child interactions using the Positive Disposition Coding System (PDCS; Karp, 1999). This coding system focuses on the quality of mother-child physical contact, mother warmth, mother and child's involvement with each other, mother on task, child's mood, activity level, vocal reactivity, approach to toys, mood regularity and adaptability. Child mood, activity level, reactivity, approach to toys and mood regularity were coded across all three tasks on a 3-point scale. The quality of mother-child contact was coded based on the presence or absence of contact in each 30-second interval, during both free play sessions. For this code, a description of the type of contact was provided along with the direction (mother to child, child to mother or mutual). Quality of mother warmth was coded during both free plays on a 4-point scale and mother and child's involvement were coded during both free plays on a 2-point scale. During the interference task, adaptability was coded on a 3-point scale and the degree to which the mother stayed on task and did not attend to her child was also coded after each 15-second interval of the interaction (see Appendix E for a detailed description of the coding system and the coding sheet that was used). Twenty percent of the tapes were

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double coded and the remaining 80% were coded independently. The coders achieved at least 75% inter-rater reliability for each coding category using percent agreement. A temperament factor based on each child's average mood, activity level, regularity, reactivity, approach to toys and adaptability was utilized in the majority of analyses.

Children's Cognitive Development

a) Infant Development

For the purposes of the study, children were divided into two cohorts. The first cohort, which included children who ranged in age from 12-42 months, was administered the Bayley Scales of Infant Development (Second Edition, Bayley, 1993). The Bayley Scales are well-standardized, reliable and popular instruments that measure infant cognitive and motor development. Areas evaluated include: cognitive processes, verbal and motor expressive functions, auditory and visual receptive functions, and basic neurological functions. Individual items are combined to create three basic scales: Mental, Motor, and Behavior Rating. For the present study, only the scores on the Bayley Mental Development Index (MDI) were analyzed. This index has 163 items which are displayed as a graded series, and can be converted to a standardized score with a mean of 100 and a standard deviation of 16. The psychometric properties of the Bayley are well documented (see Bayley, 1993). Trained examiners, blind to the family's risk status, administered the Bayley Mental Development scale.

b) Preschool Cognitive Functioning

The second cohort, in which children ranged from 43-72 months, was given a French translation of the Stanford-Binet Intelligence Scale (SB-IV; Thorndike, Hagen, & Sattler, 1986). This test evaluates the intellectual functioning of 2-23 year olds and is

well-standardized. The SB-IV has 15-subtests which combine to form a general intelligence factor as well as specific factors of verbal reasoning, quantitative reasoning, abstract visual reasoning and short-term memory. The specific subtests administered to determine the total and factor scores depend on the age of the child being tested. The subtests given to children aged 2 to 7 years old, and consequently utilized in the present study consisted of: 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. It is important to note that the memory for sentences subtest was excluded from the analyses, due to the generalized poor performance on this task. Therefore, the short-term memory area score was solely based on performance on the bead memory subtest. One likely reason for children's weak performance was the fact that they were being penalized for responding to a Parisian French test with Quebecois phrases. As a result of the decision not to include this subtest, the total score had to be prorated. In the current study, the overall IQ score was used as an outcome measure.

Thorndike et al. (1986) demonstrated that the composite score of the SB-IV has excellent reliability: specifically, the median internal consistency estimate of the composite score was .97. Comparisons of scores on the SB-IV with other individual intelligence tests have also provided support for the concurrent validity of this instrument.

Quality of the Home Environment

The Home Observation for Measurement of the Environment (HOME: Caldwell & Bradley, 1984) was administered to each family as a measure of the stimulation and

support offered to the child in the home. In the present study two versions of the HOME were utilized. The infant HOME, which was designed for children from zero to three, and the preschool HOME, which is appropriate for children ranging from three to six. The infant version of the HOME consists of 45 yes/no items combined to form six scales, while the preschool version contains 55 yes/no items grouped into eight scales. The subscales of the infant instrument include: a) emotional and verbal responsivity of parent; b) acceptance of child's behaviour; c) organization of physical and temporal environment; d) provision of appropriate play materials; e) parent involvement with child; and f) opportunities for variety in daily stimulation. The preschool instrument is composed of the following subscales: a) toys and learning materials; b) language stimulation; c) physical environment; d) responsivity; e) stimulation of academic behaviour; f) modeling; g) variety of stimulation; and h) acceptance. A composite score for the quality of the home environment was created by adding the number of yes responses; the higher the score, the higher the quality of the home environment.

The HOME inventory has been found to have good psychometric properties. For example, the internal consistency estimate for the preschool version was .93 (Luster & Dubow, 1992). In the current study, internal consistency was found to be .77 for the infant version and .70 for the preschool version. The strong correlations of the HOME with children's intellectual and language development during the infant and preschool years have provided evidence to support its predictive validity (Bradley & Rock, 1985).

Parenting Social Support

A modified version of the Parenting Social Support Index (PSSI; Telleen, 1985) was utilized to assess parenting social support. The original PSSI was designed for new

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teenage mothers with infants. The current instrument was modified in order to be appropriate for parents of toddlers and preschoolers. The PSSI is a self-report measure with 22-items addressing 7 forms of support received by parents: relationship with a confidant, material aid, advice about child-rearing, positive feedback, help with household tasks, child care and social participation. Respondents are asked to answer with respect to the past 30 days for each category, and rate their need for the particular type of support on a 5-point Likert scale ranging from "no need at all" to "very great need." Participants who indicate a need for support identify the providers of the particular support in their social network. Finally, subjects rate their satisfaction with the support they received on a 5-point Likert scale ranging from "very dissatisfied" to "very satisfied". By summing across items, three composite scores are created including total perceived need for support, total network size, and total support satisfaction.

The PSSI demonstrates good reliability and validity. Each of the total scores has been found to possess a high degree of internal consistency, with the following alpha levels: need for social support, .79; network size, .92; and social support satisfaction, .86 (Telleen, 1985). As well, test-retest reliability scores are within acceptable limits, in the .70 range. For the purposes of this study, only satisfaction with social support was used. Previous research has found that parent's perceived satisfaction, rather than network size, was the main factor in the protective role of social support (Werner & Smith, 1992).

Parenting Stress

The Parenting Stress Inventory (PSI-III; Adibin, 1990) was employed to determine the level of stress experienced by mothers in the current study. This self-report measure was designed to assess the sources and levels of stress perceived by individuals

in relation to their parenting roles and responsibilities. Parents are asked to rate the degree to which each statement is true along a 5-point Likert scale. The PSI addresses 3 main domains: parental characteristics (i.e. isolation, depression, lack of social support), child characteristics (i.e. activity level, mood) and life stresses directly related to the role of being a parent (i.e. death of family member, parent's subjective feelings of being trapped by his/her parenting responsibilities). Items can be grouped into two major scales including the child domain and the parent domain. A total score indicating global parenting stress can also be computed. This total score was used in the present study.

The psychometric properties of the PSI are well-documented. Internal consistency coefficients for each subscale range from .70 to .84, and the reliability coefficients for the subscales and total score are .90 or above (Adibin, 1995). Numerous studies have assessed the external validity of the PSI. Overall, they have found that using this instrument allows investigators to identify families living under stressful circumstances. For example, having a child with behavioural problems, such as aggression, attention-deficit disorder or conduct disorder (Beck, Young & Tarnowski, 1990).

Interrater Reliability

In order to assess child temperament in the present study, observational coding was conducted based on mother-child interactions during two free plays and an interference task. The Positive Disposition Coding System, which was utilized to code these interactions, was developed by the author. The two coders that were trained in the use of the PDCS were the author and an undergraduate honours student. They were blind to group membership and demographic characteristics of the dyads involved. Training on the PDCS was accomplished through learning the global ratings and coding several

sample videotapes. Interrater agreement was assessed at many points during the training, by computing the percent agreement between the first and second rater. Official coding began at the point when the per category agreement between the two raters was 75% or better.

To determine interrater reliability, 35 of the 175 (20%) mother-child interactions were randomly selected and double-coded. Interrater reliability was calculated using percent agreement and Cohen's Kappa statistic. The procedure for coding the videotapes was identical to the procedure followed during the training phase. Percent agreement ranged from 84% to 99% (see Table 2 for percent agreement and Cohen's Kappa).

Table 2

Reliability Based on Percent Agreement and Cohen's Kappa for Temperament Variables

Variable	Percent Agreement	Cohen's Kappa
Child mood	.97	.81
Quality of physical contact	.99	.94
Quality of mother warmth	.94	.81
Mother involvement	.99	.75
Child involvement	.98	.78
Activity level	.98	.96
Reactivity	.96	.74
Approach to toys	.84	.70
Mood regularity	.92	.75
Adaptability	.98	.94
Mother on task	.96	.79

Data Screening

Prior to the commencement of statistical analyses, all records were evaluated for accuracy of data entry and the presence of missing values. It was found that in the case of three variables, namely parenting stress, Bayley IQ, and child temperament, values for 2, 2 and 4 cases were missing, respectively. Further examination of the data revealed that there was no overlap between the cases for which data was missing. There was a small likelihood of a systematic bias in the data, and therefore it was decided to substitute missing values by the group mean for parenting stress and Bayley IQ scores. A conservative approach of dealing with missing data is through mean substitution (Tabachnick & Fidell, 1996). For the temperament variable, the four cases were missing information on either the second free play or the interference task. Because a factor score was created based on the average of scores across the three tasks, these cases were inappropriate for mean substitution. Instead, it was decided to drop the four cases. Deletion is a good alternative when only a few cases have missing data and seem to be a random subsample of the whole sample (Tabachnick & Fidell, 1996).

Descriptive statistics were then conducted to evaluate the normality of the distribution, assess the presence of outliers, and determine if significant skewness and/or kurtosis were present. The temperament factor and parenting stress variable were found to be somewhat positively skewed. A square root transformation was successful in normalizing the distributions. No significant univariate or multivariate outliers were uncovered in the data. Intercorrelations between the predictor variables, as well as

between the predictor and outcome variables revealed an absence of multicollinearity and singularity.

Preliminary Analyses

After a chi-square revealed that there were significant differences between each cohort (infants versus preschoolers) on the temperament factor, it was decided to run the analyses separately by cohort. Furthermore, the use of different measures for assessing cognitive development in each cohort and the developmental nature of the temperament variable justified such a decision. Given the small sample size in the current study (Cohort 1=84 and Cohort 2=76), it was necessary to reduce the number of observational variables to be included in the analyses. This was undertaken to ensure that there was sufficient power for the analyses and to reduce the risk of spurious findings (Tabachnick & Fidell, 1989). The first step of data reduction involved examining the frequency distribution of all the variables that were coded in the PDCS (PDCS; Karp, 1999). Variables with low frequencies whose distributions were severely skewed were dropped from the analyses. These included quality of physical contact (verbal, physical or both), quality of mother warmth, mother involvement, child involvement and mother on task. Next, intercorrelations between the remaining variables were assessed to determine the extent to which they were related (see Table 3 for a depiction of these correlations). It was determined that a factor analysis of the remaining variables was appropriate, considering the number of sizable correlations among them. Tabachnick and Fidell (1996) recommended that several correlations should exceed .30 in order to conduct a factor analysis. This requirement was met in the current study. The final step before the factor analysis was undertaken was to recode the remaining variables in the same

Table 3

Intercorrelations Between Temperament Variables (N = 160)

	1.	2.	3.	4.	5.	6.
1. Average mood	--	.17*	.42**	.58**	.42**	.40**
2. Average activity level		--	.33**	.46**	.44**	.28**
3. Average approach to toys			--	.45**	.43**	.31**
4. Average reactivity				--	.82**	.44**
5. Average regularity					--	.50**
6. Average adaptability						--

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

direction, such that a high score would indicate more problematic behaviours. A principal

components factor analysis was performed on the 6 temperament variables, which had

been averaged across the three observational tasks. One factor was retained which had

an eigenvalue of 3.23 and explained 53.9% of the variance. The variables included in this

factor described a difficult temperament with negative mood, high activity level, low

adaptability, high reactivity, low mood regularity and low approach to toys. See Table 4

for the factor loadings of each of the variables included in the temperament factor. This

factor was retained for use in the final analyses.

Subsequent preliminary analyses were conducted to determine the presence of

multicollinearity or singularity. Intercorrelations among the predictors for temperament

were first assessed separately by cohort. As can be observed in Table 5, the majority of

correlations were in the small to moderate range ($r = .00$ to .45), for the youngest cohort.

In the oldest cohort, which can be seen in Table 6, most of the correlations were also in

the small to moderate range ($r = .00$ to .44). Finally, correlations between the predictors

and the temperament outcome variable were examined and are presented in Table 7.

Intercorrelations among the predictors for cognitive functioning were

subsequently evaluated separately by cohort. Table 8 displays the correlations of the

variables used to predict the Bayley IQ scores. Most correlations were in the small to

moderate range ($r = .00$ to .46) for the youngest sample. Table 9 presents the correlations

among the predictors for the Stanford-Binet IQ scores. The majority of correlations were

also in the small to moderate range ($r = .00$ to .51). The correlations between the

predictors and measures of intellectual competence can be found in Table 10. Table 7 and

10 highlight the fact that certain variables, which were considered for inclusion in the

Table 4

Factor Loadings of the Variables Included in the Temperament Factor

Variables	Factor Loadings
Average mood	.89
Average regularity	.85
Average reactivity	.69
Average adaptability	.66
Average approach to toys	.66
Average activity level	.59

Table 5

Intercorrelations Between Predictors of Child Temperament (Cohort 1 = 84)

	1.	2.	3.	4.	5.	6.	7.
1. Childhood aggression	--	-.23*	-.13	-.11	.03	.01	-.06
2. Childhood withdrawal		--	-.19^{t}	-.09	.09	.04	.03
3. Current income			--	.46**	-.23*	.00	.08
4. Maternal education				--	-.01	.09	-.11
5. Parenting stress					--	-.10	.11
6. Child gender						--	.07
7. Child age							--

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

Table 6

Intercorrelations Between Predictors of Child Temperament (Cohort 2=76)

	1.	2.	3.	4.	5.	6.	7.
1. Childhood aggression	--	.12	-.17	-.44**	.20^t	.12	.11
2. Childhood withdrawal		--	-.25*	-.31**	.10	.10	.11
3. Current income			--	.39**	-.04	-.13	-.02
4. Maternal education				--	-.17	-.14	.01
5. Parenting stress					--	-.05	-.12
6. Child gender						--	.13
7. Child age							--

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

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Table 7

Correlations Between Predictors and Child Temperament

	Cohort 1 (N=84)	Cohort 2 (N=76)
1. Childhood aggression	.16	.04
2. Childhood withdrawal	.07	-.01
3. Current income	-.20^t	.10
4. Maternal education	.09	-.09
5. Parenting stress	.34**	.23*
6. Child gender	-.16	-.13
7. Child age	-.18	-.01

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

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Table 8

Intercorrelations Between Predictors of Childrens' Bayley Scores (N = 84)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Childhood aggression	--	-.23*	-.13	-.11	.03	.02	.16	-.08	-.06	-.06
2. Childhood withdrawal		--	-.19^t	-.09	.09	.04	.07	-.12	-.09	.03
3. Current income			--	.45**	-.23*	.00	-.20^t	.37**	.14	.08
4. Maternal education				--	-.01	.09	.09	.37**	-.05	-.11
5. Parenting stress					--	-.10	.34**	-.30**	-.24*	.11
6. Child gender						--	-.16	.04	.12	.07
7. Child temperament							--	-.12	-.15	-.18
8. Home environment								--	.27*	-.08
9. Social support									--	.15
10. Child age										--

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

Table 9

Intercorrelations Between Predictors of Childrens' Stanford-Binet Scores (N = 76)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Childhood aggression	—	.12	-.17	-.44**	$.20^t$	.12	.04	-.34**	-.10	.11
2. Childhood withdrawal		—	-.25*	-.31**	.10	.10	-.00	-.28*	-.10	.11
3. Current income			—	.39**	-.04	-.13	.11	.44**	.17	-.02
4. Maternal education				—	-.17	-.14	-.09	.51**	.11	.01
5. Parenting stress					—	-.05	.23*	-.41**	-.23*	-.12
6. Child gender						—	-.13	-.03	$-.20^t$	.13
7. Child temperament							—	$-.21^t$	-.12	-.01
8. Home environment								—	$.22^t$	.02
9. Social support									—	-.28*
10. Child age										—

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

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Table 10

Correlations Between Predictors and Measures of Children's Cognitive Functioning

	Bayley (N = 86)	Stanford Binet (N = 76)
1. Childhood aggression	.06	-.32**
2. Childhood withdrawal	-.28*	-.06
3. Current income	.36**	.15
4. Maternal education	.29**	.22^t
5. Parenting stress	-.27*	-.40**
6. Child gender	.21^t	.10
7. Child temperament	-.38**	-.26*
8. Home environment	.49**	.45**
9. Social support	.14	.39**
10. Child age	-.06	-.03

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

analyses, were unrelated to the main constructs studied. In particular, child age was not related to any of the variables of interest, and was consequently dropped from further analyses. Additional predictors which were omitted included interaction terms, specifically aggression by withdrawal, aggression by temperament, withdrawal by temperament, aggression by child sex, withdrawal by child sex, temperament by child age, and temperament by child sex. Preliminary analyses found that none of these interactions reached significance. They were subsequently excluded from the model.

<u>Design</u>

Statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS; Norussis, 1990). A critical alpha level of $p < .05$ was used as the criterion for all analyses and significance levels of .05 and .01 are reported in the text. Given the relatively small sample size of each cohort, statistical effects with significance levels less than .10 were considered. Six hierarchical multiple regression analyses were conducted, and the utilization of this approach facilitated the testing of the hypotheses in the current study. This type of analysis was specifically chosen to analyze the data because it allows for the examination of a given predictor's contribution, while controlling for the effect of other independent variables. There are other advantages of using multiple regression, including its ability to examine whether particular variables add variance to a prediction equation after other variables have already been entered. Furthermore, it permitted us to determine whether the effect of certain variables entered early in the equation remained significant, even after the inclusion of other variables in the model. Importantly, we were able to assess whether variables of interest had direct

effects on the outcome variables, or whether they operated indirectly through other factors.

In the prediction of child temperament, the analyses for each cohort utilized the same predictor variables in order to directly compare the results. The predictors included childhood aggression and social withdrawal, maternal education, current income and parenting stress. Child gender was entered as a control variable, since previous studies have found that it influences both temperament and child competence (Auerbach et al., 1992; Prior, 1992). In the prediction of cognitive functioning in both samples, the first two analyses included the above mentioned variables along with child temperament as a predictor. These regressions were examining the role of temperament as a risk or protective factor in predicting cognitive functioning, as well as a potential mediator between childhood risk status and child outcome. The last two analyses employed temperament, child gender, the home environment and social support as independent variables, in order to determine the precise relationship between temperament and cognitive competence. The ideal manner to test these questions would be in a path analysis, yet the separate analysis of each cohort prohibits this due to sample size.

Results

Hypothesis 1: Parental childhood risk status and child temperament

The first hypothesis focused on the question of whether childhood aggression and social withdrawal in the parent generation would predict child temperament in the second generation. The predictors were entered in chronological order in order to explore the pathway through which these variables might work to influence temperament. More specifically, using this strategy allowed us to determine whether childhood risk status

directly influenced child temperament or operated through mediating variables. In the first step, parental aggression and social withdrawal were entered. Maternal education and current income were added in the second step. Child gender was entered on its own in the next step, given its established relationship to temperament. Parenting stress was entered in the last step. Child temperament in cohort one was examined first, followed by temperament in cohort two.

1) Cohort One. Table 11 presents the results of the regression analysis for child temperament in cohort one. Overall, the multiple $\underline{R}$ was significantly different from zero, $\underline{F}$ (6, 77) = 3.44, $\underline{p}$ <.01, and all the predictors together accounted for 15% (Adjusted $\underline{R}^2$ value) of the total variance in child temperament. Childhood aggression and social withdrawal were entered in the first step. A trend was found for aggression, Beta = .19, $\underline{p}$ <.10, suggesting that the higher levels of parental aggression, the more difficult the child's temperament. Social withdrawal was not found to add to the variance in children's temperament. Maternal education and current income were entered in the second step. A main effect was found for both variables, Beta = .24, and -.26, $\underline{p}$'s <.05, respectively. More educated mothers tended to have children with more difficult temperaments, while parents with lower income also had children with temperamental difficultness. These variables together accounted for 7% of the variance. Child gender was entered next and a trend was found, Beta = -.19, $\underline{p}$ =.08. Girls seemed to have easier temperaments than boys. Maternal education and current income were still significant at this stage of the equation. Finally, parenting stress was entered in the last step and there was a main effect for this variable, Beta = .26, $\underline{p}$ <.05. Parents with greater levels of stress related to parenting had children with more difficult temperaments. This variable accounted for

Table 11

Results of the Regression Equation Predicting Child Temperament (Cohort 1=84)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Childhood aggression	.19	.18	1.69[t]		
Childhood withdrawal	.12	.12	1.06		
				.04	1.67
Step 2					
Childhood aggression	.17	.17	1.56		
Childhood withdrawal	.08	.08	.74		
Maternal education	.24	.21	2.01*		
Current income	-.27	-.23	-2.20*		
				.07	3.10[t]
Step 3					
Childhood aggression	.18	.17	1.65		
Childhood withdrawal	.09	.09	.85		
Maternal education	.26	.23	2.21*		
Current income	-.27	-.24	-2.23*		
Child gender[a]	-.19	-.19	-1.81[t]		
				.04	3.26[t]
Step 4					
Childhood aggression	.17	.17	1.63		
Childhood withdrawal	.08	.07	.73		
Maternal education	.23	.20	1.97[t]		
Current income	-.20	-.17	-1.69[t]		
Child gender[a]	-.16	-.16	-1.56		
Parenting stress	.27	.26	2.54*		
				.07	6.47*

R^2 =.21 R^2Adj = .15 F = 3.44**

Note. [a] Males=1, Females=2 [t] $p < .10$, * $p < .05$, ** $p < .01$

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an additional 7% of the variance. Maternal education and current income both became trends in the final step, suggesting that the effect of these variables on child temperament may partially operate through parenting stress.

   2)   Cohort 2. Table 12 presents the results of the regression analysis predicting children's temperament in cohort two. The predictors together only accounted for 1% of the variance, and did not produce a significant Multiple R. The sole variable which approached significance was parenting stress, Beta = .21, p <.10. Children of parents with higher levels of parenting stress were likely to have difficult temperaments.

   To summarize the findings with respect to the first hypothesis, parenting stress appeared to be the only consistent variable involved in the prediction of child temperament in both cohorts. Parenting stress was positively related to temperament. Unique to cohort one was a trend for maternal education and current income. Education was a positive predictor while income was a negative predictor. Childhood aggression and social withdrawal as well as child gender were essentially unrelated to child temperament in both age groups. The exception was a trend for aggression to positively predict difficult child temperament in cohort one.

Hypothesis 2: Parental risk status, child temperament and cognitive functioning

   The second hypothesis addressed two central issues. The first of which was whether child temperament would act as a risk or protective factor in influencing cognitive functioning. The second issue involved exploring the role of temperament as a potential mediator between childhood risk status and intellectual competence in the second generation. Aggression and social withdrawal, maternal education, current

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Table 12

Results of the Regression Equation Predicting Child Temperament (Cohort 2 = 76)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Childhood aggression	.04	.04	.37		
Childhood withdrawal	-.01	-.01	-.11		
				.00	.07
Step 2					
Childhood aggression	.00	.00	.02		
Childhood withdrawal	-.02	-.02	-.14		
Maternal education	-.16	-.13	-1.12		
Current income	.16	.15	1.27		
				.03	1.09
Step 3					
Childhood aggression	.01	.01	.09		
Childhood withdrawal	-.01	-.01	-.09		
Maternal education	-.17	-.14	-1.17		
Current income	.15	.14	1.19		
Child gender[a]	-.13	-.13	-1.12		
				.02	1.26
Step 4					
Childhood aggression	-.02	-.02	-.18		
Childhood withdrawal	-.02	-.02	-.19		
Maternal education	-.15	-.12	-1.03		
Current income	.14	.13	1.15		
Child gender[a]	-.12	-.11	-.99		
Parenting stress	.21	.20	1.78[t]		
				.04	3.17[t]

R^2 =.09 R^2Adj = .01   F = 1.15

Note. [a] Males=1, Females=2 [t] $p < .10$

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income, parenting stress and child gender were entered as predictors in the regressions. The order of entry was essentially the same as in hypothesis one, except for maternal education being entered alone, followed by current income. The rationale for this choice was due to the well-established relationship between maternal education and child IQ, which was not the case for child temperament. Another difference in these analyses was the inclusion of child temperament as a predictor. Temperament was entered along with parenting stress in the last step to determine whether it would function as a mediator, while taking current parenting stress into consideration.

   3) Cohort 1. Depicted in Table 13 are the results of the regression analysis for childrens' total scores on the Bayley. Overall, the multiple $\underline{R}$ was significant, $\underline{F}$ (7,76) <.01, and the predictors accounted for 29% of the total variance. Childhood aggression and social withdrawal were entered in the first step and accounted for 8% of the variance. A main effect was found for social withdrawal, Beta = -.28, $\underline{p}$ <.05. Parents who had high levels of withdrawn behaviour in childhood were likely to have children with lower intelligence scores. Aggression did not add to the prediction of IQ. Maternal education was entered in the second step and accounted for an additional 7% of the variance. It was positively linked to children's cognitive functioning, Beta = .27, $\underline{p}$ <.05, such that children of more educated mothers had higher IQ scores. Current income was entered in the third step. A main effect was found for this variable, Beta = .25, $\underline{p}$ <.05, and it accounted for 5% of the variance in IQ. Parents with higher incomes tended to have children who achieved higher scores on the Bayley Scale of Infant Development. The effect of maternal education disappeared at this step, suggesting that it operates through income to predict intelligence. Social withdrawal became a trend in the third step and

Table 13

Results of the Regression Equation Predicting Childrens' Bayley Scores (N = 84)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Childhood aggression	.00	.00	.01		
Childhood withdrawal	-.28	-.27	-2.51*		
				.08	3.33*
Step 2					
Childhood aggression	.04	.04	.36		
Childhood withdrawal	-.24	-.23	-2.28*		
Maternal education	.27	.27	2.63*		
				.07	6.91*
Step 3					
Childhood aggression	.07	.07	.66		
Childhood withdrawal	-.20	-.19	-1.85[t]		
Maternal education	.17	.15	1.48		
Current income	.25	.22	2.15*		
				.05	4.61*
Step 4					
Childhood aggression	.06	.06	.55		
Childhood withdrawal	-.21	-.20	-1.99[t]		
Maternal education	.15	.13	1.31		
Current income	.26	.22	2.24*		
Child gender[a]	.20	.20	2.02*		
				.04	4.07*
Step 5					
Childhood aggression	.12	.12	1.26		
Childhood withdrawal	-.17	-.1	-1.75[t]		
Maternal education	.24	.21	2.26*		
Current income	.14	.12	1.26		
Child gender[a]	.13	.12	1.35		
Parenting stress	-.09	-.09	-.94		
Child temperament	-.33	-.29	-3.13**		
				.11	6.69**

R^2 =.35 R^2Adj = .29   F = 5.86**

Note. [a] Males=1, Females=2   [t] $p < .10$, * $p < .05$, ** $p < .01$

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remained so until the final stage of the equation. In the fourth step, child gender was entered and accounted for 4% of the variance. There was a main effect, Beta = .20, p <.05, indicating that girls were likely to have higher IQ scores than boys. Child temperament and parenting stress were entered in the final step. This block accounted for 11% of the variance, and there was a main effect for temperament, Beta = -.33, p <.01. Children with difficult temperaments tended to have lower scores on the standardized test of intelligence. The sex of the child and current income no longer represented predictors of IQ when the last block was entered, implying that the effect of these variables work through parenting stress and temperament to predict cognitive functioning. Temperament appeared to operate as a suppressor variable, such that it allowed maternal education to regain significance in the final step, Beta = .24, p <.05. Highly educated mothers were more likely to have children with higher intelligence scores.

4) Cohort 2. Table 14 presents the results of the regression analysis predicting childrens' total scores on the Stanford-Binet. Together, the predictors accounted for 20% of the total variance, and produced a significant multiple R, F (7, 68) = 3.72, p <.01. Childhood aggression and withdrawal, entered in the first step, accounted for 10% of the variance. There was only a main effect for aggression, Beta = -.32, p <.01. Children of highly aggressive parents were likely to have lower intelligence scores. Maternal education and current income were entered in the second and third step respectively, and did not increase the amount of explained variance. History of aggression still contributed to children's cognitive functioning, even after controlling for educational attainment and income level. Child gender was added to the equation next and did not significantly add to the variance in children's cognitive functioning. In the final step, child temperament

Table 14

Results of the Regression Equation Predicting Childrens' Stanford-Binet Scores (N = 76)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Childhood aggression	-.32	-.32	-2.86**		
Childhood withdrawal	-.02	-.02	-.20		
				.10	4.24*
Step 2					
Childhood aggression	-.28	-.25	-2.26*		
Childhood withdrawal	.00	.00	.02		
Maternal education	.10	.08	.74		
				.01	.54
Step 3					
Childhood aggression	-.28	-.25	-2.25*		
Childhood withdrawal	.01	.01	.12		
Maternal education	.07	.05	.49		
Current income	.08	.07	.67		
				.01	.45
Step 4					
Childhood aggression	-.29	-.26	-2.35*		
Childhood withdrawal	.01	.01	.06		
Maternal education	.08	.06	.57		
Current income	.10	.09	.78		
Child gender[a]	.16	.16	1.41		
				.02	1.99
Step 5					
Childhood aggression	-.24	-.21	-2.04*		
Childhood withdrawal	.02	.02	.21		
Maternal education	.02	.01	.14		
Current income	.13	.12	1.15		
Child gender[a]	.11	.11	1.04		
Parenting stress	-.30	-.29	-2.78**		
Child temperament	-.17	-.17	-1.61		
				.14	6.40**

R^2 =.28 R^2Adj = .20 F = 3.72**

Note. [a] Males=1, Females=2   [t] $p <.10$, * $p <.05$, ** $p <.01$

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and parenting stress were entered and accounted for 14% of the variance. A main effect was found for parenting stress, Beta = -.30, p <.01. Children of highly stressed parents were more likely to achieve lower scores on the Stanford-Binet Scale of Intelligence. Childhood aggression remained significant in the final step, suggesting that it operates directly to predict children's intellectual functioning.

To summarize the results of the second hypothesis, there was a specific pattern of predictors involved in the explanation of IQ at different ages. In cohort one, parental withdrawal and difficult child temperament predicted lower intelligence scores, while maternal education was a positive predictor of IQ. Maternal education achieved significance in the final step only after the inclusion of child temperament. In cohort two, parental aggression and parenting stress were negative predictors of child functioning on the standardized intelligence test.

Hypothesis 3: Relationship between child temperament and cognitive functioning

This hypothesis centered on determining the specific relationship between child temperament and cognitive functioning. Of particular interest was whether temperament made a direct contribution to the prediction of IQ, or operated through current psychosocial variables. For these analyses, child temperament and child gender were entered on the first step, followed by quality of the home environment and social support on the next step.

5) Cohort 1. In the regression examining childrens' IQ scores on the Bayley, Table 15 reveals that the total variance accounted for by the regression was 32%. Together, the combined predictors produced a significant multiple R, F (4, 79) = 10.97, p <.01. In the first step, child temperament and child gender accounted for 16% of the

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Table 15

Results of the Regression Equation Predicting Childrens' Bayley Scores (N=84)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Child temperament	-.38	-.38	-3.69**		
Child gender	.15	.15	1.45		
				.16	7.95**
Step 2					
Child temperament	-.31	-.30	-3.33**		
Child gender	.14	.14	1.58		
Home environment	.45	.43	4.81**		
Social support	-.05	-.05	-.51		
				.19	11.87**

$R^2 = .36$ $R^2 Adj = .32$ $F = 10.97**$

Note. ** $p < .01$

variance and temperament was a significant negative predictor of IQ, Beta = -.38, $p < .01$. Children who had high levels of temperamental difficultness achieved lower intelligence scores. Child gender was not found to add to the variance in IQ. Quality of the home environment and social support were entered in the next block and together accounted for 19% of the variance. There was a main effect for the home environment, Beta = .45. $p < .01$. Children who were provided a supportive home environment had higher cognitive functioning, as indexed by the Bayley. Social support did not add to the prediction of scores on the standardized intelligence test. Child temperament remained significant in the last step, even after controlling for home environment and social support. Thus, there appears to be a direct link between temperament and IQ in this particular sample.

     6) Cohort 2. Table 16 presents the results of the regression equation predicting childrens' intelligence scores on the Stanford-Binet. Overall, the predictors accounted for 30% of the variance, and produced a significant multiple R, F (4, 71) = 8.87, $p < .01$. Child temperament and child gender were entered in the first step and accounted for 7% of the variance. There was a main effect for temperament, Beta = -.25, $p < .05$. Children who had difficult temperaments were likely to have lower scores on the Stanford-Binet. Child gender did not contribute to the prediction of IQ. In the next step, the quality of the home environment and social support were entered, accounting for an additional 26% of the variance. A main effect was discovered for the home environment, Beta = .36, $p < .01$. Children from stimulating environments were more likely to have higher scores on the intelligence test. Social support was also a significant positive predictor of IQ, Beta = .32, $p < .01$. The children of parents who reported higher levels of social support satisfaction

Table 16

Results of the Regression Equation Predicting Childrens' Stanford-Binet Scores (N=76)

Variables	Beta	sr^2	t	R^2 change	F change
Step 1					
Child temperament	-.25	-.24	-2.17*		
Child gender	.07	.07	.61		
				.07	2.75[t]
Step 2					
Child temperament	-.12	-.12	-1.20		
Child gender	.16	.16	1.62		
Home environment	.36	.34	3.54**		
Social support	.32	.31	3.19**		
				.26	14.01**

$R^2 = .33$ $R^2 Adj = .30$ $F = 8.87**$

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

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were likely to achieve better IQ scores. Child temperament was no longer significant in the last step, suggesting that the effect of this variable on IQ operates through environmental factors, at this particular age.

To summarize the results of the third hypothesis, the only variable that predicted cognitive functioning for both cohorts was the home environment. It was positively related to children's IQ scores. In cohort one, difficult temperament was predictive of lower scores on the Bayley, and appeared to have a direct effect on IQ even after controlling for environmental variables. In contrast, the influence of difficult temperament in cohort two seemed to operate through environmental factors, namely the home environment and social support. Social support was a positive predictor of children's functioning.

Discussion

The goal of the present study was to explore the relation between observed child temperament and cognitive competence in a high-risk intergenerational sample. Many researchers have found a link between child temperament and intellectual functioning in both infants and preschoolers (Maziade et al. 1987; Ross, 1987; Roth, Eisenberg, & Sell, 1984). The findings are ambiguous, though, with regards to the nature of this relationship (direct vs. indirect), and whether it remains the same across age groups. Furthermore, there are also mixed results concerning whether temperament functions as a risk or protective factor in predicting IQ. No study to date has examined this specific issue within a sample of children whose parents have been identified as at-risk based on childhood behavioural tendencies. The three areas that were examined included: 1) the prediction of child temperament from parental risk status, 2) the transmission of risk from parents to offspring, with temperament as a potential mediator, and 3) the specific relationship between temperament and IQ. These research questions were addressed while taking into consideration other demographic and environmental factors, in order to examine the pathways through which parents' childhood history of aggression and social withdrawal and child temperament affect cognitive competence. As well, infants and preschoolers were compared to discern whether differences existed as a function of age.

Hypothesis 1: Parental childhood risk status and child temperament

Contrary to expectations, parental risk status was not a significant predictor of child temperament in either cohort. There was a trend for aggression to predict temperament in cohort one, such that parents who were aggressive as children were likely to have children with more difficult temperaments. This may imply that parental

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aggression is a stable behavioural characteristic, which is somewhat linked to children's behavioural style. Many studies have found evidence for the stability of aggression over time (Moskowitz et al., 1985; Olweus, 1979). This link could be a function of a genetic predisposition towards temperamental difficultness which is passed on from parent to child, or the result of a "poorness of fit" between the aggressive parent's interaction style and that of their child. Even so, this finding did not reach significance which could be due to the time lag between the variables, or the fact that more recent variables had a stronger relationship with temperament. Social withdrawal was not related to child temperament, which is consistent with the fact that many researchers have questioned the constancy of this behavioural tendency over time.

There are several other possible explanations for why parental risk status did not impact on child temperament. One reason involves the interaction between genetic and environmental factors. Even if a child is at-risk for developing a difficult temperament based on genetics, the expression of their temperament may be modified due to the reciprocal influence of the individual on their environment. For example, a supportive and warm home environment could interact with a child's innate characteristics to produce a more even-tempered disposition. Another explanation is that parental shaping of child behaviour occurs gradually over the developing years. Therefore, there may be more similarities between parents and their offspring when they are both assessed as adults. In a study investigating the intergenerational stability of behaviour patterns, Cohen, Brook, Kasen and Hartmark (1998) found that difficult patterns of behaviour were not consistent across generations. This finding was attributed to the poor match between the ages of the mother and infant when temperament was measured. Similarly,

in the current study the majority of parents were assessed between the ages of 9 and 12, while the second generation was evaluated between the ages of 1 and 6. These factors could account for the absence of a relationship between parental risk status and child temperament.

Support for the hypothesis that boys would display more difficult temperaments was partially found in cohort one. Although child gender was negatively related to temperament, it explained only a small proportion of the variance. Furthermore, the effect of gender disappeared once parenting stress was added to the equation, suggesting that gender may influence temperament through its link with this variable.

Parenting stress was the one consistent variable that predicted difficult temperament across both cohorts. No other variables predicted temperament in cohort two. Mothers who perceive sources of stress through their role as a parent may become more irritable when interacting with their children. They may also be less available emotionally and use aversive discipline tactics. In turn, this may result in negative parent-child interactions, which can exacerbate the mother's level of parenting stress as well as the severity of their child's difficult temperament. Studies have found a relationship between conflictual mother-child interactions and difficult temperament (Lee & Bates, 1985). On the other hand, it is important to consider the possibility that the direction of causality can also go from the child to the mother. Children with difficult temperaments may have elicited or provoked negative reactions from their parents at an early age, which could result in a greater degree of parental stress. In this study, the measure of parenting stress was collected at the same time as the observational data so it was impossible to tease apart the direction of this effect. In cohort one, parenting stress

represented a significant predictor of temperament, while it only operated as a trend in cohort two. The reason for this difference may have been that the preschool-aged children were not as temperamentally difficult as the infants. This relates back to the issue of self-regulation and modulation of reactivity which are thought to emerge around the age of three (Kopp, 1982). If this is the case, then the perceived stress of parents in cohort two may be less of a salient predictor of temperament.

Taken together, the results from the first hypothesis emphasize the fact that parenting stress was the strongest predictor of a child's difficult temperament. Even if the direction of causality is unclear, the issue remains that a "poorness of fit" between parent and child can result in many negative consequences. Miller, Miceli, Whitman and Borkowski (1996) reported that parents who perceive their parenting role as stressful are less effective in their parenting practices. More specifically, higher levels of reported parenting stress have been related to low levels of positive maternal affect, a lack of maternal responsiveness to child cues as well as child noncompliance and insecure child attachment. Therefore, attempts to train parents on how to provide a better fit between their parenting strategies and their child's temperament might prove to be beneficial.

Hypothesis 2: Parental risk status, child temperament and cognitive functioning

Cohort one. Support was provided for the hypothesis that temperament would act as a risk factor for lower cognitive performance. This finding was in line with other studies which have discovered a connection between difficult temperament and decreased intellectual functioning in infants (Ross, 1987; Roth et al., 1984). One possible interpretation is that both the mother-child tasks and the IQ test tapped into similar constructs. In infancy, competence on an intelligence test seems to be closely tied to

behaviour. Therefore, behaviour expressed during the tasks may have a strong relationship to the Bayley IQ scores, because a pertinent aspect of achieving a high score on this measure involves behavioural competence. Infants with difficult temperaments may have been so uncooperative that it was challenging to get them to respond attentively to the IQ test. It is also possible that these children were previously delayed in terms of cognitive development, and their difficult temperament was simply a behavioural manifestation of their inability to focus on the tasks. As a result of the fact that the design of the study was partially cross-sectional in nature, it was impossible to ascertain the direction of effects in terms of the relationship between temperament and intellectual functioning.

With regards to the pathway from parental risk status to intellectual functioning in the second generation, childhood aggression did not emerge as a significant predictor. Social withdrawal, on the other hand, was a significant negative predictor of child IQ, which appeared to partially work through low family income. This could be explained by the fact that parents who possessed withdrawn tendencies in childhood may not have sought out education or career opportunities in their life, because of their passive nature. As well, individuals may not have developed adequate social skills, which could have resulted in poor social development and an inability to sustain relationships. Either of these factors alone or in combination could lead to low financial attainment. For example, an individual who has difficulty forming relationships with their coworkers or supervisor may not advance in their occupation as quickly as someone with strong social skills. Additionally, children who grow up in lower-SES families may not be privy to appropriate educational materials or adequate parental stimulation, which could result in

poor intellectual functioning. Research has consistently shown that there is a strong relationship between low family income and children's lower cognitive competence (Duncan et al., 1994). Even after controlling for more current sociodemographic variables, there was still a negative link between childhood social withdrawal and IQ. As a result of inadequate social skills, these parents may not have the tools to interact with their children in a positive and stimulating manner. They may have a tendency to spend less time playing with their children and be less responsive to their cues. Consequently, this style of interaction could be one factor that negatively affects their offspring's cognitive skill development.

Demographic variables also accounted for some variance in children's cognitive functioning. As expected, maternal education was found to be a positive predictor of cognitive competence. This finding was consistent with a large body of research which points to the strong influence of maternal education on children's intellectual development (Auerbach et al., 1992; Bee et al., 1982; Velez et al., 1989). Educational attainment appeared to operate through current family income, such that mothers with higher levels of education also tended to have higher incomes. Income was also positively related to children's IQ, which can be explained in terms of the provision of resources to promote child development (i.e. health care, nutrition, learning materials). As well, parenting practices may be influenced by economic factors. Studies have found that high-SES families differ in their parenting styles from low-SES families. Prior, Sanson, Carroll and Oberklaid (1989) discovered that upper-class parents encouraged assertiveness, whereas lower SES parents were less open to exposing their children to new experiences.

Interesting, maternal education regained its significance in the final step of the regression equation, after child temperament was entered. This implies that the inclusion of temperament allowed education to come through. Essentially, by removing variance related to children's behavioural style, the prediction of cognitive competence from maternal education was enhanced. This finding underscores the importance of taking child characteristics into account when predicting children's functioning.

Child gender was positively related to children's IQ scores, such that girls tended to have higher intelligence scores than boys. One possible interpretation relates to adaptive behaviour. Girls may have been more cooperative and controlled during the testing compared with boys, who are often more active and restless. Because the Bayley is so dependent on competent behaviour, this could help to explain the gender difference. The effect of gender disappeared once child temperament was entered into the regression equation, suggesting that the influence of this variable operates through temperament to predict IQ. In sum, childhood social withdrawal, maternal education and child temperament appeared to be the strongest predictors of child IQ in the infant subsample. However, a different pattern of prediction emerged in the preschool subsample.

Cohort two. Temperament was not a significant predictor of cognitive competence in cohort two. One reason could be that other environmental factors have become more prominent during the preschool years. For example, the degree of parental stimulation and the quality of the home environment could be more relevant to children's cognitive functioning at later ages, because of the cumulative effect of these factors over time.

With respect to parental risk status, there was a direct effect of parental aggression on children's IQ in cohort two, and no relationship with social withdrawal. Parents who were identified as aggressive in childhood were likely to have children with lower scores on the standardized intelligence test. This effect was quite powerful even after controlling for factors with known relationships to child IQ, such as maternal education and current income. The fact that aggressive behaviour identified over twenty years ago was able to predict children's cognitive functioning, reinforces the notion of aggression as a stable characteristic that can affect the second generation. This supports prior research on the continuity of aggression over time (Keenan et al., 1998; Moskowitz et al., 1985; Olweus, 1979). The implication of this finding is that an aggressive interaction style may interfere with the parent's ability to provide support and encouragement to their child. Specifically, aggressive parents may be less sensitive or responsive to their children, which could result in inadequate stimulation and lower cognitive performance. It seems likely that aggressive parents lack appropriate parenting skills. Serbin, Peters et al. (1991) found that childhood aggression in girls predicted lower educational attainment. Mothers with limited parental knowledge may not be cognizant of how to model behaviours and tasks for their children.

Contrary to expectations, none of the demographic variables emerged as significant predictors of children's intelligence scores. One potential reason for this lack of influence in cohort two may be the fact that parental aggression and maternal education were rather strongly related. As well, maternal education and current income were also correlated to a moderate degree. Considering that risk status was entered before education and income in the regression equation, it is likely that the variance in IQ that

could be explained by demographic variables was already accounted for by parental aggression. In this particular subsample, even though parents who were aggressive as children were also likely to have less schooling and lower income as adults, it was their behavioural characteristics that contributed the most to their children's poor cognitive performance.

Parenting stress was a significant negative predictor of cognitive competence. One of the main reasons why parenting stress may be more of a salient factor influencing cognitive functioning in this subsample, is that there has been a greater length of time for difficulties related to parenting to accumulate. Mothers who perceive their parenting roles as more stressful may become upset and frustrated when interacting with their children. Subsequently, they may be less responsive and provide fewer stimulating interactions with their offspring. In turn, negative parent-child interactions, which become engrained over time, can hinder children's cognitive and emotional development and create a vicious cycle of distress. It is important to consider the possibility that the direction of causality works in the opposite direction. That is, from the child to the mother. Children who are experiencing developmental delays may constitute a source of stress for their parents. Given that the data on parenting stress and children's cognitive functioning were collected at the same point in time, it is impossible to determine the direction of effect between these variables.

From the above discussion, it is evident that different predictors are influencing cognitive competence in infants versus preschoolers. In cohort one, parents who had high levels of social withdrawal in childhood tended to put their children at risk for low IQ scores through poorer financial resources. As well, the connection between social

withdrawal and intelligence may also be indicative of a passive, inattentive parenting style. In contrast, parental aggression in childhood appeared to have a direct effect on children's cognitive functioning in cohort two. This relationship is most likely explained by the development of a problematic interpersonal style which affects parents' attitudes and behaviours when interacting with their children.

Interestingly, parental aggression did not predict IQ in cohort one. One potential reason is that the younger subsample has had less exposure to the negative parenting style that may characterize aggressive individuals. Alternatively, it may be easier to see the continuity between parental aggression and children's cognitive difficulties as kids approach the age of their parents when they were first identified. Another important issue to consider is why social withdrawal did not predict IQ in cohort two. Prior research from the Concordia Longitudinal Risk Project has suggested that infants of socially withdrawn parents experienced a high degree of perinatal problems and early illnesses. These children may have been born sicker and consequently had poorer cognitive functioning. It is possible that the link between social withdrawal and IQ was only found in cohort one, as a result of the physical health status of the infants.

Another difference between the cohorts was that child temperament was a salient predictor in the infants, whereas parenting stress was a more powerful predictor in the preschoolers. It appears that the impact of parenting stress, potentially linked to difficult temperament, on children's intellectual performance may not become apparent until children are older. Yet, the only way to confirm the effect of this relationship over time would be through a longitudinal design. Overall, these findings underscore the

importance of taking a developmental perspective, in order to more fully understand which factors are operating at specific ages.

Hypothesis 3: Relationship between child temperament and cognitive functioning

Cohort one. In cohort one, temperament was found to have a direct impact on intelligence, such that having a difficult temperament was negatively related to children's IQ scores. As mentioned earlier, there may be similarities between the behaviour observed during the coding of temperament and the nature of the Bayley. Alternatively, infants who have poor self-regulation and highly reactive temperaments may also have unstable external environments, which can lead to negative outcomes. In the infant subsample, temperament maintained its strong influence on IQ, even after controlling for the home environment and social support, which have established relationships to intellectual functioning.

In line with predictions, the home environment was a significant positive predictor of cognitive competence across cohorts. This finding was in line with previous studies which have demonstrated a link between the home environment, as measured by the HOME inventory, and child IQ (for a review of studies see Gottfried, 1984; Saltaris, 1999). This relationship can be explained by the positive influence of both emotional and physical resources on child outcomes. Specifically, affection given to the child and the provision of language stimulation are thought to contribute to the cognitive development of young children. As well, the physical qualities of the home environment also help to facilitate the growth of cognitive abilities. These include learning materials, toys and the creation of a safe environment. Contrary to expectations, social support was not found to predict IQ in the infant subsample. One potential explanation is the fact that the home

environment and social support were moderately related in cohort one. This may have influenced the amount of unique variance that could be explained by social support in the infant subsample.

Cohort two. As expected, temperament operated indirectly in predicting child IQ. Specifically, the negative effect of temperament disappeared once the home environment and social support were entered into the regression equation, suggesting that the influence of this variable operates through psychosocial factors to predict IQ. In the preschool subsample, there has been a greater length of time for the external environment to become more consistent, and to work as a buffer against a child's difficult temperament. This could help to explain why difficult temperament did not make a direct contribution to children's intelligence scores.

The home environment operated as a significant mediating variable in the link between child temperament and cognitive functioning. Given that the home is partially representative of parent's educational attainment, it appears likely that parents with higher levels of education create more stimulating environments for their children. Children with difficult temperaments who interact in a supportive and warm environment over time, may show a modification in the expression of their temperament. As well, it is possible that achieving a "goodness of fit" between the child's temperament and their external environment leads to improved cognitive, social and emotional outcomes.

Social support also functioned as a significant mediating variable between temperament and intellectual competence. Temperament predicted IQ in step one, but became non-significant when social support was added to the equation. This was consistent with prior studies, which have found that social support operates as a mediator

between temperament and child functioning (Maziade et al., 1986; Prior, 1992). Social

support was demonstrated to have a positive relationship with child IQ. There are several

explanations of this finding. It is possible that parents who have a higher degree of social

support satisfaction have better coping and parenting skills, which result in competent

child outcomes. Having a supportive social network may also stimulate more positive

parenting practices, such as reading to the child or conversing more frequently and

constructively. In turn, these cognitively stimulating behaviours may lead to better

cognitive performance.

Another potential interpretation is that parents who are content with the network

of individuals in their lives may perceive their children more positively, and subsequently

have more rewarding interactions with them. Andresen and Telleen (1992) have found

that maternal social support had a positive effect on maternal attitudes and behaviour,

including appropriate responsiveness to the child's cues and positive feelings towards

tasks involved in child-rearing. Therefore, parents who are satisfied with their social

support may perceive difficult children as more manageable or even as a challenge,

instead of as a major source of stress. This could be related to how social support

functions as a mediator between child temperament and outcome.

Summary and Implications

The results from the current study demonstrate that difficult temperament does

operate as a risk factor for lower cognitive competence in high-risk families. Even though

the relationship between temperament and child IQ was stronger in the infant subsample,

it was still apparent in preschool-age children. This investigation stresses the necessity of

taking a developmental approach, by addressing the processes underlying children's

behaviour at different ages. For example, there were specific patterns of variables involved in the explanation of IQ at dissimilar ages. Furthermore, the nature of the relationship between temperament and IQ was also dependent on age, with a direct connection found in the younger children and an indirect link in the older children.

The evidence from the present study suggests that children's cognitive competence is placed at risk through two main processes. One is through parents' childhood risk status and the other is through parenting stress and difficult child temperament. Factors that appear to buffer the relationship between difficult temperament and lower IQ are the home environment and satisfaction with social support. It appears that an effective way of preventing maladaptive outcomes in the second generation would be to target the problematic behavioural characteristics in the parent generation. Children could be screened in schools for the presence of these behavioural tendencies and then helped to resolve them at an early stage in their life. Another possibility is to focus on the parent-child relationship, and implement programs aimed at improving the fit between the child's temperament and the parent's expectations and child-rearing style.

One example is parent-training programs, where parents learn to understand the temperamental basis of their child's behaviour and respond appropriately (Chess & Thomas, 1984). Sheeber and Johnson (1994) examined the efficacy of a temperament-focused, psychoeducational intervention for mothers with temperamentally difficult preschoolers. Twenty mothers of 3-5 year-old children were randomly assigned to the parent-training program (PTP) and 20 to a wait-list control group. The PTP had weekly sessions for 9 weeks and assessment questionnaires were given to both groups at post-

treatment. Results showed that mothers who participated in the PTP demonstrated increased satisfaction with parent-child relationships and perceived parenting competence, as well as improved affect, compared to the wait-list control group. Furthermore, decreases in child behaviour problems and disruptions in family lifestyle were observed. Treatment gains were maintained at 2-month follow-up, which provides some support for this particular type of intervention. Dealing with the negative fit between the parent and child through interventions that involve education and support may reduce maternal anxiety, enrich parent-child relationships and lead to more adaptive outcomes. These programs may be particularly useful in high-risk families who often lack the educational and emotional resources to cope with a difficult child.

Limitations of the Present Study

In the context of evaluating the implications of the current study, it is also important to consider the limitations. First, the coding of child temperament was based on a small sample of behaviour (three tasks), which may not be representative of the entire scope of a child's behavioural repertoire. Another important point concerns the fact that the videotaped interactions took place at one point in time. Temperament is considered to be a stable trait that manifests itself in different situations across time. It would have been useful to have a longitudinal sample of children's behaviour, yet the project was restricted in its available time and monetary resources. The data were also collected within a specific context, that of structured mother-child interactions. Even though an effort was made to construct the free play sessions as natural as possible, it was still an artificial set-up and may not have resembled the type of interactions that normally

occurred in the home. Consequently, the findings may be somewhat limited in their generalizability to other populations.

Another shortcoming of the study was the small sample size within each cohort, which imposed restrictions on the number of predictors that could be included in the analyses. The ideal way to test the hypotheses would have been through a path analysis, which would have allowed us to draw firmer conclusions concerning how parental risk status and child temperament work to influence cognitive functioning. Since this was not possible, any interpretations based on the findings must still be considered tentative. As well, replication with a larger sample size is necessary to confirm the current results.

The fact that several of the variables under investigation (i.e. parenting stress, child temperament, home environment, social support, cognitive competence) were evaluated at the same point in time was another limitation. The occurrence of concurrent predictors prevents any definitive inferences regarding the direction of causality. Teasing apart the direction of effects is imperative in order to determine where to focus intervention efforts.

Suggestions for Future Research

The current study helped to shed some light on a body of ambiguous literature concerning the nature of the relationship between child temperament and cognitive functioning, and temperament's role as a risk or protective factor in influencing IQ. Children with difficult temperaments who had low scores on the standardized intelligence tests may be at-risk for future problems at school. Following these children as they enter the critical transition stage of school entry is crucial, in order to assess how they are functioning in terms of academic competence and adaptive behaviour.

An important next step in the Concordia Longitudinal Risk Project should be to examine the link between temperament, as assessed in infants and preschoolers, and academic achievement at school-age. Research investigating how child temperament impacts on academic achievement, may facilitate a greater understanding of how temperament may enhance or impede school performance. Specifically, temperament may contribute to a generalized response set involving the modulation of activity, the focusing of attention and the ability to withstand distraction (Kohnstamm, 1986). These types of characteristics may affect a child's readiness for school. As well, they may also influence teachers' perception of pupils' teachability and the nature and degree of teacher-child interactions. Teachers who find children difficult and unmanageable may not treat them in a manner that will provide optimal stimulation. Furthermore, a difficult temperament may be linked to low achievement, because disruptive behaviours decrease the time children spend attending to the learning materials as well as to their teacher.

It would also be interesting to examine the types of factors that may mediate the relationship between temperament and academic achievement. Hypothesized variables include child-rearing practices, parental attitudes concerning their child's scholastic ability and teacher ratings of social competence. In order to get a broader picture of a child's adaptation to school, it would also be necessary to examine their peer relationships, coping skills and whether they have been a target or instigator of bullying.

Future studies should also attempt to use data gathered from the Concordia Longitudinal Risk Project to design intervention programs for high-risk families. Specifically, based on data gleaned from the current study it is important to incorporate training for parents on how to adjust to their child's temperament and respond

accordingly. As mentioned previously, it would also be ideal to target individuals who display problematic behavioural tendencies in childhood, in order to avoid the types of pathways that lead high-risk parents to negative outcomes for themselves and their children. Understanding the role of both risk and protective factors will help facilitate intervention strategies in addressing areas of vulnerability in children, as well as bolstering features which enable children to overcome the difficulties inherent in a high-risk environment.

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Appendix A

The Pupil Evaluation Inventory

<u>Aggression items</u>

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:_____

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Appendix C

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

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 — **Bathroom check**
(±5 min.) — **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)

L'INDIVIDU DANS SON MILIEU
Renseignements sociodémographiques

Tous ces renseignements sont traités de façon totalement confidentielle

1. **Sexe**   ☐ M   ☐ F

                                        AN MO JR

2. **Âge**   _____ ans   Date de naissance   ____ ____ ____

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

                                               Depuis quelle date?

    ☐ Marié(e)   ☐ Séparé(e)

                                                AN   MO   JR

    ☐ Divorcé(e)   ☐ Veuf/veuve   ____ ____ ____

4. **Nombre d'enfants** _____

    Si enceinte (ou conjointe enceinte), bébé attendu pour: ____ ____

                                                            AN   MO

    Sinon, prévoyez-vous avoir un enfant dans les prochains 12 mois?   OUI ___   NON ___

                                     dans les prochains 24 mois?   OUI ___   NON ___

    Pour <u>chaque enfant</u>:

    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.

    (Si tu as plus de quatre enfants, inscrire leurs informations sur une feuille séparée.)

1	**NOM**	**SEXE**	**AN**	**MO**	**JR**
	_____	☐ **M** ☐ **F**	____	____	____

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

Année scolaire: _____ **Classe spéciale:** _____

2   NOM   SEXE   AN   MO   JR   .
_____   **□ M   □ F**   ____ ____ ____

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

Année scolaire: _____ **Classe spéciale:** _____

3   NOM   SEXE   AN   MO   JR
_____   **□ M   □ F**   ____ ____ ____

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

Année scolaire: _____ **Classe spéciale:** _____

4   NOM   SEXE   AN   MO   JR
_____   **□ M   □ F**   ____ ____ ____

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

Année scolaire: _____ **Classe spéciale:** _____

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

     Études-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 □   ‖   NON □

Occupation: _____   ‖ As-tu déjà eu un emploi?
_____   ‖
                                             ‖ Oui □   Non □
Tes tâches: _____   ‖ ⇓
_____   ‖ En quoi? _____

Combien d'heures/sem.? _____

Salaire de l'heure _____ $

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

AN   MO

_____/_____/

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

Quand as-tu arrêté de

date: _____/_____/

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):**

AN   MO   JR

a)   Son nom:_____ Date de naissance ___ ___ ___

Son occupation:_____

Ses tâches:_____

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

AN   MO

Il/Elle travaille là depuis: date _____ _____

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 ____ ____ ____

       Son occupation:_____

       Ses tâches:_____

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

                               AN   MO

       Il/Elle travaille là depuis: date ____ ____

b)   Au cours des <u>12 derniers mois,</u> 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 <u>complétée</u> (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

10.   **Vision des couleurs**: Il y a une section de la recherche qui porte sur les couleurs. Est-ce que tu as de la difficulté à percevoir certaines couleurs?

          ☐ Oui (préciser: _____) ☐ Non

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 Positive Disposition Coding System and Manual

Positive Disposition Coding System

Tape No:_____   Age of Child: _____   Cohort: _____

Subject No:_____   Coder: _____   Date: _____

Free Play

1) <u>Mood (Child)</u> – rate child's mood with 1 indicated by frowning, anger, 2 indicated by neutral mood and lack of expressiveness and 3 indicated by smiling, laughing, positive vocalizations

1	2	3

		YES/NO	DESCRIPTION	DIR
2)<u>Quality of Physical Contact</u>	0-:30	_____	_____	_____
-rate whether mother	:30-1:00	_____	_____	_____
and child have affectionate	1:00-1:30	_____	_____	_____
physical contact	1:30-2:00	_____	_____	_____
and what type	2:00-2:30	_____	_____	_____
ex. hug, kiss, touch	2:30-3:00	_____	_____	_____
->does not include	3:00-3:30	_____	_____	_____
child/mother giving object	3:30-4:00	_____	_____	_____
or accidentally touching				

3) <u>Quality of Mother Warmth</u> – rate from 1-4 with 1 being no physical and verbal mother warmth to 4 being high physical and verbal mother warmth

1	2	3	4

4) <u>Mother's Involvement with Child</u> – after each minute, rate extent to which mother appears interested and involved in playing with child with 1 being somewhat disengaged and 2 being involved (for majority of 60 seconds)

1st minute	1	2
2nd minute	1	2
3rd minute	1	2
4th minute	1	2

5) <u>Child's Involvement with Mother</u> – after each minute, rate extent to which child appears interested and involved in playing with mother with 1 being somewhat disengaged and 2 being involved (for majority of 60 seconds)

1st minute	1	2
2nd minute	1	2
3rd minute	1	2
4th minute	1	2

6) <u>Activity Level</u> - rate child's activity level with 1 being low and 3 being high
->1 would indicate a child who sits for entire free play without getting up, 2 is a child who gets up once or twice and 3 is a child who gets up three or more times

| 1 | 2 | 3 |

7) <u>Reactivity</u> – rate child's emotional reactivity with 1 being low reactivity and 3 being high ->1 would indicate an even-tempered child, 2 would indicate a somewhat reactive child and 3 would be a highly reactive child

| 1 | 2 | 3 |

8) <u>Approach to toys</u> – rate child's approach to toys with 1 being withdrawn from play and 3 being actively engaged in play ->1 would indicate a child who resists playing with toys, 2 would indicate a child who takes some initiative and 3 would indicate a child who actively seeks out toys to play with

| 1 | 2 | 3 |

9) <u>Mood Regularity</u> – rate child's mood regularity with 1 being consistent mood, 2 being fluctuates once or twice and 3 being fluctuates three or more times

| 1 | 2 | 3 |

Interference Task

1) <u>Adaptability</u> – rate child's initial adaptability to interference task with 1 being inflexible and 3 being very flexible (**FIRST 30 SEC**)
->1 would indicate a child who becomes quite upset at beginning of interference, 2 would indicate a child who becomes fussy and 3 would indicate a child who moves easily into interference

| 1 | 2 | 3 |

2) <u>Mother on Task</u> – rate extent to which mother focuses on task at hand, without attending to child for each 15 second interval
->if mother goes off task record it in interval in which the behaviour begins

	:15	:30	:45	1:00	1:15	1:30	1:45	2:00	2:15	2:30	2:45	3:00
<u>OFF</u>												
<u>ON</u>												
<u>RSN</u>												

3) <u>Mood (Child)</u> – rate child's mood with 1 indicated by frowning, anger, 2 indicated by neutral mood and lack of expressiveness and 3 indicated by smiling, laughing, positive vocalizations

      1   2   3

4) <u>Activity Level</u> - rate child's activity level with 1 being low and 3 being high
->1 would indicate a child who sits for entire interference without getting up, 2 is a child who gets up once or twice and 3 is a child who gets up three or more times

      1   2   3

5) <u>Reactivity</u> – rate child's emotional reactivity with 1 being low reactivity and 3 being high
->1 would indicate an even-tempered child, 2 would indicate a somewhat reactive child and 3 would be a highly reactive child

      1   2   3

6) <u>Approach to toys</u> – rate child's approach to toys with 1 being withdrawn from play and 3 being actively engaged in play
->1 would indicate a child who resists playing with toys, 2 would indicate a child who takes some initiative and 3 would indicate a child who actively seeks out toys to play with

      1   2   3

7) <u>Mood Regularity</u> – rate child's mood regularity with 1 being consistent mood, 2 being fluctuates once or twice and 3 being fluctuates three or more times

      1   2   3

<u>Free Play</u>

1) <u>Mood (Child)</u> – rate child's mood with 1 indicated by frowning, anger, 2 indicated by neutral mood and lack of expressiveness and 3 indicated by smiling, laughing, positive vocalizations

      1   2   3

		YES/NO	DESCRIPTION	DIR

2) <u>Quality of Physical Contact</u> 0-:30 _____ _____ _____
-rate whether mother   :30-1:00 _____ _____ _____
and child have affectionate 1:00-1:30 _____ _____ _____
physical contact   1:30-2:00 _____ _____ _____
and what type   2:00-2:30 _____ _____ _____
ex. hug, kiss, touch   2:30-3:00 _____ _____ _____
->does not include   3:00-3:30 _____ _____ _____
child/mother giving object 3:30-4:00 _____ _____ _____
or accidentally touching

3) <u>Quality of Mother Warmth</u> – rate from 1-4 with 1 being no physical and verbal mother warmth to 4 being high physical and verbal mother warmth

      1   2   3   4

4) <u>Mother's Involvement with Child</u> – after each minute, rate extent to which mother appears interested and involved in playing with child with 1 being somewhat disengaged and 2 being involved (for majority of 60 seconds)

1st minute   1   2
2nd minute   1   2
3rd minute   1   2
4th minute   1   2

5) <u>Child's Involvement with Mother</u> – after each minute, rate extent to which child appears interested and involved in playing with mother with 1 being somewhat disengaged and 2 being involved (for majority of 60 seconds)

1st minute   1   2
2nd minute   1   2
3rd minute   1   2
4th minute   1   2

6) <u>Activity Level</u> - rate child's activity level with 1 being low and 3 being high
->1 would indicate a child who sits for entire free play without getting up, 2 is a child who gets up once or twice and 3 is a child who gets up three or more times

      1   2   3

7) <u>Reactivity</u> – rate child's emotional reactivity with 1 being low reactivity and 3 being high
->1 would indicate an even-tempered child, 2 would indicate a somewhat reactive child and 3 would be a highly reactive child

      1   2   3

8) <u>Approach to toys</u> – rate child's approach to toys with 1 being withdrawn from play and 3 being actively engaged in play
->1 would indicate a child who resists playing with toys, 2 would indicate a child who takes some initiative and 3 would indicate a child who actively seeks out toys to play with

               1   2   3

9) <u>Mood Regularity</u> – rate child's mood regularity with 1 being consistent mood, 2 being fluctuates once or twice and 3 being fluctuates three or more times

               1   2   3

Positive Disposition Coding System Manual

Free Play – 4 Minutes

Coding will begin when mother and child start interacting and will continue until the timer sounds or until the experimenter stops the interaction. Coding will stop at the end of the 4 minutes regardless of whether the mother and child continue to interact. The counter display on the screen will be used to determine the length of time and will be set by the principal coder.

1) Mood (Child)
1=negative ie. whining, frowning, screeching, tantrums, crying
2=neutral ie. neither positive nor negative, lack of expressiveness
3=positive ie. laughing, positive vocalizations, smiling
->for majority of time (more than 2 minutes)

2) Quality of Physical Contact
-for DIR (DIRECTION) do 1=M-C only, 2=C-M only and 3=Mutual
-if child is comfortable in mother's lap then 3, if not then 1
-for quality of contact does not include inappropriate behaviour such as kissing child on mouth
-examples of appropriate are hug, pat, kiss, arm around shoulders, holding hands, ruffling hair, stroking, caressing, child sitting in mother's lap, child leaning on mom
-does not include touching as part of playing game or teaching something ex. counting fingers on hand
-does not include restraining child in lap or arms
->YES=1, NO=2

3) Quality of Mother Warmth
-physical warmth is defined by affectionate physical contact such as hugging, kissing, touching, holding
-verbal warmth is defined by engaging child in conversation, being lively and animated, talking sweetly to child with affectionate terms
1=minimal physical and/or verbal warmth ie. no affectionate physical contact and verbal interaction is rare
2=low physical and high verbal warmth ie. no to some degree of physical warmth, large degree of verbal
3=low verbal and high physical warmth ie. no to some degree of verbal warmth, high degree of physical
4=high physical and verbal warmth ie. large degree of both physical and verbal warmth
->in more than one time period

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4) Mother's Involvement with Child

-based on body orientation, eye contact and verbal interaction

1=somewhat disengaged ie. mother who does not make effort to interact with child, eye contact and verbal interaction are rare, sitting away from child

->mother is detached from play or preoccupied with toys

2=involved ie. mother who verbally and physically interacts with child, lots of eye contact, child sitting in mother's lap or facing each other closely

->includes joint attention on toy, book

->in order to coded, behaviour must occur for over 30 seconds in each minute segment

5) Child's Involvement with Mother

-based on body orientation, eye contact and verbal interaction

1=somewhat disengaged ie. child who does not make effort to interact with mother, eye contact and verbal interaction are rare, sitting away from mother

->child is detached from play or preoccupied with toys

2=involved ie. child who verbally and physically interacts with mother, lots of eye contact, child who sits in mother's lap or facing her

->includes joint attention on toy, book

->in order to be coded, behaviour must occur for over 30 seconds in each minute segment

6) Activity Level

-refers to how active child is during free play on mat

-getting up refers to getting toy, moving to change sitting position, moving closer or farther away from mother

-does not include child sliding across mat to move to other side without getting up

-for child 1-2 years old, if crawling off mat considered getting up

1=child who sits for entire free play without getting up

2=child who gets up once or twice

3=child who gets up three or more times

7) Vocal Reactivity

-refers to child's emotional reactivity but not in response to any specific event

-examining whether child gets upset or frustrated easily

1=low reactivity, even-tempered child, very calm, not bothered by little things

2=somewhat reactive at times but calms down on own ->more than one occurrence

3=high reactivity, expressed by loud verbalizations, crying, whining, often cannot calm down on own

8) Approach to toys

-refers to child's approach to toys

1=child who resists playing with toys, sulks, wants to be left alone

2=child who takes some initiative to play but mostly follows mom's lead ie. mother reading book

3=child who actively seeks out toys to play with, takes initiative to gets toys, starts games

->for more than 2 minutes

9) Mood Regularity
-refers to how consistent child's mood is across free play
1=consistent ie. no fluctuation for majority of time
2=fluctuates once or twice ie. fluctuates from positive to negative, or negative to positive
3=fluctuates three or more times ie. fluctuates back and forth from positive to negative or negative to positive

Interference Task – 3 Minutes

Coding begins when timer goes off to signal the beginning of the interference task and ends when timer sounds to signal the end of the interference task. The counter display on the screen will be used to determine the length of time and will be set by the principal coder.

1) Adaptability
-refers to child's initial adaptation to interference task (first 30 seconds)
1=child who becomes quite upset at beginning of interference, whines, cries
2=child who becomes fussy, tries to get mom's attention, does not try to play with toys immediately
3=child who moves easily into interference without making fuss, starts to play with toys right away

2) Mother on Task
-refers to extent to which mother focuses on task at hand, without attending to child for each 15 second interval
-off task does not include mother telling child that she is busy
-off task does not include mother making sure that child stays on mat or sits down unless it takes mother completely away from task for majority of time interval
-when mother is off task, give reason why
->could be because mother is interacting with child, talking to them, watching them do something **CODE AS 1 IN RSN (REASON)**
->could be because mother is trying to keep child on mat but child is restless and unavoidably takes mother's attention away from task **CODE AS 2 IN RSN (REASON)**
-on task refers to mother who completes questionnaire, does not look at or interact with child

3) Mood
1=negative ie. does not have to be as pronounced as in free play, can include frowning, whining
2=neutral ie. lack of vocalizations
3=positive ie. some positive vocalizations (more than one)

4) <u>Approach to Toys</u>
2=picking up objects but not as engaged with them
3=showing enthusiasm, playing game, building something
-for children 1-3, if showing enthusiasm but not actively playing still 3
->for all other codes under interference task refer to free play definitions