

A Bio-ecological Perspective of Children's Mental Health: An Empirical Investigation
into the Unknowns of the Differential Susceptibility Hypothesis.

by

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Abstract

A nationally representative cohort (N = 2,336) was followed from the age of 2-3 to the age of 6-7, through Cycle 1 and Cycle 3 of the National Longitudinal Survey of Children and Youth. For this sample of children, the simultaneous contribution of neighbourhood characteristics, social support, maternal depression, parenting quality and temperament as predictors of their mental health outcomes was investigated using structural equation modeling techniques. Findings suggest that temperamentally vulnerable children manifest fewer problem behaviours if exposed to positive parenting. Further, parents who perceive greater problems in the neighbourhood report higher levels of depression, which in turn negatively affects their parental behaviour. Conversely, parents who are surrounded by socially cohesive communities are more positively adjusted and engage in responsive interactions with their offspring. These results highlight the pivotal role of parenting as a catalyst for successful adaptation of temperamentally vulnerable children. Moreover, the findings point out that it is essential to examine the ways in which the broader social context contributes to changes in family processes.

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Table of Contents

Abstract	ii
Acknowledgements.....	iii
Table of contents.....	iv
List of Tables.....	vi
List of Illustrations.....	vi
List of Appendices.....	vi
INTRODUCTION	
1.1. Background and Significance of the study.....	p. 1
1.2. Thesis goals.....	p. 8
1.3. Data Set and Expected Benefits of the Study.....	p. 9
LITERATURE REVIEW	
2.1. Theoretical Perspective.....	p. 10
2.2. Effects of Temperament on Children’s Psychological Adjustment	p. 13
2.3. Parental Behaviour and Children’s Mental Health	p. 16
2.4. Temperament-by-Parenting Interactions: Differential Susceptibility Hypothesis	p. 18
2.5. The Impact of Maternal Depression on Children’s Psychological Well-being	p. 22
2.6. The Impact of Neighborhood Characteristics and Social Support on Proximal Processes: Long-term Consequences for Children’s Mental Health	p. 27
THE PRESENT THESIS	
3.1 Motivation.....	p. 32
3.2. Conceptual Models.....	p. 34
3.3. Research Hypotheses.....	p. 37
3.3.1. Bio-ecological Systems Hypothesis.....	p. 37
3.3.2. Differential Susceptibility Hypothesis.....	p. 38

RESEARCH METHODOLOGY

4.1. A Brief Overview on the National Longitudinal Survey of Children and Youth.....	p. 39
4.2. Measures.....	p. 42
4.3. Covariates.....	p. 43
4.4. Statistical Modelling Procedure.....	p. 49
4.4.1. Model Fit Indices.....	p. 50
4.4.2. Methods for Deriving and Analyzing the Latent Interaction Factors.....	p. 51
4.4. Software Packages.....	p. 52
4.5. Weighting Procedure.....	p. 52

RESULTS

5.1 Sample Characteristics and Attrition Analysis.....	p. 53
5.2. Structural Models.....	p. 57
5.2.1. Risk Model.....	p. 58
5.2.2. Protective Model.....	p. 61

DISCUSSION

6.1. Summary of the Study Objectives	p. 64
6.2. Research Findings.....	p. 65
6.2.1. Bio-ecological System Hypothesis.....	p. 65
6.2.2. Differential Susceptibility Hypothesis.....	p. 71
6.3. Implication for Theory Development and Public Policy.....	p. 75
6.4. Limitations and Future Directions.....	p. 79
References.....	p. 82

List of Tables

Table 1. Cycle 1 measures of used as predictors.....	p. 44
Table 2. Cycle 3 measures used as outcome variables.....	p. 48
Table 3. Results of the Attrition Analysis.....	p. 54
Table 4. Descriptives for All of Study Variables After Imputation of the Predictor Variables in the Final Sample (N = 2,336).....	p. 56

List of Illustrations

Figure 1. Conceptual representation for the risk model.....	p. 35
Figure 2. Conceptual representation for the protective model.....	p. 36
Figure 3. SEM results for the risk model.....	p. 60
Figure 4. SEM results for the protective model.....	p. 63

List of Appendices

Appendix A: Questionnaire Items.....	p. A1
Appendix B: Percentage of Missing Values for Each of the Scales.....	p. A10
Appendix C: Univariate Summary Statistics for All of the Study Items.....	p. A11
Appendix D: Demographics Descriptives for the Final Sample of N = 2,336 children.....	p. A14
Appendix E: Measurement models for Latent Factors.....	p. A18
Appendix F: Matrix of correlations between all of the exogenous and endogenous latent factors.....	p. A24

INTRODUCTION

1.1. Background and Significance of the Study

Recently, a number of policy initiatives have stressed the continued need for the implementation of national strategies for the prevention and appropriate management of mental health problems in young populations (e.g., APA, 2001; Early Childhood Mental Health Consultation, 2005; National Scientific Council of Developing Child, 2008; World Health Organization, 2004). In a related vein, overall awareness of the importance of the early years of development to psychological well-being throughout the life course has given rise to a substantial demand for research into the determinants of children's mental health (e.g., Cicchetti, 1993; Cicchetti & Toth, 1996; Nagin & Tremblay, 2001; Reid, 1993; Romano, Tremblay, Farhat, & Côté, 2006). Clearly, the high prevalence rate of mental health-related problems in children constitutes a serious public health concern. According to recent national reports, approximately 14% of Canadian children between the ages of 4-17 years have been diagnosed with one or more psychological disorder (Waddell, 2007). Among those children suffering from mental illness, 6.4% have been diagnosed with Anxiety Disorders, 4.8% with Attention Deficit Disorders and Hyperactivity, 4.2% with Conduct Disorders, and 3.5% with Depressive Disorders (Waddell, McEwan, & Shepherd, 2005). More importantly, poor psychological functioning in childhood is accompanied by a series of related problems. For instance, it has been shown that children suffering from emotional and behavioural difficulties are more likely to demonstrate academic underachievement, poor social competence in peer

relationships, and low self-esteem (Hinshaw, 1992; Hubard & Dearing, 2004; Leary, Schreindorfer, & Haupt, 1995). Furthermore, children's mental health problems can escalate into more severe debilitating conditions at a later age (i.e., comorbid disorders, delinquent behaviour; Costello et al., 2006; Loeber, 1990). These results cause multiple concerns among which are the welfare of the implicated children and the elevated cost to the health care system (Stephens & Joubert, 2001).

Despite the importance of mental health issues in the young population, the successful implementation of early prevention programs initiatives has not yet been fully achieved (Waddell, Hue, Garland, Peters, & McEwan, 2007). The fact that public policy success has been limited is likely due to the numerous difficulties encountered in maintaining sustained public surveillance of children's mental health outcomes in the population (Waddell et al., 2007). To achieve tangible progress in prevention research, it is important to use valid instruments to track mental health outcomes in the young population. Analyses of community survey data, such as the National Longitudinal Survey of Children and Youth (NLSCY), are uniquely suited for this specific type of investigation (Boyle & Willms, 2002). Such analyses allow for the evaluation of children's mental health over time using information collected from nationally representative cohorts (Statistics Canada, 1996).

Another important issue involves the selection of a critical set of indicators that can provide a comprehensive assessment of children's mental health outcomes. According to the bio-ecological system approach, children's mental health outcomes are the result of

both innate biological processes (i.e., temperament) and the dynamic interplay among a series of micro- (i.e., family) and macro-level (i.e., societal influences) factors that shape the individual's development over time (Bronfenbrenner & Morris, 1998). In this perspective, careful evaluation of the relevant risk and protective factors that exist in the individual and in the environment are necessary to clarify the complexity of mental health-related problems in young children.

With respect to biological bases of behaviour, individual differences in later psychological functioning can be attributed to early temperamental attitudes. Temperament is characterized by a combination of innate characteristics regarding specific emotional, motoric, attentional, and self-regulating processes that are first apparent in infancy and maintain a relative stability over time (Rothbart & Bates, 1998). Importantly, a number of studies have related children's temperamental vulnerabilities to the development of two distinct clusters of symptoms, namely (1) *externalizing* behaviours that reflect the inability to promptly inhibit impulses and tendency to manifest aggressive behaviour, and (2) *internalizing* behaviours characterized by excessive worries, general low emotional tone, and social inhibition (Eisenberg et al., 2001; Eisenberg, Fabes, Guthrie, & Reiser, 2000; Eisenberg, et al., 1997; Eisenberg, et al., 1996). Specifically, temperamental profiles characterized by heightened irritability/fussiness and negative emotionality, also referred to as difficult temperament, have been related to the emergence of early signs of externalizing problems in childhood (Guerin, Gottfried, & Thomas, 1997). On the other hand, children's early tendencies to display fearfulness and

social reticence have been associated with the development of internalizing problems (Kagan, Reznick, Clarke, Snidman, & Garcia-Coll, 1984).

However, despite the importance that innate dispositions have in shaping future behaviour, temperament can only partially account for the complexity of psychological symptoms and their variability across individuals. Indeed, children's congenital dispositions do not seem to operate in a singular manner but, rather, act in concomitance with other proximal factors in determining children's behaviour (Belsky, 1997). Regarding such factors, parents are considered to be the major socializing agents for the developing child and, hence, play a pivotal role in channelling and shaping children's future socio-emotional development. Indeed, numerous findings have shown that young children's well-being depends on the quality of rearing practices endorsed by the primary caregivers as well as the resources provided in the immediate life-space environment (Collins, Macobby, Steinberg, Hetherington, & Bornstein, 2000). Generally, responsive and sensitive rearing practices induce a number of positive developmental outcomes, including prosocial behaviour and empathy (Clark & Ladd, 2000; Krevans & Gibbs, 1996; Garner, 2006). Conversely, hostile child-parent relationships can compromise children's emotional regulatory capacities, thereby interfering with normal socio-emotional development (Patterson, 1992). Moreover, the presence of hostile parenting might serve to aggravate the detrimental effect of children's temperamental vulnerabilities on behaviour. For instance, it has been shown that children who manifest early signs of difficult temperament are negatively affected by aversive parenting practices to a much

greater degree than are normative samples of same-age peers (Karreman, Hass, van Tuijtel, van Aken, & Dekovic, 2010; Morris, Silk, Steinberg, Sessa, Avenevoli, & Essex, 2002; van Aken, Junger, Verhoeven, van Aken, & Dekovic, 2007).

More interestingly, a growing body of research has provided evidence that temperamentally vulnerable children are not only more likely to develop problem behaviours when exposed to ineffective parenting practices, but are also positively impacted by favourable rearing experiences to a greater extent than non-vulnerable children (Gilissen, Koolstra, van IJzendoorn, Bakermans-Kranenburg, & van der Veer, 2007; Gilissen, van IJzendoorn, Bakermans-Kranenburg, & van der Veer, 2008; Mesman et al., 2009; van Zeijl et al., 2007). This particular phenomenon has been referred to as the “differential susceptibility hypothesis” (Belsky, 1997; 1998, Belsky, 2005; Belsky, Bakermans-Kranenburg & van IJzendoorn, 2007; Belsky & Plues, 2009, 2010). According to proponents of this view, temperamental vulnerability is regarded as a source of both risk and protection with respect to children's mental health outcomes. More importantly, it highlights the importance of considering temperament from an interactionistic perspective, which focuses on the joint effects that temperamental dispositions and parenting have on the prediction of children's mental health outcomes.

Nonetheless, although previous research findings have provided some support for the differential susceptibility hypothesis, to the best of my knowledge, no researchers have investigated this particular phenomenon while also taking into account the simultaneous effects of other family-based (e.g., maternal mental health) and community-

based factors (e.g., neighbourhood quality) on the psychological adjustment of children with different temperaments. Thus, my thesis will examine the joint effects of parenting and temperament on children's mental health outcomes as well as the mechanisms through which other proximal and distal elements of the children's environment come into play with respect to their behaviour.

Among all proximal factors influencing children developmental outcomes, parental psychopathology, particularly maternal depression, has been regarded as an important antecedent to children psychological maladjustment (Cummings & Davies, 1999; Goodman & Gotlib, 1999). Moreover, as a number of studies have pointed out, the manner in which parental depression affects children's psychological functioning could be in large part due to its negative effect on parenting. Namely, a growing body of evidence exists to suggest that maternal depression can jeopardize children's well-being by leading to the embracement of a range of inappropriate rearing practices that are detrimental to children's psychological health (Cummings & Davies, 1994; Goodman & Gotlib, 1999; Leve, Kim, & Pears, 2005; Miller-Lewis, 2006). From this perspective, maternal depression can be considered as a potential mechanism that affects children's mental health both directly and indirectly via parenting.

As mentioned previously, to advance our understanding of the ecology of children's development, broader elements of the environmental context also need to be considered. More specifically, aspects of the neighbourhood environment are among the most prominent factors of the broader living context that can exert both direct and indirect

effects on children's mental health (Moren-Cross, Wright, LaGory, & Lanzi, 2005; Pachter, Auinger, Palmer, & Weitzman, 2006). Particularly, neighbourhood disorganization (i.e., violence, safety concerns, and noise) can constitute a serious hazard to children through its adverse effects on both maternal depression and parenting behaviour (Earls, McGuire, & Shay, 1994; Hill & Herman-Stahl, 2002). Conversely, a good quality neighbourhood contributes to better outcomes for both children and their families. For instance, it has been shown that living in a less problematic area decreases family stress and positively influences maternal depressive symptoms (Leventhal & Brooks-Gunn, 2001). Furthermore, socially cohesive neighbourhoods characterized by the presence of robust social networks, can provide depressed parents with more available support, thereby favouring the creation of a more positive rearing environment (Kohen, Leventhal, Dahinten, & McIntosh, 2008).

Taken together, the current evidence confirms the important role that both individual and environmental characteristics have in modulating children's behaviour. However, no published research has examined parenting-temperament interactions while simultaneously assessing the impact of the myriad of other family-related factors and community influences that are present. Hence, an investigation of these relationships with respect to longitudinally representative cohorts within a large-scale survey such as the NLSCY seems timely. Such an investigation would not only further our understanding of the mechanisms through which different sets of factors might affect children's mental health but also allow for greater generalizability of the results to the larger population.

1.2. Thesis goals

My thesis has the following objective: To test two predictive models of children's externalizing and internalizing problem behaviour by examining the simultaneous contributions that a number of proximal and distal factors have on these two mental health outcomes. Within each of the two models, the differential effects of parenting on behaviour of temperamentally vulnerable individuals will also be examined. The first model, which will be referred as to the *risk model*, focuses on factors that are thought to enhance the likelihood of problem behaviours in children, namely, neighbourhood problems, maternal depression, and hostile parenting. The second model, the *protective model*, will examine the role of neighbourhood cohesion, perceived social support, and positive parenting as protective factors against the emergence of internalizing and externalizing problem behaviours in children. For both models, the contribution of children's temperamental vulnerability (i.e., difficult temperament and negative adaptability/affect) to the future manifestation of behavioural problems will be examined both on its own and as moderator of the relationship between parenting quality and behavioural outcomes.

The distinction between risk and protective models was made both to simplify the analysis of temperament by parenting interactions and to determine the mechanisms through which distinct negative and positive family and community factors affect children's mental health. Each of these models will be implemented in terms of a set of structural equations and tested statistically within the structural equation modeling (SEM)

framework. The use of SEM is particularly well-suited to the examination of the bio-ecological systems approach because it provides unique estimates of the relative contributions of the full set of direct and indirect paths to children's mental health while also allowing for the modeling of cross-level interactions (in particular, those involving temperament and parenting).

1.3. Data Set and Expected Benefits of the Study

The primary source of data for the present study is the NLSCY. One of the advantages of using this dataset is the availability of longitudinal estimates for different age groups as well as the collection of maternal reports of both children's individual characteristics (e.g., gender, temperament, age), maternal mental health, quality of parenting, and environmental features of the neighbourhood. These important features of the NLSCY enabled me to examine of the effects of early predictors of children's mental health outcomes measured in toddlerhood (2-3 years of age) on later psychological outcomes measured at school entry (6-7 years of age). Second, the survey is administered to a representative sample of children and youth in Canada, thereby allowing for greater generalizability and applicability of the study findings to the Canadian population at large. It is expected that the findings of this study will be especially useful to researchers who use the NLSCY data to develop policy options by determining the nature of the pathways of effects that exist among neighbourhood characteristics, maternal psychological health, parenting quality, temperament, and children's healthy mental development.

LITERATURE REVIEW

In this section, an integrative review of the theoretical and empirical literature is provided which describes a series of factors critical to children's mental health outcomes and the inter-relationships among them. Bronfenbrenner's (1979) bio-ecological theory is presented as a theoretical framework for examining children's development and psychosocial well-being. In addition, the empirical link between children's mental health outcomes and family/social contexts is discussed. The extent of the review is as follows: (1) A theoretical perspective on children's mental health that focuses on bio-ecological models of human development is presented; (2) Current research on the association between temperament and children's externalizing and internalizing behaviours is outlined; (3) Current findings regarding the effects of parenting quality on children's psychological adjustment are described; (4) Some of the most recent work on the differential susceptibility hypothesis are reviewed; (5) The important role of other proximal influences, particularly, the effect that maternal depression has on both children's behaviour and family dynamics is clarified; (6) Some broader distal features of the environment, namely, neighbourhood characteristics that can influence children's mental health both directly and indirectly through their effects on other more proximal factors are discussed.

2.1. Theoretical Perspective

According to Bronfenbrenner (1977), development is shaped from individual's biological-genetic dispositions, their immediate surroundings, and the features of their

social landscape. In his earlier theorizing, Bronfenbrenner had proposed a framework, also known as the *Process-Person-Context* (PPC) model, which aimed to reconcile both intra-organismic factors and the social-relational systems in which they operate. What is essential to this model is the acknowledgement of a systematic variation in developmental outcomes as a function of both specific constitutional characteristics of the person and the experiences that take place both within and outside the immediate environment.

Another fundamental aspect of Bronfenbrenner's theory is the role of proximal processes, such as parenting, in shaping the future development of the individual. Through such processes, individuals actualize their potential abilities and acquire the basic skills/knowledge necessary to adjust to the external environment (Bronfenbrenner & Morris, 1998). Further, according to the PPC model, proximal processes do not operate in a singular manner. They contribute to both continuity and changes in an individual's intellectual, emotional, and social growth by acting in synergy with biological-genetic aspects of the person (Bronfenbrenner & Ceci, 1994).

Moreover, proximal processes are also subject to protective or disruptive forces emanating from the broader environment. In the bio-ecological framework, such complex dynamic relationships existing among proximal and distal factors are expressed as a series of nested structural systems. Bronfenbrenner (1977; 1979; 1995; Bronfenbrenner & Morris, 1998) identified four distinct, but interconnected systemic dimensions representing multiple sources of influence on well-being. Microsystems refer to influences exerted by the child's immediate rearing environment (i.e., family and parents).

Mesosystems consist of elements of the child's ecological system that serve to bridge connections among other microsystems (i.e., childcare, school, and peer group). Exosystems define those structures of the broader social context that impact children's development by acting in conjunction with other systems (i.e., community-based family resources and social capital). Finally, macrosystems embody remote elements of the child's ecology that impose indirect effects on behaviour through their relations with all of the other system's structures (i.e., social norms, customs and cultural values).

In order to build a comprehensive theory of human development across the life cycle, Bronfenbrenner felt the need to also include temporal aspects of development. Indeed, in a second version of his earlier theory, Bronfenbrenner proposed a general operational research design, called the *Process-Person-Context-Time* model (Bronfenbrenner & Morris, 1998; Bronfenbrenner & Evans, 2000; Bronfenbrenner, 2005). According to this latest version of the theory, the nature of the effects of proximal and distal processes on human development varies with respect to the spatial and temporal features of each systemic dimension. Specifically, Bronfenbrenner and Morris (1998, 2006) distinguished time as constituted by micro-time, which refers to the exact timing of a specific event or individual developmental process; meso-time, which refers to the continuity of such events/processes over time; and macro-time, which is defined as large-scale historical changes (i.e., between and across generations) that indirectly influence the individual's developmental process. By introducing the concept of time, Bronfenbrenner was able to capture the essence of development across the life-span.

In sum, bio-ecological models offer a comprehensive perspective for understanding human developmental processes in a way that enhances our understanding of complex relationships among different structures of the individual's ecological system. Moreover, bio-ecological theories are well-suited to fulfil a preponderant role in informing social policies. Given their focus on the use of information from both the individual and the social context, they represent a mean though which to develop meaningful research solutions for a variety of real-world applications (Bronfenbrenner, 1974). Seemingly, the ecological model incorporates some of the most relevant factors influencing children's life, including the family, the community, and the cultural setting. The inclusion of all areas of potential influence on the development of children renders the bio-ecological model an ideal framework for identifying early predictors of behavioural and emotional problems that can then be used to design appropriate interventions for dealing with children's mental health issues.

2.2. Effects of Temperament on Children's Psychological Adjustment

Biological models of personality development have defined early childhood temperament as an abiding set of psychological characteristics, largely heritable, that owe their stability to biological and genetic correlates. Such innate dispositions represent the infant's emotional reactivity to external stimuli and his/her capacity to adapt to the changing environment (Allport, 1961; Buss & Plomin, 1984; Rothbart & Bates, 1998).

Over the last decade, individual differences in temperamental traits and their influence on mental health of young children, have captured the attention of researchers

who have started questioning the exact manner by which early temperamental attitudes affect the future occurrence of emotional and behavioural difficulties (e.g., Rothbart & Bates, 1998; Rothbart, Posner, Cicchetti, & Cohen, 2006; Thomas, Chess, & Birch, 1968). In response, a number of studies have been undertaken to clarify the degree of specificity that certain temperamental characteristics might have for predicting distinct classes of behavioural problems, namely internalizing and externalizing behaviours.

The research that has investigated internalizing behaviours, also referred to as problems of overcontrol, has identified early fearful-inhibited temperament as a primary determiner (Manassis & Bradley, 1994; Rapee & Coplan, 2010; Sanson, Hemphill, & Smart, 2004). For instance, in one of the first studies conducted in this area, Kagan et al. (1984) examined the effect of 21-month-old infants' fearful reactions to novelty on behavioural outcomes four years later. Direct observation of the children's reactions to a series of simulated unfamiliar situations (e.g., an encounter with a female stranger or with an unfamiliar set of toys) was used to determine the infant's level of fearfulness. Subsequently, the same sample was tested four years later on a series of cognitive and social activities in order to measure the stability of early internalizing symptoms, assessed in terms of the level of emotional reactivity and heart rate variability. Kagan et al. (1984) found that children who were classified as extremely fearful in infancy showed a persistent pattern of internalizing behaviours at age 4. They showed greater reticence with peers and higher sympathetic activity (e.g., fast heart rate, higher blood pressure, and vagal tone) in response to unfamiliar situations. In a similar study, Olson, Bates, and

Boyles (1989) found that infants' social inhibition was highly predictive of teacher-reported internalizing problems in early childhood. Interestingly, infants' unsociability towards strangers was negatively related to mother-reported externalizing symptoms, suggesting an inverse relation between early social reticence and aggressive-impulsive behaviour.

Similarly, it has been shown that early temperamental reactivity (i.e., irritability, frustration) positively relates to high levels of impulsivity and aggressive conduct across childhood (Bates, Boyles, Bennet, Ridge, & Brown, 1991; Eisenberg et al., 1997; Stringaris, Maughan, & Goodman, 2010; Zhou, Wang, Deng, Eisenberg, Wolchik, & Tein, 2008). Irritability and fussiness together represent the nucleus of a "difficult" temperament (Bates, 1980) which characterizes children's early tendency toward anger, frustration, and unmanageability. Findings have provided evidence that high levels of fussy/irritable temperament (also called the Difficultness factor) on the Infant Characteristics Questionnaire (ICQ) during toddlerhood relates to subsequent externalizing problems throughout childhood (Guerin et al., 1997). In a related study, Shaw, Owens, Giovannelli, and Winslow (2001) found that 5-year-olds manifesting attention deficit disorder, as well as conduct-related difficulties, had more difficult temperaments in infancy compared to a non-difficult group.

Taken together, these findings confirm the considerable significance of children's temperamental attitudes as biological-genetic substrates of behaviour phenotypes. With respect to this particular issue, a majority of studies have investigated the relationship that

specific temperamental attributes have with two broad domains of psychological disorders, namely internalizing and externalizing behaviours (Eisenberg et al., 2001; Eisenberg et al., 1995; Eisenberg et al., 1997). However, notwithstanding the value of distinct temperamental traits in predicting behaviour, the bio-ecological systems approach emphasizes the necessity to take into account other proximal forces, such as parenting, that might act as catalysts for either improving or aggravating the mental health outcomes of children. In the next section, I will briefly present some of the findings from research that has examined the effects of parental behaviour on children's mental health outcomes.

2.3. Parental Behaviour and Children's Mental Health

Among a multitude of contextual factors that influence children's behaviours, parenting practices appear to play a pivotal role in determining children's psychological adjustment and their social-emotional development. The majority of research to be reviewed here has focused on two important aspects of parental behaviour: (1) *positive child-parent interactions* characterized by the degree to which caregivers respond sensitively to the child's needs and the level of positive emotional involvement in the child's daily activities, and (2) *hostile parenting* which refers to ineffective child-rearing practices and the lack of appropriate skills for responding to the child's needs.

Positive parenting has been considered fundamental to all aspects of healthy child development. Warmth and affect offered by the primary caregiver has positive consequences for children's emotional, social, and intellectual growth (McCain & Mustard, 1999; Pettit, Bates, & Dodge, 1997). Indeed, it is through sensitive and

responsive behaviour that parents fulfil the child's basic needs for physical proximity, interpersonal relatedness, and intimacy, which are essential to the promotion of children's empathetic responding and sense of self-worthiness (Weatherston & Fitzgerald, 2010). Similarly, parents that are warm, nurturing, and actively involved with their children provide learning opportunities and represent role models for appropriate behaviour. Moreover, parent-child interactions characterized by mutual exchange and reciprocity contribute to the development of children's early moral reasoning and social conscience both of which are critical to the development of socially appropriate behaviours (Ainsworth, Bell, & Stayton, 1979; Kochanska, 2002; Kochanska & Murray, 2000). Through these positive early rearing experiences, children build a sense of emotional security that is indispensable to their socio-emotional well-being and the maintenance of future relationships (Bowlby, 1988; Brumbaugh & Fraley, 2006).

Conversely, children whose basic developmental needs for emotional closeness, intimacy, and security are not adequately met are at increased risk for compromised mental health. Indeed, children raised in hostile family environments have been shown to report more mental health problems both across childhood and later in adolescence (Bayer, Hiscock, Ukoumunne, Price, & Wake, 2008; Rutter, Giller, & Hagell, 1998). Generally, different types of psychological mechanisms regulate the relationship between negative parenting and the development of children's problematic behaviour. For instance, hostile parenting might negatively affect children's sense of self-worth and self-esteem, thereby increasing the risk for development of psychological distress and problematic

behaviours (Murry & Brody, 1999). Similarly, it has been suggested that negative parent-child interactions, characterized by hostile confrontation and lack of warmth, lead to modelling of inappropriate behaviour, hence, contributing to the reinforcement of children's deviant and oppositional conduct (Granic & Patterson, 2006; Patterson, 1976).

Certainly, such findings confirm the critical role of quality of parenting in shaping mental and emotional growth as well as its role in determining the behaviours of children. However, to address relevant issues regarding the manner in which parenting might guide future development of children, the differential effects of parental behaviour on children's mental health need to be examined in combination with individual's temperamental characteristics.

2.4. Temperament-by-Parenting Interactions: Differential Susceptibility Hypothesis

There is growing consensus among researchers that not all children exposed to similar rearing practices manifest analogous behavioural outcomes (Klein Velderman, Bakermans-Kranenburg, Juffer, & van IJzendoorn, 2006; Kochanska, 1991, 1997; Morris et al., 2002; Patterson & Sanson, 1999). For instance, a recent longitudinal study that examined a sample of 17-month-old toddlers (van Aken, Junger, Verhoeven, van Aken, & Dekovic, 2007), found that the presence of externalizing symptoms increased more from 17 to 23 months for children with difficult temperaments who also had mothers displaying high levels of negative control and lack of maternal sensitivity. Similarly, Karreman et al. (2010) found that parental negative control (e.g., over-involvement and intrusiveness) contributed to intensifying internalizing symptoms in fearful infants who

were more likely to experience a great deal of distress and frustration than non-fearful children.

More interestingly, other research has suggested that temperamentally vulnerable children are not equally affected by parental behaviour but manifest a differential susceptibility to such influences, for either better or worse (Belsky, 1997; Mesman et al., 2009; van Zeijl et al., 2007). With respect to children's externalizing behaviours, findings confirm that children with negative temperamental attitudes are not only particularly susceptible to aversive parenting practices but also tend to display heightened behavioural malleability in face of favourable environmental influences. For instance, Mesman et al. (2009) noticed that temperamentally difficult toddlers were more prone to show a decrease in externalizing behaviours over time than their non-difficult counterparts as the observer-rated sensitivity of their mothers increased. Furthermore, van Zeijl et al. (2007) investigated the interaction between difficult temperament and parenting with respect to the prediction of externalizing problems in early childhood. Measures of temperament were obtained from the child's mother. Maternal parenting behaviour was then observed in a laboratory session and child outcomes were assessed from both direct observation of children's physical aggression and maternal reports of externalizing problems. In comparison to children with relatively easy temperaments, difficult children manifested greater susceptibility to reported externalizing problems when their mothers displayed high levels of negative disciplinary behaviour. In addition, with respect to both levels of reported and observed externalizing problems, difficult children benefited more from

having mothers who were more likely to invoke positive disciplinary behaviour while interacting with their children.

In a similar study, Bradley and Corwyn (2008) attempted to discern, for a sample of first graders, whether the effect of the quality of parenting practices (both positive and negative) varies with early temperamental difficultness in determining externalizing behaviours. Direct observations of maternal behaviour and child-parent interactions obtained while performing age-appropriate tasks were used as measures of quality of parenting. Ratings of mothers' tendencies towards sensitivity to non-distress, positive regard, intrusiveness, and physical punishment were utilized to define positive and harsh parenting practices. Difficult temperament was assessed by maternal report at both 1 and 6 months based on the level of activity and intensity of mood of the child, whereas teacher-reported levels of externalizing symptoms in the first grade was the outcome measure. In line with previous research findings, children with difficult temperaments showed greater susceptibility to parental practices compared with children with average and easy temperaments. However, the effects were specific to the influences of positive parenting. That is, engagement in positive child-parent interactions was associated with a significant reduction in externalizing behaviour problems for children with difficult temperaments but not for children with either easy or average temperaments. On the other hand, this study failed to show any differential effect of harsh parenting on the behaviour of temperamentally difficult children. Hence, these findings suggest that while harsh parenting might not serve to aggravate the negative effect of difficult temperament on

children's externalizing behaviour, positive parenting might be particularly effective in assisting temperamentally difficult children develop positive patterns of adaptation.

Support for the differential susceptibility hypothesis has been also obtained in two studies that tested the effects of parenting quality on children with fearful temperament.

In two concurrent studies, Gilissen et al. (2006, 2007) employed controlled experimental sessions in which the behaviour of fearful children (3-4 and 7 years old) was examined in conjunction with parental behaviour. In both experiments, children were exposed to either fear-inducing or emotionally neutral stimuli. Subsequently, their internalizing symptoms - skin conductance level of reactivity and heart rate variability - were compared.

Furthermore, measures of parent-child relationship quality were taken to address the effects of either harmonious or hostile dyadic interaction styles. In support of previous research on temperamentally vulnerable individuals, fearful children exposed to insensitive parental behaviour were more prone to display fright reactions in threat-oriented conditions when compared to their non-fearful counterparts. Nevertheless, they manifested less reactivity to fear-inducing stimuli in the presence of responsive and warm parental behaviour.

In sum, these research findings suggest the possibility that not all children are affected equally by their rearing experiences and that patterns of temperament-by-parenting interactions might be useful in understanding the complex relationship among proximal processes of development, children's inherited dispositions, and mental health outcomes. According to the differential susceptibility hypothesis, the joint effect of both

parenting and children's temperamental vulnerability is fundamental in determining the development of either problematic behaviours or successful adaptation in children. However, given the somewhat restricted scope of these previous studies, a multi-dimensional approach to children's mental health that includes the complex interplay of multiple contextual factors that can affect the psychological well-being of highly susceptible individuals seems needed in order to fully clarify the dynamics of this particular phenomenon (Gallager, 2002).

Hence, within the bio-ecological systems approach, my thesis will test the differential susceptibility hypothesis while simultaneously examining the effects of other proximal and distal factors that might also account for variability in the mental health outcomes of temperamentally vulnerable children. For this purpose, the effects of both intra-familial processes, such as maternal depression, and macro-level factors, such as neighbourhood characteristics, with respect to the future development of children's externalizing and internalizing behaviours will be also investigated. In doing so, particular emphasis will be placed on examining the indirect effects that these factors exert on children's behaviour through their impact on parental behaviour.

2.5. The Impact of Maternal Depression on Children's Psychological Well-being

Previous investigations into the moderating effects of parenting in the association between temperament and children's behaviour have not captured the sensitivity and complexity of these relationships by examining the simultaneous contribution of multiple proximal and distal factors associated to children's mental health. To expand our

understanding of the processes through which parenting might promote or undermine children's positive development, other elements of both the immediate and broader social environment needs to be also considered. In this section, I will focus on maternal depression and the various mechanisms through which such risk factor can affect children's mental health outcomes both directly and indirectly via parental behaviour.

Symptoms of depression include depressed mood, loss of pleasure, apathy, low energy, disturbed sleep and appetite problems, lethargy, and a negative view of oneself and the future (4th Ed., DSM-IV-TR; American Psychiatric Association, 2000). Depression can interfere with the personal, physical, and social aspects of an individual's life to the extent that it might impair normal functioning and ultimately even lead to mortality (Vogt, Mullooly, & Hollis, 1994). Furthermore, depression is a mental illness that affects not only the depressed individual, but also the family as a whole. Particularly, children appear to suffer the most in situations in which they are exposed to either chronic or transient forms of maternal depression (Goodman, 2007).

As confirmed by a large body of research, children exposed to maternal depression during their early years are at risk for the development of mental health problems throughout the life course (Bureau, Easterbrooks, & Lyons-Ruth, 2009; Davis, 2006; Lee & Gotlib, 1991). In a related vein, researchers have examined both the concurrent and long-term consequences of maternal depression on children's mental health to determine the extent to which maternal depression exerts a direct negative impact on the psychological outcomes of off-spring. For instance, Weissman, Warner,

Wickramaratne, Moreau, and Olfson (1997; Weissman et al., 2006) in both a 10- and a 20-year follow-up study involving clinical samples of mothers and their children, noticed that early exposure to maternal depression was associated with high rates of anxiety, disruptive thoughts, and depressive disorders in offspring. In addition, it contributed to a moderate stability of mood disorder symptoms in children across childhood and throughout adulthood.

Similarly, a wealth of evidence exists to demonstrate the negative impact that parental depression has on various aspects of children's mental health, such as self-development, self-esteem, and affect regulation. Parental depression can also lead to a general impairment of their socio-emotional growth (Cicchetti, Rogosch, Toth, & Spagnola, 1997; Cummings & Davies, 1999; Goodman & Gotlib, 1999). For instance, in a recent longitudinal study, Trampolini, McMahon, and Ungerer (2007) found that children exposed to both chronic and transient parental depression assessed in infancy received high ratings for both parent- and teacher-reported symptoms of internalizing and externalizing behaviours four years after the original assessment. More interestingly, they also noted that chronic maternal depression was significantly related to children's behavioural and emotional disorder above and beyond the effects of other family factors, such as marital adjustment, thereby confirming the unique predictive validity of maternal depression for children's psychological adjustment.

In light of the importance of maternal depression to children's mental health, several mechanisms have been considered in the attempt to understand the dynamics

underlying this phenomenon, namely, the heritability of psychological disorders and the impact of the stressful environment to which children are exposed. Regarding the first mechanism, a number of twin and adoption studies have been undertaken to establish the inheritance of psychological disorders in children of depressed mothers (Boomsma, Busjahn, & Peltonen, 2002). Although most of these studies represent a valuable source of information about the genetic basis of mental disorders, they have unfortunately yielded inconclusive results (Harrington, Rutter, & Fombonne, 1996; Murray & Sines, 1996). Indeed, despite acknowledgement of a genetic etiology of mental disorders (e.g., depression, anxiety and antisocial behaviour), it has been shown that environmental factors might still account for a unique proportion of variance in psychological symptoms (Kendler, Neale, & Kessler 1992; Kendler, Neale, Kessler, Heath, & Eaves, 1992, Rhee & Waldman, 2002).

Alternatively, it has been proposed that children of depressed mothers might be at increased risk for developing behavioural problems due to heightened stress associated with disruptions in their rearing environment. This situation may be due to stress-induced alterations to the hypothalamic–pituitary–adrenal axis arising from early exposure to a non-optimal rearing environment. For instance, Ashman, Dawson, Panagiotides, Yamada, and Wilkinson (2002) found that maternal depression exerts long-term effects on children's mental health mainly because of the heightened stress induced responses elicited by early exposure to maternal psychopathology. In their study, they collected salivary samples from 7- to 8-year-old children of mothers with a history of depression

and compared them to samples from a control group of children of healthy mothers. Children who had elevated levels of internalizing symptoms and whose mothers had a history of depression showed an elevated stress response both at the baseline level and after being exposed to a mild laboratory stressor. More interestingly, following a careful examination of the longitudinal history of psychopathology, maternal depression during the child's first two years of life was the best predictor of elevations in baseline cortisol at the school entry. Although these findings offer compelling evidence that children of depressed mothers are more prone to experience chronic levels of stress, the study failed to take into account the potential influence of other proximal and distal mechanisms underlying the risk of behavioural problems in children of depressed mothers.

Accordingly, it has been suggested that parental depression might become operative only upon the influence of other family factors, such as quality of parent-child relations and family functioning (Cummings & Davies, 1994). Generally, depression provokes negative emotionality, pessimism, feeling of hopelessness, and extreme fatigue (Beck, 1967). All these symptoms interfere with the mother's ability to experience pleasure in their children's activities and engage in positive dyadic interactions with them (Leve et al., 2005; Lyons-Ruth, Alpern, & Repacholi, 1993; Miller-Lewis et al., 2006; Rottenberg & Gotlib, 2004). Similarly, depressed parents often display impaired attention, withdrawal, and self-absorption that reduce their ability to focus on inputs from their children and limit their effectiveness in directing behaviour toward child-oriented goals (Dix & Meunier, 2009). Indeed, it seems that depressed mothers are more likely to engage

in insensitive and coercive parenting (Bugental, 1992; Feng, Shaw, Skuban, & Lane, 2007; Hasting & Grusec, 1998; Patterson, 1982).

In sum, these results highlight the importance of addressing maternal depression as central part of the effort to understand the different dynamics involved in determining children's mental health problems. As mentioned above, recent progress in research suggests that, although maternal depression constitutes a potential vulnerability marker for future development of psychological problems in children, multiple etiological factors that account for transmission of risk are operative. Namely, a number of studies exist to confirm that the association between depression and poor parenting might be a key indirect path that could account for the negative impact of maternal depressive mood and children's behaviour. However, in line with this view and according with bio-ecological models of human development, the influence of even broader contextual factors and their association with more proximal processes, here maternal depression and parenting, should also be examined. Therefore, the role that other macro-level factors have on children's mental health outcomes will also be a focus of the thesis.

2.6. The Impact of Neighbourhood Characteristics and Social Support on Proximal Processes: Long-term Consequences for Children's Mental Health.

In the previous sections, some of the fundamental proximal correlates of children's development including a range of intra-individual and inter-familial processes associated with children's mental health were described. However, other macro-level variables that emerge as distal features of the environment also qualify as important predictors of

children's mental outcomes. With respect to such factors, both neighbourhood structural (i.e., poverty, lack of safety, problems and social disorder) and functional (i.e., neighbourhood collective efficacy) characteristics have been regarded as salient features that can exert both direct and indirect effects on the adjustment of the developing child.

Children naturally depend on the quality of the surrounding environment. The research on neighbourhood structural characteristics shows that growing up in impoverished or violent communities may put children at increased risk for development of problem behaviours (Moren-Cross et al., 2005; McLeod & Edwards, 1995). For instance, direct exposure to neighbourhood violence in addition to scarcity of social resources might lead to high perceived-stress reactivity, thereby compromising children's mental health (Attar, Guerra, & Tolan, 1994). Furthermore, children living in dangerous areas might be subjected to the indirect effect of hostile parenting that caregivers might be more likely to adopt given the extreme circumstances. In support of this notion, Earls et al. (1994) have shown that families living in dangerous neighbourhoods are more likely to employ harsh parenting practices characterized by restrictive control and hostility as compared to families residing in less problematic areas. Similarly, Pinderhughes, Nix, Foster, and Jones (2001) found that higher levels of neighbourhood danger, as well as the lack of residential stability, adequate public services and social support, are inversely related to parental warmth and consistent discipline. In line with Earls et al. (1994), they found that mothers living in impoverished and dangerous neighbourhoods valued the

endorsement of harsh discipline, which in turn, led to greater behavioural problems in young children.

Moreover, neighbourhood problems could contribute to the risk of children's psychological disorders by affecting parental depression. For instance, both higher levels of stress and major incidences of depression have been reported by individuals who live in deprived neighbourhoods and economically disadvantaged families (Belle, 1990; Brown, Bhrolchain, & Harris, 1975; Kim, 2001; Ross, 2000; Ross & Mirowsky, 2001). Similarly, a study conducted by Leventhal and Brooks-Gunn (2001) examining the effects of neighbourhood composition on the severity of parental depressive symptoms confirmed the pivotal role of neighbourhood quality in determining resident's mental health. Their study consisted of a quasi-experimental design comparing three groups of families including an experimental group with families who chose to move from public housing located in dangerous neighbourhoods to private housing in low-poverty areas, a group of families who relocated to private housing while staying in an unsafe neighbourhoods, and a control group comprised of families that did not receive any assistance (Leventhal & Brooks-Gunn, 2001). Their findings suggest that members of families belonging to the experimental group, to which greater economic and social resources reported were made available, reported greater improvements in parental mental health and behaviour when compared to the two other groups. Indeed, it seems that the positive effects of moving to safer areas were particularly beneficial to parental mental health status, as demonstrated by the steep decrease in self-reported depressive

symptoms (Leventhal & Brooks-Gunn, 2001). More interestingly, when compared with the in-place control group, families that moved to more advantageous areas reported less engagement in harsh parenting practices, increased compliance, and enhanced generalized well-being in their children (i.e., less depression and anxiety).

Furthermore, researchers who have attempted to explain children's behaviours by placing their development in an ecological context have considered the functional characteristics of the social environment to be an essential component of children's positive development. For instance, a growing body of research suggests that social capital, regarded as the formation of social bonds, trust, and social supportive relationships among residents, plays a crucial role in sustaining individual's well-being under condition of high stress (Cobb, 1976; Leavy, 1983). In support of this notion, findings from a recent examination of a nationally representative sample of Canadian 0- to 11-year-old children from the NLSCY confirmed the presence of neighbourhood collective efficacy (i.e., cohesion, trust, and reciprocity) as one of the mechanisms by which distal features of the social environment might affect children's behaviour (Kohen et al., 2008). In this particular study, neighbourhood collective efficacy was associated with lower ratings of maternal depression and higher family functioning scores that, in turn, led to more positive parenting, which then ultimately contributed to a decrease in children's behavioural problems (Kohen et al., 2008).

Similarly, it has been shown that the presence of different types of social support, namely relational, informal, ideological, and physical support can facilitate maternal and

marital adaptation during pre- and post-gestational periods, which then also positively influences the nature of mother-child interactions (Power, & Parke, 1984). For instance, a number of studies have shown that mothers who are provided with strong social support networks are less punitive and more responsive with their children (Colletta, 1979; Powell, 1980). Moreover, high levels of social support might help buffer the effects of maternal depression on children outcomes through the enhancement of perceived self-efficacy in the parenting role (Cochran & Brassard, 1979). Thus, it seems that support provided by both members of the family (i.e., close relative and partner) and other extra-familial sources of assistance (i.e., friends, health professionals) are essential to the promotion of individual well-being and the improvement of the life of children (Belsky, 1994; Cutrona & Troutman, 1986).

In conclusion, features of the broader contextual living environment can be regarded as important determiners of the mental health and general well-being of both children and their families. In particular, children living in highly dangerous neighbourhoods are exposed to a number of hazards, which include a higher degree of both mental health problems in parents and ineffective parenting practices. Conversely, functional characteristics of the social environment, such as neighbourhood collective efficacy and perceived social support, can act as protective factors for children's mental health through their positive impact on maternal psychological well-being and parental behaviour. Therefore, it can be argued that the effects of both parenting and maternal

depression need to be interpreted within the larger context of neighbourhood organizational and functional characteristics.

THE PRESENT THESIS

3.1. Motivation

Previous literature suggests that children's mental health outcomes are the result of many factors including (1) individual characteristics, such as temperament; (2) proximal factors, such as parenting and maternal depression; and (3) distal factors, including neighbourhood problems/cohesion and social support. Multiple effects underlying their impact on children's mental health were considered. First, I explained how different temperamental characteristics, namely, irritability/fussiness and fearfulness/social inhibition, relate to externalizing and internalizing problem behaviours, respectively. Furthermore, I highlighted the importance of including both additive and multiplicative effects of temperament and parenting quality in the assessment children's well-being within a differential-susceptibility framework. Finally, I focused on the impact of other micro- (i.e., maternal depression) and macro-level system factors (i.e., neighbourhood quality and social support) on children's mental health. In describing such relationships, I highlighted the importance of the indirect mechanisms through which each of these latter factors influence children's mental health through their effects on other adjacent system factors. For example, I described how distal features of the broader

environment affect children through their impact on both maternal depression and parenting quality.

There are several limitations of past research that should be taken into consideration, however. For instance, the studies reviewed above have mostly focused on a restricted set of predictors of children's mental health. To date, no study has tested the interaction of parenting and temperament while simultaneously assessing the effects of associated micro- and macro-level factors. Moreover, the majority of the studies on the differential susceptibility hypothesis reviewed here have relied on cross-sectional samples of children. No researchers have tested for such relationships longitudinally within a large representative survey sample.

Consequently, the research presented in this thesis differs from previous efforts in several important ways. First, it represents a secondary data analysis of a large longitudinal cohort of Canadian children from the NLSCY. This population-based survey collects important information about the individual, family, and community with the purpose of providing reliable longitudinal estimates of children's mental health in Canada. This particular aspect of the research design will not only facilitate the assessment of the subsequent effects of risk and protective factors on Canadian children's mental health, but will also allow for a greater generalizability of the results to the Canadian population as a whole. In addition, the complex inter-relationships among temperament, maternal depression, parenting, social support, and neighbourhood characteristics as well as their relation to externalizing and internalizing outcomes will be tested within the SEM

approach. This method will allow for an assessment of the unique contribution of this specific set of predictors while simultaneously estimating, in a single step, the indirect and multiplicative relationships that are present. In this manner, the analytical approach employed here will serve to disentangle the various ways in which temperamental, family-level, and community-level factors are related to children's psychological outcomes.

3.2. Conceptual Models

Two conceptual models will be used to predict the relationships among the full set of proximal and distal factors affecting children's mental health. Each model is framed in terms of the dynamic effects associated with either negative or positive predictive factors. The risk model (see Figure 1) includes potential contextual risk factors to children's mental health, specifically, neighbourhood problems, maternal depression, and hostile parenting. The protective model (see Figure 2) is defined in terms of the role exerted by a number of protective factors, specifically, social support, neighbourhood collective efficacy, and positive parenting, that could be assumed to buffer children from mental health problems. Within each model, the interactive effects of parenting and temperament on mental health outcomes are also included.

Note that these two models differ mainly in terms of both neighbourhood problems versus cohesion and hostile versus positive parenting. In both cases, the factors that differ within each model can be viewed as distinct dimensions, which do not simply represent bipolar measures (i.e., each of these factors represents conceptually different

constructs). Moreover, separating out the full set of factors of concern into these two conceptual models should help to circumvent any model-fitting problems that might arise due to the potential intractability of trying to include four different temperament-by-parenting interactions within a single model.

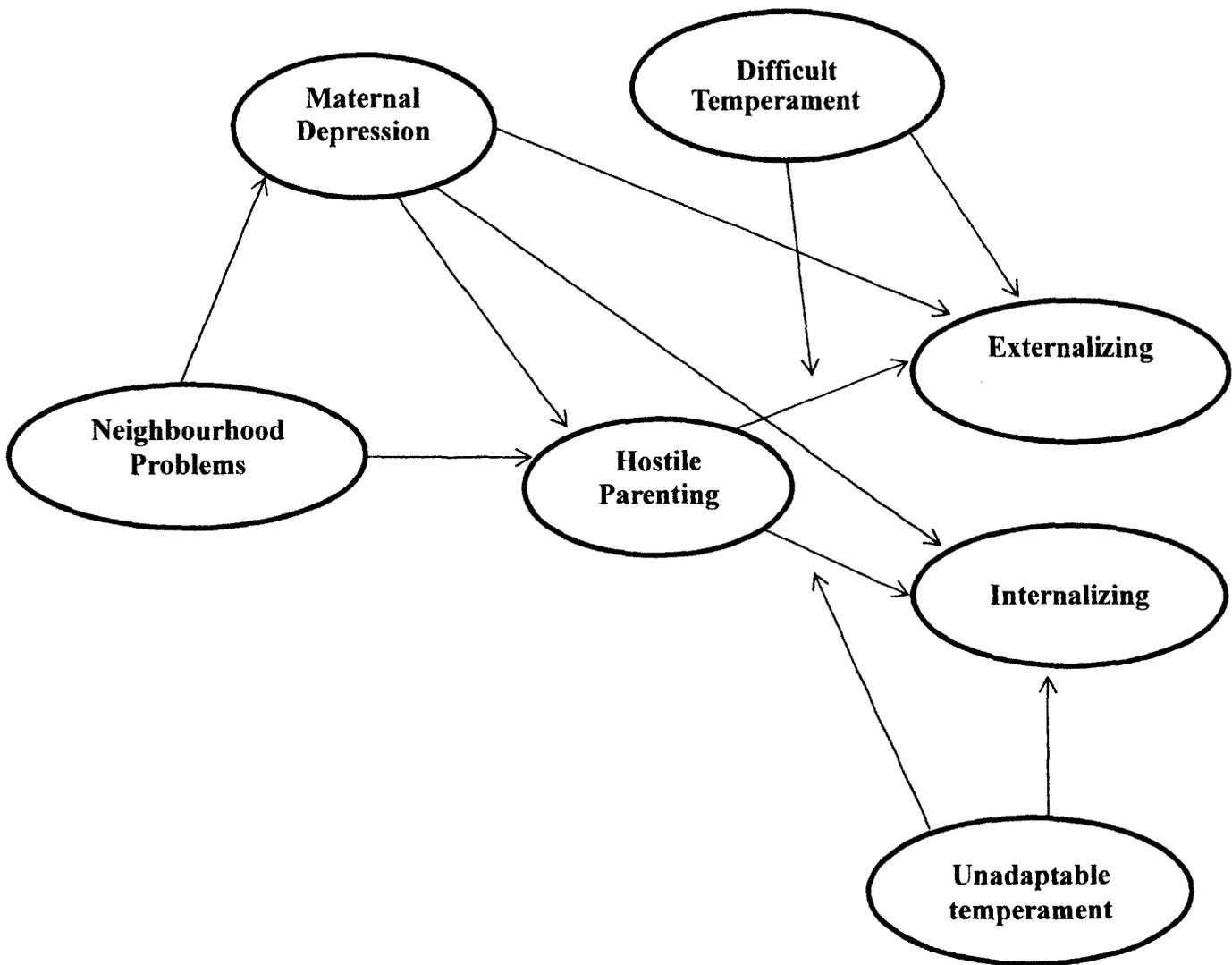


Figure 1. Conceptual representation of the risk model.

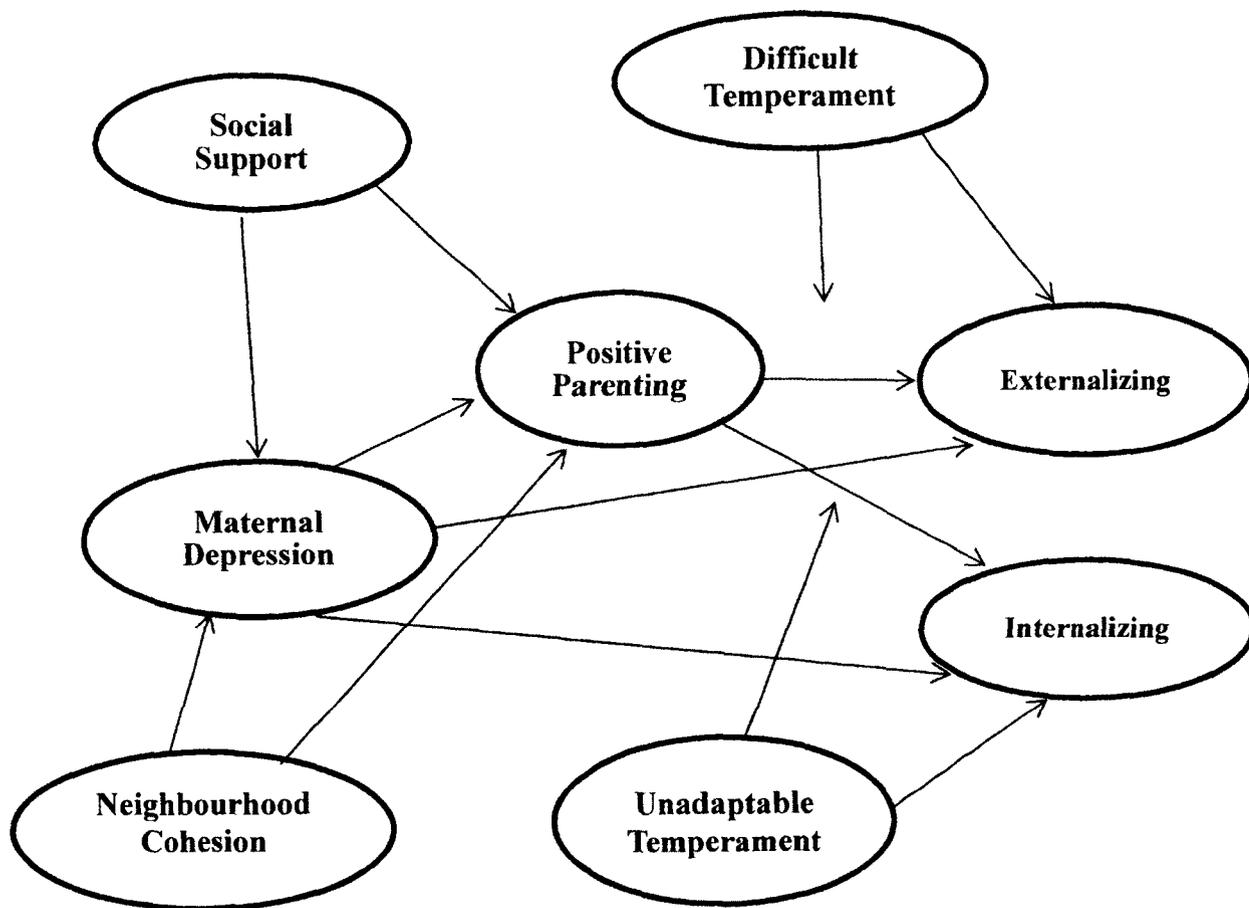


Figure 2. Conceptual representation of the protective model.

3.3. Research Hypotheses

For both models, two key hypotheses will be tested:

3.3.1. Bio-ecological systems hypothesis: Children's mental health outcomes are multiply determined by a number of inter-related proximal and distal factors.

Children's mental health is the result of the impact of a multitude of factors related to the child, parents, family, and social context. Within such different systems of a child's ecology, distal factors of the broader environment (i.e., neighbourhood), which represent the outermost systems of the child's ecology can affect children's mental health through their impact on proximal processes that take place in the child's immediate environment (i.e., the family).

In the risk model, I hypothesize that the presence of high levels of neighbourhood problems will affect maternal psychological functioning by increasing the likelihood that mothers will report higher depression scores. I also expect high levels of neighbourhood problems to lead to an increase in the prevalence of hostile parenting practices. Moreover, higher maternal depression scores should also increase the likelihood that mothers engage in negative hostile parenting. Finally, high levels of either maternal depression or hostile parenting are expected to lead to an escalation of children's externalizing and internalizing behaviours.

Similarly, in protective model, I hypothesize that high levels of both neighbourhood cohesion and social support will affect maternal psychological functioning by decreasing the likelihood that mothers will report higher depression scores. High

neighbourhood cohesion and social support should also increase the prevalence of positive parenting practices. Moreover, higher maternal depression scores should decrease the likelihood that mothers will engage in positive parenting. As before, high levels of maternal depression are expected to lead to an escalation of children's externalizing and internalizing behaviours. On the other hand, I expect that high levels of positive parenting will lead to an attenuation of these two types of behaviours. In both risk and protective models, higher levels of difficult and unadaptable temperament are expected to increase the prevalence of externalizing and internalizing behaviours, respectively.

3.3.2. Differential susceptibility hypothesis: There will be moderating effects of parenting on the relationship between temperament and the mental health outcomes of vulnerable children.

According to the differential susceptibility hypothesis, children with a vulnerable temperament tend to manifest greater susceptibility to their rearing environment, for better or for worse, when compared with non-vulnerable children (Belsky, 2005). In the risk model, I hypothesize that temperamentally difficult children will be especially likely to manifest more externalizing problems when exposed to hostile parenting practices. Similarly, I expect that hostile parenting will have a greater impact on unadaptable children with respect to the manifestation of internalizing problems, than on their non-vulnerable counterparts. Note that the interactive effects of difficult temperament and hostile parenting as well as unadaptable temperament and hostile parenting are expected to be significant and positive in magnitude (i.e., a synergistic interaction whereby the

combination of higher scores on both the difficult/unadaptable temperament and hostile parenting measures should serve to enhance the presence of internalizing and externalizing problems in children).

Similarly, in the protective model, I expect that temperamentally difficult children, who are engaged in positive relationships with their mothers, will be less likely to manifest externalizing problems. Further, I hypothesize that those children displaying unadaptable temperament will be less likely to exhibit internalizing problems in the presence of positive and responsive mothers. Here, the interactive effects of difficult temperament and positive parenting as well as unadaptable temperament and positive parenting are expected to be significant and negative in magnitude (i.e., an antagonistic effect, whereby the combination of higher scores on both difficult/unadaptable temperament and positive parenting measures will attenuate the presence of internalizing and externalizing problems in children).

RESEARCH METHODOLOGY

4.1. An Overview of the National Longitudinal Survey of Children and Youth

The NLSCY is a long-term study that includes repeated cross-sectional and longitudinal cohorts designed to give national estimates for the population of Canadian children. Statistics Canada has conducted the NLSCY over a 16-year period in biennial data-collection cycles. The main objectives of the NLSCY are to collect data on factors influencing individual's mental health, including social and environmental correlates of

early childhood development. Similarly, this survey has the scope to make that information available for people who are developing programs and policies focused on improving the life of children and youth (Statistics Canada, 1996).

The original NLSCY sampling strategy relied on household selection through a multi-stage, stratified cluster, probability-sampling procedure based on basic demographic and other labour force information collected by Statistics Canada's Labour Force Survey (LFS). This technique makes use of the stratification and/or clustering of population units before sampling. Cluster sampling includes the process of sampling city blocks that are selected based on specific characteristics (i.e., province and average income). Subsequently, households are selected from within those blocks and children from each household are randomly selected (up to a maximum of four children per household; Michaud, 2001).

In the NLSCY, three sources of data were used. First, the main component, which is composed of approximately 12,900 households with children from 0 to 11 years of age selected from the LFS. However, residents of Yukon or North West Territories (NWT) as well as individuals living in institutions or on Indian Reserves were not part of the LFS and, therefore, were excluded from the main component. The second source of data, namely the integrated component, is composed of approximately 2,700 households from the National Population Health Survey. Finally, the territories component, which includes approximately 2,300 children living in the Yukon, Nunavut, and the NWT, was supposed to constitute the third source of data. However, some of the data from the latter

component were not included in the final stages of the data processing, resulting in a final NLSCY data set that excluded households located in Yukon, Nunavut, and the NWT, First Nations (Aboriginal) Reserves, and children living in institutional settings. In total, 13,439 households were maintained in the first cycle yielding data for 22,831 children (Statistics Canada, 1995b).

Data were collected in two different contexts: the school and the household. The school collection included a teacher questionnaire, a principal questionnaire, as well as a Math Computation and Reading Comprehension test administered to the child. The household-collected data included information about the person most knowledgeable (PMK) about the child, the spouse/partner of the PMK, and the child. Note that 91% of the PMKs in the NLSCY were mothers. The household survey questionnaire is composed of four main parts: the Household Record, which includes basic demographic information, questions about dwelling conditions, and a relationship grid that can be used to derive variables describing the family structure (i.e., number of siblings, relationship of child to PMK/spouse, etc.); the General Questionnaire, which was utilized to gather information about the socio-economic status of household members (i.e., education, labour force, income, etc.); the Parent Questionnaire, which was completed by both the PMK and spouse, and contains information about the child's family environment, mental health of PMK, levels of social support, and neighbourhood characteristics; and the Child Questionnaire, which includes information about the child's behaviour, physical health, education, parenting, childcare, and custody history.

Data collection for NLSCY relies on both face-to-face interviews and Computer Assisted Personal Interviewing (CAPI) technology. The CAPI system is composed of two main parts: the Case Manager system, which utilizes a secure file transfer protocol that controls case assignment and data transmission for the survey from federal sources to residents on separate secure computers with no external access; and the Survey Specific part, which is composed of an introductory component that includes the basic procedures for the recruitment of households and all other applicable questionnaire content sections. For the household collection, the interview was estimated to be approximately two hours in length.

Researchers currently have access to eight data-collection cycles (1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008). Data for the present study were obtained from two cycles of the survey, namely, Cycle 1 and Cycle 3. The first wave of data collection was conducted in 1994/1995 at Cycle 1 on 13,439 residential households across Canada. It had an overall response rate of 86.3%, resulting in a sample of data for 22,831 newborn to 11-years-old children (Statistics of Canada, 1995c). Among those, a sub-sample of children 2 and 3 years old were assessed on a series of potential predictors of mental health. Subsequently, those children's mental health outcomes were assessed at 6-7 years with measures incorporated into Cycle 3 (1998/99).

4.2. Measures

A detailed description of the measures utilized in the present study is provided in the following in Tables 1 and 2. Information regarding the specific wording of the items

related to each of these measures and the specific nature of the rating scale used for them is given in Appendix A.

4.3. Covariates

In this study family, socio-economic status (SES) and child's gender were used as covariates. In the NLSCY, family SES is a derived variable that makes use of demographic information including mother's level of education, level of education of mother's spouse, mother's occupational prestige, occupational prestige of mother's spouse, and household income (Willms & Shields, 1996; Statistics Canada, 1996). Gender was categorized as dichotomous variable. The variable was recoded as 1 if the child was female and 0 if the child was male.

Table 1. Cycle 1 measures used as predictors.

Variable Name	Source	Characteristics	Number of Items	Measurement Level	Reliability for this sample (Chronbach's α)
Neighbourhood Problems	Simcha-Fagan Neighbourhood Questionnaire (Barnes-McGuire, 1997)	The scale measures the respondent's perception of neighbourhood problems (i.e., litter, broken glass or garbage in the street or road, illicit drug trafficking, vandalism).	5	3-point scale	.73
Neighbourhood Cohesion	Simcha-Fagan Neighbourhood Questionnaire (Barnes-McGuire, 1997)	The scale measures the respondent's perception of neighbourhood social cohesion (i.e., mutual trust among neighbors, sharing common values) and informal social control (i.e., neighbours can rely on one another to monitor and supervise children).	5	4-point scale	.87

Table 1. (continued)

Variable Name	Source	Characteristics	Number of Items	Measurement Level	Reliability for this sample (Chronbach's α)
Social support	Social Provision Scale (Cutrona & Russell, 1987)	The scale assesses several dimensions of social support: 1) Attachment 2) Social Integration 3) Reassurance of Worth 4) Reliable Alliance 5) Guidance 6) Opportunity for Nurturance	6	4-point scale	.82
Maternal Depression	Center of Epidemiological Studies Depression rating scale (CES-D; Radloff, 1977)	The scale assesses frequency and severity of depressive symptoms. Common symptoms include lack of interest in outdoor or fun activities, lack of appetite, apathy, hopelessness, loneliness, crying spells, and sleeping disturbances.	12	4-point scale	.80

Table 1. (continued)

Variable Name	Source	Characteristics	Number of Items	Measurement Level	Reliability for this sample (Chronbach's α)
Hostile Parenting	(Statistics Canada, 1995c)	The scale assesses parent-reported use of negative parenting techniques including frequent punishment, harsh discipline, disapproval, and general management problems.	7	5-point scale	.71
Positive Interaction	(Statistics Canada, 1995c)	The scale assesses the parent's perspective on the positive interactions that they have with their children, including contingent praise, sensitivity, and enjoyment of activities with the child.	5	5-point scale	.73
Difficult Temperament	Child Characteristics Questionnaire (i.e., CCQ; Lee & Bates, 1985; Finegan, Niccols Zacher, & Janehood, 1989)	The difficult temperament sub-scale were utilized to assesses the degree of irritability and moodiness of the child by measuring frequency and amount of crying and whining.	8	7-point scale	.73

Table 1. (continued)

Variable¹ Name	Source	Characteristics	Number of Items	Measurement Level	Reliability for this Sample (Chronbach's α)
Negative¹ Adaptability & Affect	CCQ	This sub-scale was used to assess the degree of unadaptability to new situations, unsociability, and general low emotional tone	12	7-point scale	.68

Note¹ Please note, that for convenience, the term "unadaptable temperament" will be used to refer to negative adaptability and affect temperament.

Table 2. Cycle 3 measures used as outcome variables.

Variable Name	Source	Characteristics	Number of Items	Measurement Level	Reliability for this Sample (Chronbach's α)
Externalizing Problems	Child Behavioural Checklist (CBCL; Achenbach, 1991)	This scale assesses children's externalizing based on parental reports for the following three subscales: 1) Physical Aggression 2) Indirect/Relational Aggression 3) Hyper-activity Inattention	19	3-point scale	.87
Internalizing Problems	CBCL	Internalizing problems were based on parental reports and assessed using the Emotional Disorders subscale, which measures children's level of anxious and distressed behaviour.	8	3-point scale	.78

4.4. Statistical Modeling Procedure

SEM was used to test whether the hypothesized models provided a good fit to the data. This analytic method allows for the simultaneous examination of the relations among multiple latent variables and separates the measurement errors from the true scores (Hu & Bentler, 1999). In the present study, Anderson and Gerbing's (1988) two-step approach was employed for the model testing. In the first step, a measurement model was proposed that specified the relationships of the observed item variables to the underlying the latent factors. In the second step, a structural model that specified the nature of the relationships among the latent factors was established and tested.

Fitting the measurement model in conjunction with the structural model enables a confirmatory specification of conceptually viable measurement models through a comprehensive assessment of their construct validity (Bentler, 1978). Furthermore, confirmatory factor analysis (CFA) offers the advantage of being able to test hypotheses about a particular factor structure. It also allows a researcher to obtain estimates of the relations of the observed variables to the latent factors while also determining the amount of error in each observed variable (Brown, 2006).

Once the measurement model had been established, the structural models were then obtained by estimating a system of simultaneous regression-like equations between multiple exogenous and endogenous latent factors. Exogenous factors are those not affected by any other factor in the model and endogenous latent factors are those affected by other factors in the model. Subsequently, both the goodness of fit of the structural

models and the significance of each single parameter estimate (i.e., path coefficient) were assessed (for reviews see Kline, 2005; Maruyama, 1998; Schumaker & Lomax, 2004).

In the present study, maximum likelihood (ML) estimation methods were used to fit the models in conjunction with partial correlation matrices as input. This method of analysis entailed partialling out of the effects of covariates (i.e., gender, SES) from each of the study variables prior the estimation of the both measurement and structural models (such partialling results in models that are adjusted for the effects of the covariates). Furthermore, item scores were first z-transformed given that the measures consist of multiple items measured in different scales.

4.4.1 Model Fit Indices

SEM estimation procedures generally attempt to determine the model parameters from which an implied covariance matrix can be derived that best predicts the observed matrix of covariances between all of the observed indicator variables (Byrne, 1998). A commonly reported measure of model fit is the Pearson chi-square statistic χ^2 . Generally, significant χ^2 values will be obtained if the model is not supported by the sample data

(i.e., there are discrepancies between observed and predicted covariance values). However, it is widely known that chi-square-based statistics are extremely sensitive to sample sizes and model complexity (e.g., Byrne, 1998; Kline, 2005). This situation might then result in the rejection of reasonable models due to the presence of large samples and large numbers of latent factors. For this reason, it is always recommended that additional goodness of fit indices be examined (Byrne, 1998). The indices that were used to help evaluate the fit of the present models include the Root Mean Square Error of Approximation (RMSEA, Steiger & Lind, 1980) and the Comparative Fit Index (CFI; Bentler, 1990). Criterion values for these fit statistics were based on Hu and Bentler's (1999) recommendation. Following such recommendations, $RMSEA < .50$ and $CFI \geq .90$ were chosen as cut-off values for determining a close fit of a structural model.

4.4.2. Methods for Deriving and Analyzing the Latent Interaction Factors

Product-term interaction indicators for the latent interaction terms were obtained by cross-multiplying all of the indicator variables for each of the corresponding first-order factors. In the present study, in order to minimize correlations among the first-order and interaction factors, hence reducing any associated nonessential multicollinearity, each product indicator was then residual centered (Marsh et al., 2007). That is, each product term was regressed against all first-order indicators simultaneously and the residuals from that regression were used as indicators for the latent interaction factor. Compared with mean-centered approaches, the residual centered-approach has the advantage of not

having to impose any constraints on either the factor loadings or the variances/covariances of the latent factors related to the product term's first-order effects (Steinmetz, Davidov, & Schmidt, 2011).

One important issue regarding the estimation of the latent interaction factors is that the use of a large number of product indicators might then introduce non-convergence and other model estimation problems (Marsh et al., 2004; Ping, 1996). To overcome such problems, Saris, Batista-Foguet, and Coenders (2007) proposed that the optimal way to estimate latent interaction factors is to select the most reliable product indicators. For these reasons, confirmatory factor analysis was used in the present study to select only residual-centered product indicators with the highest factor loadings (i.e., loadings $> .30$) and the lowest measurement errors as the indicators for the latent interaction factors.

4.5. Software Packages

LISREL 8.80 was the primary software package used to fit the measurement and the two structural equation models. SPSS/PAWS 16.0 was used to obtain descriptive statistics and to conduct univariate analyses.

4.6. Weighting Procedure

In this study, national longitudinal survey weights from Cycle 3, 1998–1999 (normalized for inferential analyses) were applied during the data analytic procedures, with exceptions made only when it was desirable to obtain descriptive information about the unweighted cohort. Such procedures were applied in order to obtain unbiased

estimates of the model parameters (Asparouhov, 2006; Kaplan & Ferguson, 1999).

Weights were normalized to return the sample to its original size by dividing the weight variable by its average (Statistics Canada, 2000b, pp.74). The use of survey weights in a clustered stratified sample such as the NLSCY not only allows the results of any statistical tests to be generalized to the population and but also increases the likelihood that the sample remains representative of the original target population despite survey dropout.

RESULTS

5.1. Sample Characteristics and Attrition Analyses

The initial sub-sample at Cycle 1 was composed of 3,877 children. Among those children, 36.7% (N = 1,541) had missing data at Cycle 3 for items from the scales used to measure the outcome variables (i.e., externalizing and internalizing problems). Appendix B provides the exact percentages of missing data for each of the study variables

Attrition analysis was performed to determine the impact of the loss of the panel data relevant to this study from Cycle 1 to Cycle 3 of the survey on the outcome data. For this purpose, dichotomous variables (i.e., 1 = non-respondents and 0 = respondents) were first derived for each of the two main outcome variables (i.e., externalizing and internalizing problems) and then separate logistic regression models were conducted using total scale scores for each of the predictors to assess the extent of the attrition bias.

Results from the attrition analysis for the two outcome variables are presented in Table 3.

Please note that for convenience only significant odds-ratios are reported.

Table 3. Results of the Attrition Analysis on the Two Outcome Variables.

	Externalizing		
	Beta	Sig.	Odds-ratio
Family SES	-.191	.000	.83
Neighbourhood Cohesion	-.040	.001	.96
Social support	-.031	.009	.97
Positive Parenting	-.036	.004	.96
	Internalizing		
	Beta	Sig.	Odds-ratio
Family SES	-.23	.000	.79
Neighbourhood Cohesion	-.040	.001	.96
Neighbourhood Problems	.042	.031	1.04
Social support	-.031	.009	.97
Positive Parenting	-.036	.004	.96

These analyses indicated that children with missing data on either externalizing or internalizing problems tended to have lower scores on the measures of social support, neighbourhood cohesion, and positive parenting, and they came from families with lower socio-economic status than children who had complete data on the outcome variables. In addition, the group of respondents with missing values on internalizing behaviour tended to have more neighbourhood problems compared with the group of children with complete data on this particular outcome variable. After deletion of those children with missing data on the outcome variables, the matched longitudinal component contained 2,336 children.

Except for the outcome data, multiple imputation was conducted on the specific items that were used as indicators for each of the predictor variables. Any remaining missing data on the predictors were imputed in LISREL using multiple imputation based on the expectation-maximization algorithm (Schafer, 1997). With respect to the imputation of any missing values for the product indicators, the “transform, then impute” method suggested by von Hippel (2009) was employed. This two-step procedure involves first computing the product-term indicators from the incomplete data and then imputing the missing values on those indicators. The use of the “transform and impute” method was justified by its effectiveness in producing more reliable estimates (Allison, 2002) and also because it helps to preserve the nature of the covariances among the raw and transformed variables (von Hippel, 2009). For the final set of reduced and imputed data, unweighted descriptive statistics for the total scores of all scales to be used in this study

are reported in Table 4. Please refer to Appendix C for the means, standard deviations, and other measures of skewness and kurtosis for each single item scale. For this final sample of 2,336 children, further descriptive statistics for the full set of demographic variables are reported in Appendix D.

Table 4. Descriptives for All of the Study Variables After Imputation of the Predictor Variables in the Final Sample (N = 2,336).

	Mean	SD	Skewness	Kurtosis	Min-Max score
Maternal Depression	16.84	4.97	1.75	4.32	12-48
Positive Parenting	21.25	2.56	-.62	.22	5-25
Hostile Parenting	16.18	3.82	.39	.19	7-35
Neighbourhood Problems	6.26	1.71	1.91	4.11	5-15
Neighbourhood Cohesion	15.43	2.67	-.46	.83	5-20
Social Support	20.42	2.88	-.32	-.35	6-24
Unadaptable Temperament	26.68	7.50	.34	-.02	12-84
Difficult Temperament	26.40	7.26	.09	.07	8-56
Externalizing Problems	26.25	5.48	.96	.75	19-57
Internalizing Problems	10.47	2.46	1.09	.78	8-24

5.2. Structural Models

Measurement models for each of the latent factor scales were assessed prior to testing the structural relationships among the latent factors. Please refer to Appendix E for more details on the measurement models. The estimated factor loadings were all significant and in the expected direction. These results indicated that the relation among all the observed indicator variables and the underlying latent factors were quite strong. Furthermore, the goodness-of-fit indices suggested the presence of an adequate overall fit of the factor models to the each of the study variables. The correlation matrix was also inspected to detect the presence of any large correlations between pairs of variables. No multicollinearity problems were detected. Inter-items correlations are presented in Appendix F.

The risk and protective structural models were tested using SEM in LISREL 8.80 (Jöreskog & Sörbom, 2001). Model estimation was undertaken using ML. Partial correlation matrices obtained in SPSS were converted into ASCII files and then used as input into LISREL for model estimation. After running each of the structural models with uncorrelated measurement errors, any additional model modifications that were suggested by LISREL were applied in order to ensure that the best fitting and most parsimonious model had been obtained. For all effects that were tested in each of these two models, results have been provided. It is important to note that all the reported effects were adjusted a priori for the effects of the two covariates (i.e., gender and family SES). As

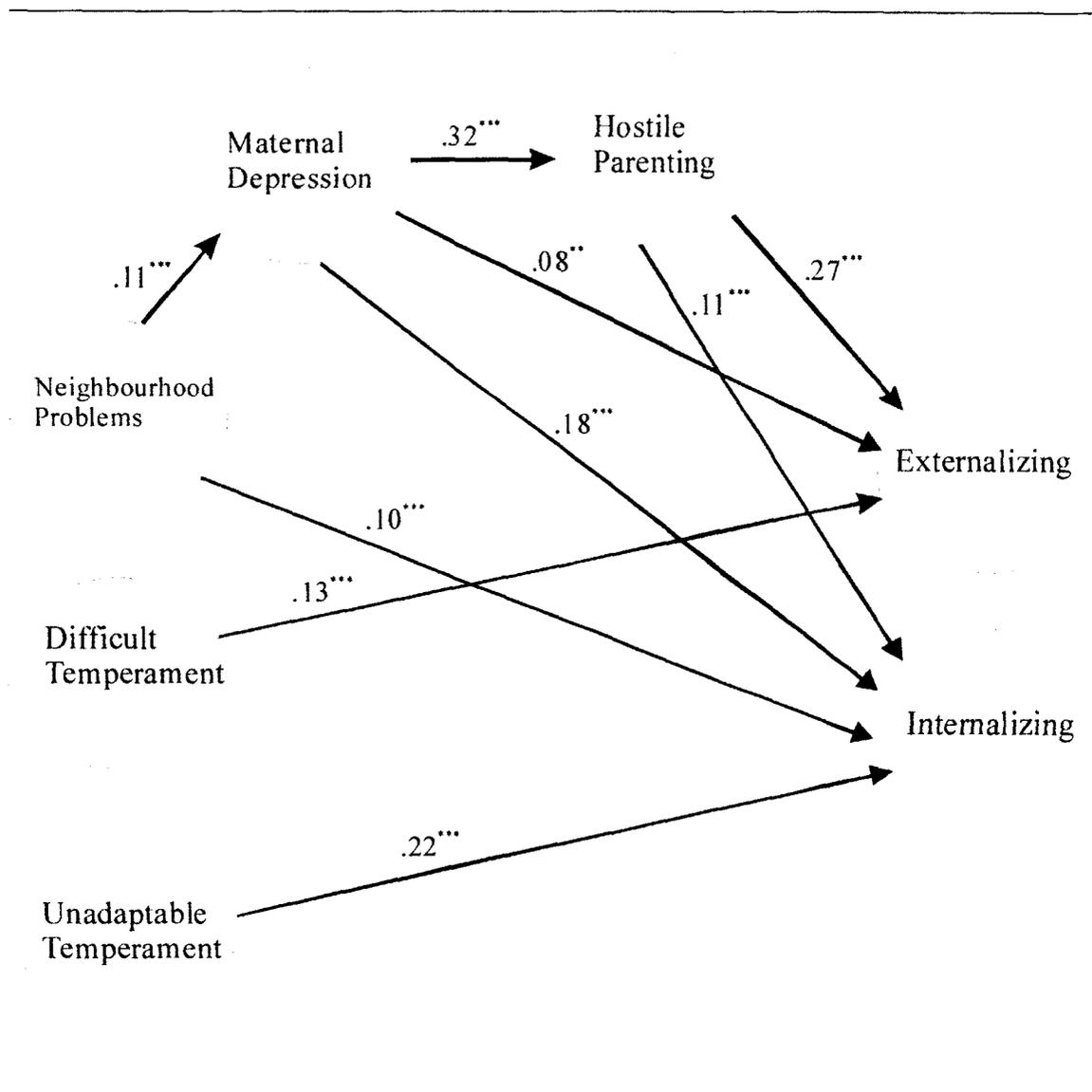
well, note that the reported effects of any one model factor on a second were always adjusted for the other effects on that second factor that were also tested.

5.2.1. Risk model

In the risk model, the simultaneous direct and indirect effects of a series of proximal and distal risk factors (that included neighbourhood problems, maternal depression, and hostile parenting) on children's externalizing and internalizing problem behaviours were examined. Moreover, both the direct effects of the two temperament traits, namely difficult and unadaptable temperament, as well as their respective interactions with hostile parenting were also investigated. Overall, the goodness-of-fit indices suggested the presence of a satisfactory fit of the structural model for this sample ($\chi^2(4266) = 17331.36, p < .001$; RMSEA = .038, 90% CI = (.038-.039); CFI = .90). The full path diagram for the risk model along with the standardized path coefficients for all of the significant paths is shown in Figure 3. Note that the full model contributed to accounting for approximately 11% of the variance in both externalizing and internalizing behaviours.

In this model, a significant direct effect of neighbourhood problems on maternal depressive symptoms but not hostile parenting ($\beta = -.007; p > .10$) was observed. Whereas the unique direct effect of neighbourhood problems was significant with respect to internalizing behaviour, no significant direct effect of neighbourhood problems on externalizing behaviours was detected ($\beta = -.04, p > .10$). In addition, maternal depression was significantly related to hostile parenting and both maternal depression and hostile

parenting had significant direct effects on internalizing and externalizing behaviours. Furthermore, there were significant direct effects of difficult temperament on externalizing behaviours and of unadaptable temperament on internalizing behaviours, respectively. However, neither the direct interactive effect of difficult temperament and hostile parenting on externalizing problems nor the direct interactive effect of unadaptable temperament and hostile parenting on children's internalizing problems were statistically significant ($\beta = -.03, p > .10$; $\beta = -.04, p > .10$, respectively). Note that because neither of these interactions was significant, their respective indicators have been omitted from Figure 3.



***p < .001
 **p < .01
 *p < .05

Figure 3. SEM results for the risk model.

5.2.2. Protective model

In the protective model, the simultaneous direct and indirect effects of a series of proximal and distal factors (including neighbourhood cohesion, social support, maternal depression, and positive parenting) on externalizing and internalizing problem behaviours were examined. Moreover, both the direct effects of the two temperament traits, namely difficult and unadaptable temperament, as well as their respective interactions with positive parenting were also investigated. Overall, the goodness-of-fit indices suggested the presence of a satisfactory fit of the structural model for this sample ($\chi^2(3918) = 18018.20, p < .001$; RMSEA = .037, 90% CI = (.037-.038); CFI = .91). The full path diagram for the protective model along with the standardized path coefficients for all of the significant paths is shown in Figure 4. Note that the full model contributed to accounting for approximately 9% of the variance in externalizing behaviours and 10% of the variance in internalizing behaviours.

In this model, significant direct effects of social support and neighbourhood cohesion on both maternal depression (negatively) and positive parenting were observed. Furthermore, neighbourhood cohesion did not exert a significant direct unique effect on either externalizing or internalizing behaviours ($\beta = .03, p > .10$ and $\beta = .03, p > .10$, respectively). Consistent with findings in the risk model, maternal depression was directly related to both internalizing and externalizing behaviours. Interestingly, although a direct negative effect of positive parenting practices on children's externalizing behaviours was found, no corresponding effect was present for internalizing behaviours ($\beta = .03, p > .10$).

Finally, as was observed in the risk model, difficult temperament had a significant direct effect on externalizing behaviours and unadaptable temperament on internalizing behaviours. More interestingly, however, the direct interactive effects of positive parenting with the two temperament factors were significant (and negative) for both internalizing and externalizing behaviours.

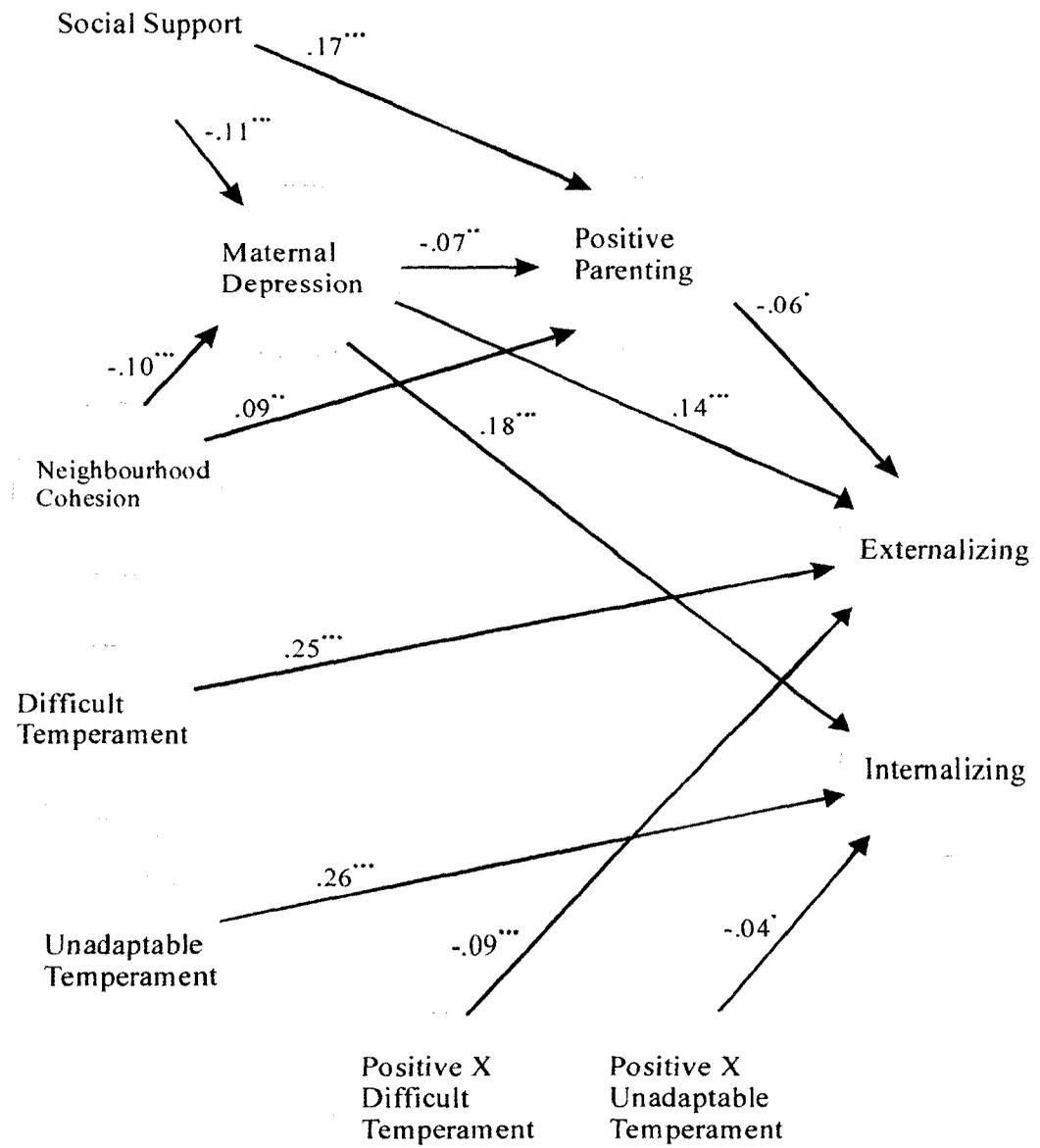


Figure 4. SEM results for the protective model.

DISCUSSION

6.1. Summary of the Study Objectives

The overall objectives of this research were twofold: (1) Determine the nature of the direct and indirect pathways through which both distal and proximal factors influence children's mental health. (2) Contribute to a growing literature on the differential susceptibility to parenting quality of temperamentally vulnerable children. The present research used data from the NLSCY to conduct secondary analyses. This dataset has been widely used to investigate Canadian children's development. Hence, the results obtained have important implications for Canadian health and social policy.

My thesis examined factors related to the emergence of both externalizing and internalizing problem behaviours in sub-sample of 2,336 of young children followed until the early years of school. Predictive measures of mental health were obtained from Cycle 1 of the survey (1994/1995) when children were 2-3 years of age. Selected key predictors included (1) distal factors, namely, neighbourhood problems, neighbourhood social cohesion, and social support; (2) proximal factors, such as maternal depression and parenting quality; and (3) one individual-level factor, namely, temperament. Outcome measures were obtained from Cycle 3 of the survey (1998/1999) when children were 6-7 years old. These latter variables were distinguished in terms of two main classes of externalizing and internalizing behaviours.

Two models were proposed: a risk model and a protective model. The risk model was distinguished by including a series of risk factors that are known to increase the

occurrence of problematic behaviours in children. The protective model was characterized by the inclusion of a series of protective factors known to positively affect children's mental health outcomes. SEM techniques were used to determine the relations between the predictors and outcomes within each model in order to test two key hypotheses:

Hypothesis 1. Bio-ecological systems hypothesis: Children's mental health outcomes are multiply determined by a number of inter-related proximal and distal factors; Hypothesis 2. Differential susceptibility hypothesis: There will be moderating effects of parenting on the relationship between temperament and the mental health outcomes of vulnerable children

6.2. Research Findings

6.2.1. Bio-ecological systems hypothesis

It was hypothesized that broader features of the context would affect children's behaviour indirectly through their impact on proximal processes that take place in the child's immediate family environment. In the risk model, maternal depression and hostile parenting were expected to lead to poorer mental health outcomes in children. Similarly, an indirect relation between maternal depression and children's behaviour through the former's impact on hostile parenting was also expected. In line with these expectations, my results provide support for the presence of direct influences of hostile parenting on both externalizing and internalizing behaviours. This result is consistent with previous research suggesting that children whose mothers engage in hostile parenting have a greater chance of developing aggressive-hyperactive behaviour as well as other

adjustment problems such as anxiety and depression (e.g., Cowen, Work, Wyman, Peter, 1997). Such a relationship could be due either to the modeling of inappropriate parental behaviour or to the psychological stress deriving from exposure to such adverse environmental circumstances (Murry & Brody, 1999; Patterson, 1976). Moreover, consistent with previous research, it was found that higher levels of maternal depression during the first years increases the potential for the future development both internalizing and externalizing behaviours at school entry (Lyon-Ruth, Easterbrook, Cibelli, 1995). This result suggests that maternal depression can exert a pervasive effect on the psychological well-being of children resulting in long-term negative consequences that might include both overt (referring to aggressive-hyperactive) as well as covert (referring to anxious-depressive) problem behaviours. Furthermore, the finding that depressed mothers were also significantly more likely to report higher levels of hostile parenting corroborates prior research demonstrating that they tend to interact more negatively with their children, and that such disciplinary actions ends up having a negative impact on the mental health of their off-spring (Bugental, 1992; Feng et al., 2007; Hasting & Grusec, 1998).

Moreover, in the risk model, neighbourhood problems were expected to affect children's behaviour indirectly through their impact on both maternal depression and hostile parenting. Interestingly (and not specifically as hypothesized), it was found that neighborhood problems directly contributed to the future development of internalizing behavioural problems in this sample of children. Thus, these results provide some

evidence for the unique predictive value of neighbourhood problems for later emergence of internalizing behaviours (i.e., over and above the contribution of maternal depression, hostile parenting, temperament, child gender, or family SES). Such a result is consistent, nonetheless, with findings from recent research conducted by Xue, Leventhal, Brooks-Gunn, and Earls (2005) on a community sample of 5-year olds living in the Chicago area. That research showed that living in disadvantaged areas might increase the likelihood of internalizing problems becoming manifested in children. Conversely, no direct relation between neighbourhood problems and externalizing behaviours was observed in this study. Such a finding suggests that influence of neighbourhood problems on children's externalizing problems might become realized mainly through their negative impact on other intermediary processes at the family level.

In line with previous research, higher levels of neighbourhood problems did significantly contribute to higher levels of maternal depression, independently of the effects of children's gender and family SES (Kim, 2001; Ross & Mirowsky, 2001; Ross, 2000). Indeed, it seems that mothers burdened by a number of problems within the neighbourhood tend to be more depressed. However, in contrast with previous research that has provided evidence for the presence of a significant association between neighbourhood problems and maternal negative parenting (Earls et al., 1994; Pinderhughes et al., 2001), the present study did not reveal any direct effect of neighbourhood problems on hostile parenting practices. Hence, my results indicate that for this specific sample of children, the predominant mechanism through which

neighbourhood problems exert their influence on externalizing behaviours (and to some extent internalizing behaviours as well) is by way of their negative impact on maternal mental health.

In the protective model, positive parenting was expected to directly contribute to more favourable psychological outcomes for children (i.e., fewer internalizing and externalizing behaviours). However, the current results indicate that positive parenting has a direct influence on externalizing behaviours only. This finding suggests that whereas positive parenting seems to be an important factor in predicting externalizing problem behaviours, it generally does not relate to future occurrence of internalizing problems in this group of children. Such results contrast with those from previous research which have confirmed that warm, sensitive, and stimulating parenting plays an important role as a protective resource for children who become less prone to manifest either internalizing or externalizing behavioural problems under such circumstances (Armistead, Forehand, Brody, & Maguen, 2002; Booth, Rose-Krasnor, McKinnon, & Rubin, 1994; Koblinsky, Kovalanka, & Randolph, 2006; Russell & Russell, 1996). A possible reason for this inconsistency might be that it is due to the fact that the influence of a number of other factors related to children's internalizing behaviour was also controlled for in this model analysis. In other words, it might be the case that in the present sample of children, positive parenting did not have any particular impact on internalizing behaviour over and above the fairly strong contributions of some other

relevant sources of influence, specifically, maternal depression and unadaptable temperament.

Moreover, an indirect effect of maternal depression on children's behaviour through its impact on positive parenting was also expected and, indeed, the present results indicate that higher levels of maternal depression were associated with less positive parenting behaviours. This result is highly consistent with current research suggesting that depressed mothers are generally emotionally unresponsive and less able to engage positively with their children (Lovejoy, 2000). Hence, not only are depressed mothers more likely to engage in negative parental behaviour (i.e., hostile parenting; as suggested by the results from the risk model), but they also tend to manifest difficulties in their display of affection and nurturing (Jacob & Johnson, 1997).

Moreover, neighbourhood cohesion and social support were expected to affect children's behaviour indirectly through their influences on both maternal depression and positive parenting. Consistent with these expectations, no significant direct associations between neighbourhood cohesion and either externalizing or internalizing behaviours were observed in the protective model. Such a finding is also consistent with prior studies supporting the notion that characteristics of the social environment (i.e., social capital) are likely to exert an impact upon children's behaviour through their influence on other processes at the family level (Dorsey & Forehand, 2003). In line with this view, higher levels of both neighbourhood cohesion and social support were associated with significant improvements in both maternal depressive mood and positive parenting

practices (Cutrona & Troutman, 1986; Kohen et al., 2008; Powell, 1980). A plausible explanation for such effects would likely be that greater social support and higher levels of cohesion in the neighbourhood contribute to fostering self-confidence and reinforcing positive attributions and behaviour (i.e., Perkins, Hughey, & Speer, 2002; Thompson, Flood, & Goodvin, 2006). Indeed, it could be argued that a high level of both interconnectedness among residents and self-perceived social support should serve to alleviate symptoms of depression by reducing stress and isolation in individuals. Moreover, the presence of a strong social support network would provide parents with opportunities for discussions regarding how to handle children that misbehave, thus, helping them in their efforts to engage in positive interactions with their children (Furstenberg, 1993). Hence, these results indicate that for this specific sample of children, the predominant mechanism through which neighbourhood cohesion exerts its influence on children's problem behaviours is by way of its positive impact on maternal mental health (for both externalizing and internalizing behaviours) and positive parenting (for externalizing behaviours only).

In sum, the present work has served to identify a series of key direct and indirect paths through which both distal and proximal ecological factors can affect children's mental health outcomes. More interestingly, it was shown that broader environmental factors can exert an important influence on children's behaviour through their impact on family-level processes. For instance, the detrimental effect of neighbourhood problems on children's mental health outcomes seems, in large part, to be due to the fact that it can

lead to concomitant increases in maternal depression, which can then also result in the adoption of more aversive parenting strategies. This particular coalescence of risk factors has a negative cascading effect on children, leading to the development of both more externalizing and internalizing problems. Similarly, the beneficial effect of neighbourhood cohesion on children's mental health outcomes seems to be due to the positive impact that such cohesion then has on both maternal depression and positive parenting behaviour.

In line with the bio-ecological systems approach, these results confirm the importance of placing the young child's developmental processes in context over time. In this perspective, children's development is not considered in isolation but within a dynamic system that includes both proximal and distal sources of influence on behaviour. Such an approach emphasizes that children's mental health outcomes are indeed the result of a series of co-occurring forces within the family and the larger community. Moreover, it is clear that a fundamental aspect of such a dynamic system is the level of interconnectedness among such different dimensions of the individual's ecology. Hence, examination of such complex inter-relationships are necessary in order to discern the manner in which different micro- and macro-level processes contribute to children's psychological well-being.

6.2.2. Differential susceptibility hypothesis

It was hypothesized that temperamentally vulnerable children will be differentially affected by parenting, for either better or worse. In the risk model, the strength of the

relation between difficult or unadaptable temperaments and the presence of externalizing or internalizing behaviours, respectively, was expected to be differentially enhanced by higher levels of hostile parenting (as indexed by direct positive effects of the two corresponding model interaction terms). In the protective model, the strength of the relation between difficult or unadaptable temperaments and the presence of externalizing or internalizing behaviours, respectively, was expected to be differentially attenuated by higher levels of positive parenting (as indexed by direct negative effects of the two corresponding model interaction terms).

In line with the biological component of the bio-ecological systems approach, the present study offers some evidence that temperamental vulnerabilities measured in early childhood relate to the development of behavioural problems in children at the school entry. Indeed, consistent with prior findings, children who manifested a tendency to show low adaptability to novel experiences and negative affect (i.e., unadaptable temperament) were prone to the future development of internalizing problems (Kagan et al., 1984; Manassis & Bradley, 1994; Olson et al. 1989). Similarly, difficult temperament characterized by children's early tendencies toward enhanced irritability was positively associated with externalizing problems (Shaw et al., 2001; Guerin et al., 1997.). These findings indicate that different temperamental traits are predictive of specific categories of behavioural problems. Importantly, these temperament effects were obtained here even after simultaneously accounting for the effects that a number of other distal and proximal environmental factors had on these two behavioural outcomes.

Besides the unique independent contributions of temperament to children's mental health outcomes, it is also important to consider the way in which temperament and other socializing factors (i.e., parents) jointly affect children's behaviour (Belsky, 1997; Belsky & Plues, 2009, 2010). In this regard, the findings from the present study suggest that temperamentally vulnerable children indeed respond more positively to the effects of positive parental practices in comparison to non-vulnerable children. These results show that for both temperamentally difficult and unadaptable children, positive parenting can serve as a buffer against the emergence of behavioural and emotional difficulties. Indeed, for this sample of children, the positive relations between each these two temperament factors and their respective outcomes become weaker as the level of positive parenting increases. However, contrary to my initial hypotheses, neither difficult nor unadaptable children exposed to hostile parenting in early childhood seem to be at a particular increased risk for the development of behavioural problems at later age in comparison to easier or more adaptable children. Hence, these findings suggest that whereas positive parenting can serve to attenuate emotional and behavioural difficulties for children with vulnerable temperaments, hostile parenting does not necessarily seem to exacerbate problem behaviours for this specific group of individuals.

Interestingly, the present findings are consistent with research conducted by Bradley and Corwyn (2009) on difficult children. That study found that 4-5 year old children who were classified as more difficult were greatly affected by positive parenting and therefore showed much less of a tendency to exhibit externalizing problems when

parents endorsed responsive and warm behaviour. On the other hand, non-difficult children were not affected that much by the level of positive parenting. However, difficult children whose parents endorsed hostile parenting did not manifest a greater propensity for externalizing behaviours that did non-difficult children.

Despite some fundamental differences in research designs (e.g., they employed observational ratings of parenting), the fact that the present study corroborates Bradley and Corwyn's findings suggest that such results are not likely to be due to chance. That is, it seems that children with vulnerable temperaments manifest increased plasticity to positive changes in the external environment. However, it is worth mentioning that, as in the present research, Bradley and Corwyn (2009) did control for SES and gender, in addition to other variables such as amount of child-care and life events. Hence, the high level of control used in both studies might have contributed to the lack of significant interactive effects of difficult temperament and negative parenting in comparison to other research that did not perform such covariate adjustment (e.g., van Zeijl et al., 2007).

With respect to the development of internalizing behaviours, the present study partially supports previous research findings on the differential susceptibility of fearful children to positive rearing experiences (Gilissen et al., 2007, 2008). However, the combined effect of unadaptable temperament and hostile parenting failed to reach conventional levels of significance. Again, differences in research design may account for the lack of consistency between results. For instance, Gilissen et al. (2007, 2008) used

controlled experimental sessions to assess the quality of the parent–child relationship. Moreover, they did not control for either SES or gender differences.

It might be also the case that the lack of significant interactive effects of both difficult and unadaptable temperaments with hostile parenting in this study could be due to fact the scale used to assess hostile parenting might not have adequately captured some of the more extreme dimensions (i.e., over-criticism, physical punishment) of negative parenting that have been considered in previous research (e.g., Karreman et al., 2010). Furthermore, it could also be speculated that such non-results might be due, in part, to possible ceiling effects on externalizing and internalizing behaviours associated with high levels of difficult and unadaptable temperament, respectively. That is, difficult and unadaptable children might already be demonstrating such high levels of behavioural problems that it is not possible for them to be increased any further by hostile parenting.

In sum, these findings offer some evidence that the type of strategies employed by parents in dealing with their children's demands might affect their mental health by attenuating the impact of children's temperamental vulnerability. Particularly, positive parenting serves to have a soothing effect on temperamentally vulnerable children, which then decreases the tendency for them to exhibit externalizing and internalizing behaviours.

6.3. Implications for Theory Development and Public Policy

Overall, this work provides insight into some relevant factors that play a pivotal role in the healthy mental development of children. With the intent to achieve a more complete understanding of the key early determinants of children's mental health, this

research has focused on the level of the inter-connectedness among the different bio-ecological systems that are present in children's lives. In particular, I attempted to determine the manner in which children's mental health outcomes are influenced by individual-level (i.e., temperament), family-level (i.e., parenting and maternal mental health), and community-level factors (i.e., features of the neighbourhood and availability of social support). Such a multi-layered approach provides the means by which to detect the multiple facets of the social and physical environments that affect the development of children.

Most importantly, this research is the only national population sample study to examine the simultaneous relationships of both proximal and distal factors with the purpose of elucidating the dynamics underlying the successful adaptation of children with vulnerable temperament. Specifically, in the present research a bio-ecological system approach was used to test the differential susceptibility of temperamentally vulnerable children to the rearing environment. As such, a comprehensive assessment of the additive and interactive relationships among a large set of factors was undertaken. Analysis of such data sets with the statistical techniques used here has the potential to greatly improve the breadth and depth of the knowledge about children's mental health and its precursors. Such knowledge will provide a more reliable means of monitoring of children's behaviour for the purposes of both research and policy making (Willms, 2002). It is my hope that the results presented here might eventually help the development of government policies and programs that can serve to benefit children. More specifically, my findings should be

useful to researchers and mental professionals engaged in the assessment of both the risk and protective factors associated with the emergence of mental problems in vulnerable populations and, hence, aid in them in the re-balancing of a child's environment.

As discussed above, a fundamental dimension for understanding the positive adaptation of temperamentally vulnerable children is the extent to which parents endorse warm and responsive behaviour with their off-spring during the first years of life. Generally, parents have the power to nurture and instill positive qualities (i.e., good self-esteem and self-efficacy) in the young child who strives to master ongoing challenges and integrate personal experiences into its own sense of "autonomous-relational self" (Kagitçibasi, 1996). Indeed, parental guidance is essential in order to promote children's problem-solving skills and encourage the self-control that is necessary to change patterns of bad behaviour (Landry, Smith, & Swank, 2006). More importantly, positive parenting is particularly beneficial to temperamentally vulnerable children with respect to enhancing their ability to regulate emotion and control behaviour in a more effective fashion. In this view, only in environments with managed exposure to potential risk and positive opportunities to learn can temperamentally vulnerable children develop adequate coping skills and manifest positive developmental outcomes. Given this perspective, it is important to ensure that children develop in safe, loving, and secure family environments. Hence, to help ensure the healthy development of children, the government needs to work to support these primary relationships by creating the best environment for them that it

can to. Accordingly, more resources and support for parents should be made available to help them to play a positive role in the lives of their children.

Moreover, families that are more at risk should be a priority target for government policies involving the support of families. The present study highlights that family processes are not to be examined in isolation, but that other distal features of the larger context in which children live might be among the most significant initiating mechanisms in a chain reaction of factors that affect children's mental health. For instance, the present study findings show that neighbourhoods characterized by social disorder and disorganization (i.e., crime, vandalism, danger) indirectly contribute to the maladjustment of children through their negative effect on maternal mental health. This suggests that living in a dangerous and problematic neighbourhood might be a burdensome experience for mothers who are more likely to report more severe symptoms of depression (that then often coincide with problematic parenting). Hence, this fact needs to be acknowledged by policy makers so that programs can be implemented within such neighbourhoods to help alleviate such symptomatology or, at least, help depressed parents deal with them in a more positive fashion.

Furthermore, the results of the present research also support the view that there are factors in the wider community around children that can help protect both them and their family members. As shown here, high levels of trust and reciprocity (social cohesion) among members of the community as well as greater social support help to facilitate parents' social adjustment and promote their psychological well-being. In this view,

positive social-relational processes at the community level might be fundamental sources of support for families. Providing families with access to wider community support networks (i.e., local community groups or organizations) might facilitate their integration in the society, thereby reducing feelings of loneliness and isolation and improving mental health. Such an approach can be extended, in particular, to the development of parenting support groups and other intervention strategies (i.e., TRIPLE-P) that can assist parents in adopting effective practices for raising their children and deal with daily parenting stress (for a recent review of the effectiveness of such programs see, Sanders, Marki-Dadds, & Turner, 2003).

6.4. Limitations and Future Directions

Several limitations of this study need to be noted as they provide directions for future research. First, the data employed relied exclusively on maternal reports. The exclusive use of maternal report increases the likelihood of shared method invariance bias. Shared method invariance bias can lead to erroneous conclusions by overestimating the correlation between true scores due to correlated errors attributable to participant's response sets (Campbell & Fiske, 1982; Fiske, 1982). However, the use of SEM does serve to minimize this phenomenon by specifically allowing for correlations among the error terms (Cole, 2006). However, future researchers may want to replicate this study with different measurement methods and multiple informants for all the constructs in order to be protected against both shared informant bias and social desirability bias.

Aside from such issues, another inevitable issue with longitudinal survey data is the handling of missing data. First, although my sample was relatively large, it may be somewhat unrepresentative due to the participants that were excluded from the study because of attrition or non-completion of the children's behavioural problems scale. For instance, the final sample had higher SES, social support, social cohesion, and positive parenting, and lower neighbourhood problems. Although the use of normalized longitudinal weights attenuates the effects of attrition, the remaining children were no longer a nationally representative sample. Namely, in the future, a replication study might be useful in order to compare my findings with those obtained from an even larger and even more representative sample. Moreover, it is important to acknowledge that the loss of participants due to attrition might have affected the final results. Indeed, the fact that high-risk cases (i.e., respondents with high levels of neighbourhood problems, low social support and social cohesion) were excluded from the analyses might have contributed to the underestimation of the relationship among the study variables (e.g., direct effects of neighbourhood on both hostile parenting and children's externalizing behaviours). In order to be inclusive, researchers should strive to preserve data from more disadvantaged families by either increasing response-rate for such individuals or using high-risk population surveys.

In addition, it could be argued that the effects of some of the study variables (i.e., particularly the interaction effects) might have been overestimated due to the large sample size. Indeed, the present findings show that some of the effects are rather small but still

statistically significant. To help clarify the nature of such effects, replication studies should attempt to conduct similar analyses on smaller samples of children.

Moreover, it is worth mentioning that the findings are based on scores obtained by national normative sample of children. As such, those children might present relatively lower levels of behavioural and/or temperamental problems compared with clinical samples. Research based on clinical children might lead to different results due to the presence of such extreme cases.

Some other important issues also need to be addressed for future research in this area. Though not a focus in this study because the respondents are almost exclusively mothers, the important contribution of both parental figures to children's well-being cannot be ignored or dismissed. Researchers interested in such differences might want to consider the option of using methods that take into account information obtained from both parental care-givers. Moreover, other important components of the child's ecological system, such as the school and peer group, should be given some consideration. Nowadays, young children are spending more time in day-care centers with an increased exposure to the influence of other socializing forces outside the family. For instance, positive interactions with teachers and other caretakers can assume a positive role in promoting children's feelings of self-worth and belonging that are essential to their healthy development (Birch & Ladd, 1998; Gillian, 1998; Pianta, 1999). This situation invites consideration of how day-care workers might support and interfere with children's socialization processes and socio-emotional development. For these reasons, future

researchers might want to include such educational settings within the conceptual and operational framework proposed here.

Furthermore, the present study does not discount the possibility of reciprocal relationships between temperament and parenting as they both relate to impairment in children's development. In a recent longitudinal study, Lengua and Kovacs (2005) tested for the bidirectional effects of specific temperament traits and parenting practices in relation to children's adjustment problems over time. In this study, greater maternal acceptance was predicted by fearfulness, whereas children's irritability predicted more inconsistent discipline. Moreover, maternal inconsistent parenting was predicted by both greater fearfulness and irritability. These findings demonstrate that the associations among parenting, temperament, and children's adjustment are very complex and that parenting and temperament may simultaneously influence each other. Future research should attempt to define the extent to which bi-directional relationships between children's temperament and parenting might account for the development of children's problem behaviours.

Moreover, the dynamics underlying the effects of proximal and distal factors on children's mental health might also depend on other characteristics such as culture and ethnicity. For instance, in a recent study, Pachter, Auinger, Palmer, and Weitzman (2006) showed that the mechanisms through which neighbourhood disorder, maternal depression, and parenting influence behaviour of children, indeed, vary across different ethnic-cultural groups. These authors found that the effects of maternal depression were

indirectly related to children's behaviour through parenting in the European-American and Latino groups but not in the African-American group. Moreover, neighbourhood effects were present in European and African-American parents but were not significant for the Latino sample. In another recent study Ho, Bluestein, and Jenkins (2008) found interesting differences in the associations between parental harshness and children's behavioural problems across different ethnic-cultural groups. Specifically, whereas parental harshness was positively related to child aggression in European-Canadian families, an inverse relationship between the two variables was found in South-Asian-Canadian families. Because of the existence of such differences, it cannot be assumed that similar processes affect all children in the same manner. Given that Canada represents a multi-cultural society, culturally relevant characteristics related to minority population requires special consideration. However, in the present sample only a small percentage of respondents belonged to ethnic minority groups (i.e., less than 10%). Future research should therefore attempt to address these issues and employ minority children as target populations.

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APPENDIX A
Questionnaire Items

Name of the scale	Item code	Item Statement	Measurement level
<i>Neighborhood Problems</i>	NP1*	Litter, broken glass or garbage in the street or road, on the sidewalk, or in yards?	1= A big problem 2 = Somewhat of a problem 3 = No problem
	NP2*	Selling or using drugs?	
	NP3*	Alcoholics and excessive drinking in public?	
	NP4*	Groups of young people who cause trouble?	
	NP5*	Burglary of homes and apartments?	
<i>Neighborhood Collective Efficacy</i>	NC1*	If there is a problem around here, the neighbours get together to deal with it.	1 = Strongly Agree 2 = Agree 3 = Disagree
	NC2*	There are adults in the neighbourhood that children can look up to.	4 = Strongly Disagree
	NC3*	People around here are willing to help their neighbours.	
	NC4*	You can count on adults in this neighbourhood to watch out that children are safe and don't get in trouble.	

NC5* When I'm away from home, I know that my neighbours will keep their eyes open for possible trouble.

Social Support

SS1*	If something went wrong, no one would help me.	1 = Strongly Disagree 2 = Disagree 3 = Agree 4 = Strongly Agree
SS2	I have family and friends who help me feel safe, secure and happy.	
SS3	There is someone I trust whom I would turn to for advice if I were having problems.	
SS4*	There is no one I feel comfortable talking about problems with.	
SS5*	I lack a feeling of closeness with another person.	
SS6	There are people I can count on in an emergency	

Positive Parenting

PP1	How often do you praise ..., by saying something like "Good for you!" or "What a nice thing you did!" or "That's good going!"?	1 = Never 2 = About once a week or less 3 = A few times a week 4 = One or two times a day
PP2	How often do you and he/she talk or play with each other, focusing attention on each other for minutes or more, just for fun?	

PP3	How often do you and he/she laugh together?	5 = Many times each day
PP4	How often do you do something special with him/her that he/she enjoys?	
PP5	How often do you play sports, hobbies or games with him/her?	

Hostile Parenting

HP1	How often do you get annoyed with ... for saying or doing something he/she is not supposed to?	1 = Never 2 = About once a week or less 3 = A few times a week 4 = One or two times a day 5 = Many times each day
HP2*	Of all the times that you talk to ... about his/her behaviour, what proportion is praise?	1 = Never 2 = Less than half the time 3 = About half the time 4 = More than half of the time 5 = All the time
HP3	Of all the times that you talk to him/her about his/her behaviour, what proportion is disapproval?	
HP4	How often do you get angry when you punish ...?	
HP5	How often do you think that the kind of punishment you give him/her depends on your mood?	

- HP6 How often do you feel you are having problems managing him/her in general?
- HP7 How often do you have to discipline him/her repeatedly for the same thing?

Maternal Depression

- | | | |
|-------|---|--|
| DP1 | I did not feel like eating; my appetite was poor. | 1 = Rarely or none of the time
(Less than 1 day) |
| DP2 | I felt that I could not shake off the blues even with help from my family or friends. | 2 = Some or a little of the time
(1-2 days) |
| DP3 | I had trouble keeping my mind on what I was doing. | 3 = Occasionally or a moderate amount of time (3-4 days) |
| DP4 | I felt depressed. | 4 = Most or all of the time (5-7 days) |
| DP5 | I felt that everything I did was an effort. | |
| DP6* | I felt hopeful about the future. | |
| DP7 | My sleep was restless. | |
| DP8* | I was happy. | |
| DP9 | I felt lonely. | |
| DP10* | I enjoyed life. | |
| DP11 | I had crying spells. | |

DP12 I felt that people disliked me

*Difficult
Temperament*

TM1	How easy or difficult is it for you to calm or soothe ... when he/she is upset?	1-7 (Very Easy - Very Difficult)
TM5	How many times per day on average does he/she get cranky and irritable – for either short or long periods of time?	1= Never; 2= 1-2 Times per day 3= 3-4 Times; 4= 5-6 Times; 5= 7-9 times 6= 10-14 Times; 7= More than 15 times
TM6	How much does he/she cry, fuss or whine in general?	1-7 (Very little - A lot)
TM7	How easily does he/she get upset?	1-7 (Very Hard - Very Easily)
TM8	When he/she gets upset, how vigorously or loudly does he/she cry and fuss?	1-7 (Very Mildly - Very Loud Intense)
TM9	How does he/she react during hair washing?	1-7 (Very Well - Doesn't Like it at all)

TM17	How changeable is ...'s mood?	1-7 (Changes Seldom and slowly - Changes often and rapidly)
TM24	How does he/she typically respond to new foods?	1-7 (Always favourably - Very negatively)

*Unadaptable
Temperament*

TM4	How easy or difficult is it for you to know what's bothering him/her?	1-7 (Very easy-About average-Very difficult)
TM11	How much does he/she smile and laugh?	1-7 (Much more than most infants - Much less than other children)
TM12	What kind of mood is he/she generally in?	1-7 (Very Happy - Serious)
TM13	How much does he/she enjoy playing with you?	1-7 (A great deal - Doesn't like it very much)
TM15	How does he/she respond to disruptions and changes in everyday routine, such as when you go to church, a meeting, on trips, etc.,?	1-7 (Very favourably – Very Unfavourably)
TM18	How excited does he/she become when people play with or talk to him/her?	1-7(Very Excited - Not at all)
TM20	When left alone, he/she plays well by him/herself?	1-7 (Almost always - Almost never)

TM22	How much does he/she cuddle and snuggle when close to you?	
TM23	How does he/she typically respond to new playthings?	1-7 (Always favourably - Always negatively)
TM25	How does he/she typically respond to a new person?	
TM26	How does he/she typically respond to being in a new place?	
TM27	How well does he/she adapt to new experiences (such as new playthings, new foods, new persons, etc.) eventually?	1-7 (Very Well - Almost always dislike it)

Externalizing Problems

HY1	Can't sit still, is restless, or hyperactive?	
HY2	Is distractible, has trouble sticking to any activity?	
HY3	Fidgets?	1 = Never or Not True 2 = Sometimes or Somewhat true 3 = Often or Very True
HY4	Can't concentrate, can't pay attention for long?	
HY5	Is impulsive, acts without thinking?	
HY6	Has difficulty awaiting turn in games or groups?	
HY7	Cannot settle to anything for more than a few moments?	

HY8	Is inattentive?
PA1	Gets into many fights?
PA2	When another child accidentally hurts him/her (such as by bumping into him/her), assumes that the other child meant to do it, and then reacts with anger and fighting?
PA3	Physically attacks people?
PA4	Threatens people?
PA5	Is cruel, bullies or is mean to others?
PA6	Kicks, bites, hits other children?
IA1	When mad at someone, tries to get others to dislike that person?
IA2	When mad at someone, becomes friends with another as revenge?
IA3	When mad at someone, says bad things behind the other's back?
IA4	When mad at someone, says to others: let-s not be with him/her?
IA5	When mad at someone, tells the other one's secrets to a third person?

Internalizing Problems

ED1	Seems to be unhappy, sad, or depressed?
ED2	Is not as happy as other children?

ED3	Is too fearful or anxious?
ED4	Is worried?
ED5	Cries a lot?
ED6	Appears miserable, unhappy, tearful, or distressed?
ED7	Is nervous, high-strung or tense?
ED8	Has trouble enjoying him/herself?

Note ¹ Items with the asterisk were reversed scored.

APPENDIX B**Percentage of Missing Values for Each of the Scales**

	NC	NP	SS	DF	NA	PP	HP	DP	EXT	INT
N (Present)	3561	3749	3827	3793	3787	3782	3760	3798	2339	2465
N (Missing)	316	128	50	84	90	95	117	79	1538	90
Percent Missing (%)	8.2	3.1	1.3	2.2	2.3	2.5	3.0	2.0	39.7	36.4

NC= Neighborhood cohesion

NP= Neighborhood problems

SS= Social support

DF= Difficult Temperament

NA= Negative Adaptability & Affect

PP= Positive Parenting

HP = Hostile Parenting

DP= Depression

EXT= Externalizing problems

INT = Internalizing problems

APPENDIX C

Univariate Summary Statistics for All of the Study Items

<u>Item</u>	<u>Mean</u>	<u>SD</u>	<u>Skewness</u>	<u>Kurtosis</u>
DP1	1.40	.81	1.98	2.82
DP2	1.26	.60	2.62	6.84
DP3	1.46	.74	1.59	1.82
DP4	1.39	.72	1.94	3.29
DP5	1.59	.88	1.47	1.24
DP6	1.83	.98	.93	-.57
DP7	1.54	.93	1.56	1.12
DP8	1.28	.63	2.37	5.10
DP9	1.41	.79	1.94	2.86
DP10	1.32	.72	2.33	4.62
DP11	1.23	.60	2.79	7.60
DP12	1.13	.48	4.17	8.91
SS1	3.37	.68	-1.09	1.74
SS2	3.39	.70	-1.20	1.85
SS3	3.37	.72	-1.19	1.67
SS4	3.37	.75	-1.43	2.45
SS5	3.41	.70	-1.39	2.66
SS6	3.51	.59	-1.11	2.13
TM1	3.11	1.70	.29	-.71
TM5	2.26	.80	1.74	5.61
TM6	2.87	1.52	.18	-.79
TM7	3.79	1.48	-.03	.15
TM8	4.28	1.69	-.12	-.38
TM9	3.04	2.11	.59	-.96

TM17	3.39	1.59	.67	-.32
TM24	3.64	1.73	.57	-.62
TM4	2.22	1.47	1.02	.25
TM11	2.01	1.22	.86	-.58
TM12	1.68	.98	1.65	2.81
TM13	1.32	.79	2.71	6.84
TM15	2.68	1.56	.44	-.69
TM18	2.53	1.37	.28	-1.06
TM20	2.33	1.56	.92	-.07
TM22	2.33	1.48	.83	-.79
TM23	1.63	1.05	1.66	1.85
TM25	3.09	1.76	.36	-.78
TM26	2.83	1.57	.42	-.57
TM27	2.03	1.25	.98	.12
PP1	4.71	.58	-2.13	4.73
PP2	4.52	.65	-1.24	1.27
PP3	4.73	.52	-1.90	3.36
PP4	3.76	.93	-.41	-.18
PP5	3.56	.93	-.02	-.79
HP1	3.43	1.07	-.41	-.42
HP2	2.16	.72	.64	1.14
HP3	2.25	.65	1.23	2.75
HP4	2.10	.91	.98	1.05
HP5	2.14	1.08	.91	.23
HP6	1.68	.76	1.14	1.36
HP7	2.43	1.06	.68	-.23
NC1	2.85	.72	-.40	.15
NC2	3.07	.65	-.50	.83
NC3	3.15	.65	-.57	.88
NC4	3.14	.67	-.46	.28
NC5	3.23	.66	-.60	.41
NP1	1.27	.53	1.84	2.46

NP2	1.15	.43	2.85	7.65
NP3	1.14	.41	3.02	8.82
NP4	1.30	.53	1.60	1.63
NP5	1.40	.60	1.17	.35
HY1	1.80	.71	.32	-.99
HY2	1.62	.66	.61	-.68
HY3	1.72	.71	.45	-.93
HY4	1.49	.62	.86	-.28
HY5	1.63	.61	.40	-.67
HY6	1.71	.65	.38	-.74
HY7	1.39	.57	1.16	.35
HY8	1.42	.54	.77	-.49
PA1	1.38	.54	1.04	.03
PA2	1.47	.59	.87	-.23
PA3	1.18	.40	1.95	2.63
PA4	1.13	.36	2.58	5.93
PA5	1.10	.31	2.91	7.61
PA6	1.17	.39	1.95	2.48
IA1	1.21	.44	1.89	2.71
IA2	1.17	.40	2.16	3.80
IA3	1.22	.44	1.75	2.07
IA4	1.28	.49	1.45	1.13
IA5	1.15	.39	2.53	5.91
ED1	1.32	.48	.86	-.91
ED2	1.13	.35	2.59	5.94
ED3	1.37	.56	1.17	.38
ED4	1.53	.59	.64	-.55
ED5	1.46	.60	.97	-.08
ED6	1.23	.43	1.43	.71
ED7	1.29	.51	1.52	1.37
ED8	1.15	.37	2.32	4.38

APPENDIX D

Demographics Descriptives for the Final Sample of N = 2,336 children

	Mean	SD
Age child Cycle 1	2.56	.50
Age child Cycle 3	6.49	.50
Age of the PMK	31.79	5.3

	Frequency	Percentage
Gender child		
Females	1128	48.3
Males	1208	51.7
Gender PMK		
Females	2168	92.8

Males	168	7.2
Highest Level Of Schooling		
(Less than Secondary)	407	17.4
(Secondary Graduation)	387	16.6
(Beyond High School)	639	26.7
(College University)	936	39.3
Household Income		
Less than 19,999	350	15
20,000 to 29,999	249	10.6
30,000 or more	1737	74.4
Number of Siblings in the household		
0	594	25.4
1	1074	46
2	446	19.1
3+	222	9.5

Status child Live with

(Both Parents)	2001	85.7
(One Parent)	335	14.3

Biological Parent Status

(Both biological Parents)	1956	83.7
(One biological Parent)	380	16.3

Urban-Rural¹ Area

1	1021	43.7
2	425	18.2
3	146	6.4
4	81	3.4
5	201	8.6
6	462	19.8

Province of Residence

Newfoundland	42	1.8
Prince Edward Island	19	.8
Nova Scotia	71	3.1

New Brunswick	56	2.4
Quebec	559	23.9
Ontario	869	37.2
Manitoba	100	4.3
Saskatchewan	93	4.0
Alberta	242	10.4
British Columbia	285	12.2

Recoded Place of Birth

Canada	1877	80.4
USA	16	.7
Europe	55	2.4
Asia	34	1.5
Other	52	2.2
Missing	302	12.9

¹1= Urban area with a population of 500,000 or over; 2= Urban/ area with a population between 100,000 and 4999, 99; 3= Urban area with of population between 30,000 and 99,99; 4= Urban area with a population between 15,000 and 29,99; 5= Urban area with a population less than 15,000; 6= Rural area

APPENDIX E

Measurement Models for Latent Factors

	Item	Factor Loading	Measurement Error	Coefficient of Determination	CFI	RMSEA
Neighbourhood Problems	NP1	.56***	.68	.32	1.00	.038
	NP2	.68***	.53	.47		
	NP3	.68***	.53	.47		
	NP4	.63***	.60	.40		
	NP5	.40***	.84	.16		
Neighbourhood Cohesion	NC1	.64***	.59	.41	1.00	.038
	NC2	.75***	.44	.56		
	NC3	.82***	.33	.67		
	NC4	.80***	.36	.64		
	NC5	.76***	.42	.58		
Social Support	SS1	.51***	.74	.26	1.00	.037
	SS2	.54***	.72	.29		
	SS3	.55***	.70	.30		
	SS4	.54***	.71	.29		
	SS5	.58***	.67	.34		
	SS6	.79***	.37	.63		

	Item	Factor Loading	Measurement Error	Coefficient of Determination	CFI	RMSEA
Maternal Depression	DP1	.32***	.90	.10	.97	.046
	DP2	.64***	.59	.41		
	DP3	.50***	.74	.26		
	DP4	.76***	.42	.58		
	DP5	.55***	.69	.31		
	DP6	.30***	.91	.09		
	DP7	.31***	.90	.10		
	DP8	.55***	.70	.30		
	DP9	.49***	.76	.24		
	DP10	.49***	.76	.24		
	DP11	.46***	.78	.22		
	DP12	.37***	.86	.14		
Hostile Parenting	HP1	.54***	.74	.29	.98	.047
	HP2	.58***	.66	.34		
	HP3	.70***	.51	.49		
	HP4	.59***	.65	.35		
	HP5	.46***	.78	.22		
	HP6	.60***	.63	.47		
	HP7	.18***	.97	.04		

	Item	Factor Loading	Measurement Error	Coefficient of Determination	CFI	RMSEA
Positive Parenting	PP1	.52***	.73	.27	1.00	.038
	PP2	.57***	.67	.33		
	PP3	.76***	.43	.57		
	PP4	.57***	.68	.32		
	PP5	.44***	.80	.20		
Difficult Temperament	TM1	.57***	.68	.32	.98	.046
	TM5	.58***	.67	.33		
	TM6	.69***	.53	.47		
	TM7	.58***	.66	.34		
	TM8	.50***	.75	.25		
	TM17	.61***	.63	.37		
	TM9	.19***	.97	.04		
	TM24	.30***	.91	.10		
Unadaptable Temperament	TM4	.55***	.70	.30	.97	.049
	TM11	.58***	.67	.33		
	TM12	.69***	.52	.48		
	TM13	.58***	.66	.34		
	TM15	.45***	.80	.20		
	TM18	.61***	.63	.37		
	TM20	.20***	.96	.04		
	TM22	.32***	.90	.10		
	TM23	.36***	.87	.13		
	TM25	.33***	.89	.11		
	TM26	.47***	.77	.23		
	TM27	.11***	.99	.02		

	Item	Factor Loading	Measurement Error	Coefficient of Determination	CFI	RMSEA
Hostile X Difficult Parenting Temperament						
	HD1	.58***	.67	.33	.97	.049
	HD2	.77***	.41	.59		
	HD3	.45***	.77	.21		
	HD4	.43***	.81	.19		
	HD5	.40***	.84	.16		
	HD6	.64***	.60	.40		
	HD7	.39***	.85	.15		
	HD8	.51***	.74	.26		
	HD9	.53***	.72	.28		
	HD10	.31***	.91	.10		
Hostile X Unadaptable Parenting Temperament						
	HN1	.56***	.69	.31	.97	.049
	HN2	.50***	.73	.25		
	HN3	.45***	.78	.21		
	HN4	.63***	.65	.38		
	HN5	.64***	.60	.41		
	HN6	.70***	.51	.49		
	HN7	.60***	.63	.37		
	HN8	.52***	.73	.27		
	HN9	.38***	.86	.14		
	HN10	.47***	.78	.22		

	Item	Factor Loading	Measurement Error	Coefficient of Determination	CFI	RMSEA
Positive X Difficult Parenting Temperament						
	PD1	.56***	.69	.31	.97	.049
	PD2	.57***	.67	.33		
	PD3	.70***	.51	.49		
	PD4	.58***	.66	.34		
	PD5	.46***	.76	.21		
	PD6	.35***	.87	.14		
	PD7	.37***	.86	.15		
	PD8	.32***	.91	.12		
	PD9	.48***	.75	.25		
	PD10	.35***	.87	.14		
Positive X Unadaptable Parenting Temperament						
	PN1	.57***	.67	.40	.97	.049
	PN2	.58***	.66	.20		
	PN3	.65***	.60	.19		
	PN4	.70***	.52	.49		
	PN5	.46***	.79	.21		
	PN6	.60***	.63	.35		
	PN7	.35***	.96	.12		
	PN8	.33***	.91	.10		
	PN9	.37***	.86	.14		
	PN10	.32***	.90	.10		

	Item	Factor Loading	Measurement Error	Coefficient of Determination	CFI	RMSEA
Externalizing Problems	HY1	.58***	.66	.34	.91	.057
	HY2	.56***	.69	.31		
	HY3	.68***	.54	.46		
	HY4	.56***	.68	.32		
	HY5	.60***	.64	.36		
	HY6	.46***	.78	.22		
	HY7	.33***	.89	.11		
	HY8	.21***	.96	.04		
	DA1	.39***	.85	.15		
	DA2	.34***	.88	.12		
	DA3	.49***	.76	.24		
	DA4	.14***	.98	.02		
	DA5	.26***	.93	.07		
	DA6	.07***	.99	.01		
	IA1	.31***	.90	.09		
	IA2	.11***	.99	.01		
IA3	.10***	.99	.10			
IA4	.23***	.95	.05			
IA5	.20***	.94	.04			
Internalizing Problems	ED1	.57***	.68	.32	.98	.046
	ED2	.58***	.67	.33		
	ED3	.69***	.53	.47		
	ED4	.58***	.66	.34		
	ED5	.50***	.75	.25		
	ED6	.61***	.63	.37		
	ED7	.19***	.97	.04		
	ED8	.30***	.91	.09		

APPENDIX F

Matrix of Correlations Between All of the Exogenous and Endogenous Latent Factors

	NP	NC	SS	DP	DF	NA	HP	PP	INT	EXT	SES
NP	-										
NC	-.47***	-									
SS	-.20***	.42***	-								
DP	.16***	-.19***	-.20***	-							
DF	.01	-.13***	-.07**	.25***	-						
NA	.05	-.18***	-.17***	.11***	.62***	-					
HP	.05	-.14***	-.03	.31***	.71***	.43***	-				
PP	-.05**	.19***	.22***	-.13***	-.16***	-.35**	-.19***	-			
INT	.17***	-.07**	-.14***	.27***	.31***	.25***	.27***	-.12**	-		
EXT	.07**	-.10***	-.11***	.20***	.21***	.16**	.28***	-.15**	.54***	-	
SES	-.12**	.17**	.14**	-.07**	-.04**	-.05*	-.08**	-.03	-.11**	-.09**	-