Pathways of linguistic success: A 30-year longitudinal investigation in a high-risk

French-Canadian sample

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ABSTRACT

Pathways of linguistic success: A 30-year longitudinal investigation in a high-risk French-Canadian sample

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Few intergenerational studies have investigated the role of language ability in the transmission of risk for cognitive, linguistic, academic and social difficulties from mother to child within at-risk populations. Existing studies have mainly involved short time spans and have exclusively focused on English-speaking samples. The present studies utilized prospective, intergenerational and longitudinal methods, spanning a 30-year period, to examine the role of language in a social and economically disadvantaged French-speaking population. The three questions that were examined were: (1) What are the direct and indirect pathways between mothers' childhood histories of problematic behaviour and the quality of their child-directed speech? (2) Do the second-generation children's language skills continue to exert an influence on development in the elementary years? (3) To what extent do specific dimensions of children's language skills differentially affect academic abilities?

Data from the Concordia Longitudinal Risk Project were used to answer these questions. Results from these studies revealed direct and indirect pathways operating from maternal histories of childhood maladaptive behaviour to maternal language. The results also revealed that socio-emotional functioning mediated the well-known relationship between socio-economic status and maternal language. Regarding the second-generation children, findings revealed that early elementary-aged children's language skills, associated with narrative macrostructure predicted academic success in

late elementary. Children's narrative macrostructure predicted overall report card scores and scores in all language-based subjects. Together, findings support an intergenerational transfer of risk from mother to child operating through language. Further the studies highlight the continued risk status of these second-generation children extending up until late adolescence. The studies also underscore the role of language assessment as a possibly cost-effective and easy to use diagnostic tool, which may become part of a comprehensive intervention strategy within at-risk populations.

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General Introduction

Language, by its very existence is both a complex and simple phenomenon. Its simplicity is seen by its natural occurrence in every culture and society and by the instinctive process at which children learn it. Yet, human language is also a complex communication tool that is uniquely human. Indeed, unlike every other species on earth who communicate innately through the use of a limited number of signals (either vocal or gestural), humans have developed a communication system that is infinite in the number of expressions that can be created, arbitrary given there is no real connection between the word and its meaning (e.g., the word food bears no connection to the item it is representing) and is constantly evolving and adapting to the changing historical and cultural context. How children learn to acquire and master this extraordinary feat within such a short span of time is a question that has interested scholars from several different disciplines for centuries (Christiansen & Kirby, 2003).

One central tenet of language acquisition is that the linguistic environment the young child is exposed to plays a central role in language development. This is true on a global level in that the language of society and the child's family both play key roles in the child's ability to learn a language (Hoff & Tian, 2005). Numerous studies (Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Bornstein, Haynes, & Painter, 1998; Hoff & Naigles, 2002) have investigated the quality and quantity of mothers' child-directed speech on children's language development and have shown this to be one of the strongest influences on children's vocabulary size. The consequences and lasting effect of children's early language acquisition can also be felt years later when

these children enter the academic years, as numerous studies have suggested a relation between early language abilities and academic success (Campisi, Serbin, Stack, Ledingham, & Schwartzman, 2009; Snow, Burns, & Griffin, 1998; Whitehurst & Lonigan 1998).

The following thesis aims to examine the factors that underlie maternal talk to her child and subsequently how the child's language then serves to predict academic success in pre-adolescence. The following introduction includes a brief overview of intergenerational research and transfer of risk, as well as outlines the various theoretical perspectives upon which this thesis is based. A brief review and discussion of the current literature and its limitations is presented, followed by the rationale for the two studies included in this thesis.

Intergenerational Research and Transfer or Risk

According to the intergenerational model of risk transmission (Caspi & Elder, 1988), problematic behaviour profiles that begin during childhood often persist into adulthood, creating family dysfunction and consequently affecting subsequent generations. Caspi et al. (1988), elucidated two ways to consider continuity across the life course. *Cumulative continuity* is considered to involve individuals' own dispositions as the guiding process for continuity of risk. According to this view, individuals' behaviours are sustained by the accumulation of their own consequences. For instance, an aggressive child may be more prone to face negative consequences in school and be more likely to drop-out of school prematurely. Consequently, the ensuing negative circumstances thus perpetuate a hostile attitude towards the world are maintained. The second process, termed *interactional continuity,* refers to the

reciprocal interaction between a person and his or her environment. This process creates a chain of action-reaction that once again serves to perpetuate maladaptive behaviours and skills. In this instance, the same aggressive child may obtain short-term benefits from the aggressive situation and continue to exert the same behaviour years later due to a failure to develop more adaptive coping styles.

While continuity of risk is a common consequence of growing up in adversity, early risk status does not inherently direct an individual to a negative life course. Many individuals who grow up in even the most adverse of circumstances are able to become successful adolescents and adults (Elder, 1998; Furstenberg, 2002; Werner & Smith, 2001). For example, several children growing up during the Great Depression were able to overcome the odds to get an education and make careers for themselves and their families (Elder, 1998). Resiliency has been defined as the positive adaptation in the context of risk or adversity (Masten et al., 2004). As such, the study of resilience also necessarily involves the identification of protective factors that allow the individual to defy the effects of the environmental risk.

Little is known about the specific processes involved in predicting how or if an at-risk child will "make it" out of adversity. Developmental transitions are of particular interest to those investigating continuity and change in adaptive functioning. These "critical periods" of development are often accompanied by social, cognitive and biological changes, which are often characterized by new risks and opportunities (Masten et al., 2004). For instance, a student entering grade-school will gain exposure to a new social network of peers and potential adult role models. Conversely, a girl entering puberty may also gain exposure to a different peer

network and face new risks, such as teenage pregnancy. These transition phases afford researchers an opportunity to examine whether the changes taking place will result in more negative outcomes or instead, engender rapid changes.

Language is another key component to the study of normative and nonnormative development and may act as a protective factor to the nefarious environment that at-risk children face. As such, understanding the factors underlying mothers' and children's communication should be a central feature of intergenerational research.

Theoretical Perspectives

With respect to how children acquire language, Bruner's (1983) theory of language emphasizes the communicative aspects of language learning rather than the structural form of language. According to Bruner, in order for learning to occur, children require the internal drive to learn language, as well as a supportive and stimulating environment. This support is represented in the form of individuals with whom the child regularly interacts, as well as context in which language can be used. Bruner's social interactionist view of language learning (1983) maintains that language development is best achieved when there is a close match between the content and structure of the adult's child-directed speech and the child's own processing mechanisms. According to this model, caregivers provide a framework for children to learn, by adjusting their own behaviours and speech to the child's capacity, and increasing expectations accordingly.

With respect to the processes by which parents' language influences the child's development, a substantial amount is rooted in Vygotsky's (1978) socio-

cultural model of cognitive development, which purports that learning occurs in the context of social interactions. According to this view, children gradually internalize strategies and skills from interactions with more skilled partners. A central tenet of this model is that guidance is most effective when it is geared towards the child's current developmental level and abilities.

As a natural progression to Vygotsky's socio-cultural model and Bruner's social interactionist view of language, Snow, (1989), elucidated the *fine tuning hypothesis* to language development, which proposes that parents fine tune their language to their child by adjusting the "level of complexity in child-directed speech in relation to the level of complexity of the child's own output and/or comprehension level" (p. 86). According to this theory, mothers' language has the potential to promote children's early language development by providing a model that the child can master. A number of studies have since provided support of this hypothesis (Snow, 1995; Sokolov, 1993) by showing a contingent relationship between the interactions of parents and their children, which changes as a function of development.

Bronfenbrenner's ecological model of human development (see Bronfenbrenner, 1986, for review), states that development occurs through a series of progressively more complex interactions between the child and the social systems in the environment. These social systems include the children themselves, parents, peers, schools, and the greater community. Moreover, the reconceptualised bioecological model of development (Bronfenbrenner & Ceci, 1993) maintains that the child's own biology is but one of the primary systems fuelling development. The

relationship between the child and these systems is seen as dynamic and transactional and each serves to influence the other. According to this model, the parent-child relationship and more particularly the relationship between mothers and their children, is considered to be the most influential relationship the child encounters up until school entry and language is considered one of the core *proximal processes* through which these social interactions occur. However, other influences are considered crucial to development. The ecological framework also holds that the various contributors have a cumulative effect on development and can contribute to a positive or negative trajectory through life.

Whether the influence of the environment on development is global – that is, that warm supportive environments will serve to promote all aspects of development and unsupportive environments will hinder it – or specific, is another question that remains to be answered. The *environmental specificity* theory claims that specific aspects of the environment influence specific aspects of development (Hoff, 2003). According to this theory, aspects of parenting that predict children's language development will be different from other aspects of parenting that predict other aspects of children's behaviour. The theory also proposes an explanation as to why some children growing up in the harshest of environments make it, by positing that certain proximal variables serve as buffers to the negative global effects of distal variables. More specifically, broad, distal variables like socio-economic status may affect child development through multiple pathways, whereby each of these separate pathways reflects a specific proximal process. Evidence has emerged to support this claim showing that maternal language, in particular, may act as a buffer against the

well-documented negative association between socio-economic status and children's language development (Hart & Risley, 1992; Hoff, 2003; Rowe, Pan, & Ayoub, 2005).

Methodological Limitations

A number of studies have looked at the role of maternal input in child language development. However the studies as a whole suffer from several limitations. A majority of these studies are based on small samples, consisting primarily of middle to upper-class families (Tamis-LeMonda, Bornstein, & Baumwell, 2001; Hoff & Naigles, 2002; Huttenlocher et al., 1991). Those that have focused on lower-income families (Hart & Risley 1992; Weizman & Snow, 2001; Hoff, 2003; Rowe et al., 2005) have entirely been comprised of English-speaking samples. Moreover, a number of the studies in the field, measure maternal and child language concurrently (Bornstein et al., 1998; Hoff & Naigles, 2002) or involve short follow-up periods (Hart & Risley 1992; Huttenlocher et al., 1991). Few studies have investigated the trajectories of language development and even fewer have looked at the underlying factors that can account for differences in maternal talk. For example, Rowe et al. (2005) examined the role of maternal input in low-income mother-child dyads. Findings from this study revealed a host of maternal and child variables that explained variation in maternal talk. However the relatively short time-frame of the study (i.e., 18 months) precluded further extrapolation with respect to life-course trajectory.

Similarly, a number of studies have linked child language to school readiness and academic success. However, the vast majority involved relatively brief periods of

follow-up, linked to particular periods of development (Rhea, Hernandex, Taylor, & Johnson, 1996; Snow et al., 1998). Few studies exist that follow children through extended periods of development. One longitudinal study of 32 disadvantaged children (Walker, Greenwood, Hart, & Carta, 1994), found that early language ability predicted academic achievements in language-related topics (reading and spelling) up to 10 years later. However, the small sample size suggests a need for replication with a larger population. As well, the studies often lack generalizability by focusing on relatively homogeneous groups and populations (Whitehurst & Lonigan, 1998).

The Current Thesis

The current studies aim to investigate the role of language in the transmission of risk for cognitive, linguistic, academic and social difficulties from mother to child within at-risk populations. The thesis addresses the aforementioned limitations in the following ways. First, the studies involve a prospective, longitudinal, intergenerational design spanning a period of over 30 years and examining outcome in two generations of participants. Second, the studies focus on primarily lower class French-speaking families living in Québec, Canada. As such, the papers present a representative, at-risk sample. As well, by focusing on a francophone sample, the thesis provides a unique examination of language development outside of the English language. While it is possible that similar developmental trends may be seen across languages, the rich morphology of the French language presents the possibility for linguistic variations to arise.

Using an ecological and social-interactionist framework, and guided by the environmental specificity theory, Study 1 aims to identify the variables underlying

mothers' child-directed speech. The study examines several environmental and dispositional correlates associated with maternal talk and posits that early maladaptive behavioural patterns, sets these women, and consequently their children, on a negative life course trajectory. Recent advances in the field of developmental psychology have allowed more in-depth examinations of the differential trajectories of specific populations, with the use of new statistical methods. One such statistical design, structural equation modeling, was used to examine these women's life-course trajectories.

In Study 2, these same children, having now entered school, thus provide an opportunity to study language as a precursor to academic success. Using an ecological and developmental perspective and evidenced by the longitudinal method employed, the second study aims to examine the child language variables that contribute to later success or failure in school. Earlier data obtained from the Concordia Project (Campisi et al., 2009) has found that preschoolers' lexical development predicted achievement in early elementary. In that same study the authors established that maternal language predicted children's expressive language even after controlling for SES and IQ. The study's conclusions provided support for an intergenerational continuity of risk, operated through maternal language. The following studies aimed to extend these findings and examine the language and academic outcomes of mothers and their children, as well as provide insight in the trajectory of language across two generations of at-risk individuals. Together with the earlier study (Campisi et al., 2009), the following comprises a programmatic body of research.

The three key questions examined in the current thesis were: (1) What are the direct and indirect pathways between mothers' problematic childhood behavioural profiles and the quality of child-directed language? (2) Do the second-generation children's language skills continue to predict academic success throughout their elementary years? (3) To what extent do specific dimensions of children's elementary-aged language skills differentially affect academic abilities? To answer the first question, it was expected that positive childhood histories of maternal withdrawal and aggression would directly predict child-directed speech. It was also expected that indirect pathways would be established from childhood maladaptive behaviour profiles to child-directed speech, operating via SES status and maternal depression. To address the second question, we previously established that preschool-aged language predicted achievement in early elementary (Campisi et al., 2009). In the current studies, we further expected that elementary-aged children's narrative language skills would continue to predict achievement in late elementary. Finally, we hypothesized that narrative macrostructure (i.e. structure and organization of a narrative) could most reliably predict achievement in language-based subjects. A conceptual model is presented in Figure 1 synthesizing our expected findings across all three studies. The model encompasses two generations of at-risk mothers and their children, spanning a period of over three decades.

Given the different periods of development involved, the primary outcome measures were selected based on the type of linguistic interactions involved at the time of data collection and the child's development level. In Study 1, the interactions between mothers' and their preschoolers' occurred during free-play. Lexical diversity

and productive measures were selected to measure mothers' and children's conversational abilities. In Study 2, language interactions occurred between the children and an examiner and data was obtained through the use of a storytelling task. Narrative analysis was conducted allowing the collection of both quantitative (lexical diversity and productivity analysis) and qualitative (narrative structure analysis) data to be compiled.

Pathways predicting maternal speech: A 30-year longitudinal investigation

Lisa Campisi, Lisa A. Serbin, Dale M. Stack, &

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Abstract

Mothers' child-directed speech has been found to be an essential component to children's optimal development. Several variables have been identified as contributors of maternal speech, yet little evidence regarding the original pathways that explain mothers' child-directed speech. With the use of data from the Concordia Longitudinal Risk Project, mothers who were recruited as children in the 1970s, were investigated during a 30-year period. The study sought to examine the trajectory from problematic childhood behaviour patterns to maternal child-directed speech. Using structural equation modeling, childhood social withdrawal directly predicted mothers' child-directed speech, whereas both childhood aggression and social withdrawal were found to indirectly affect maternal speech via SES (education and poverty level) and depressive symptomatology. Moreover, a meditational effect was obtained with maternal depressive symptoms mediating the effect of poverty on maternal speech. The current study adds to the existing literature showing links between SES, maternal depression and maternal speech, and provides evidence that these pathways originate early on in a mother's childhood.

Pathways predicting maternal speech: A 30-year longitudinal investigation

Early maternal care has long been known to be a key player in children's optimal development. Most developmental theorists (Bronfenbrenner, 196; Elder, 1988; Hart & Risley, 1992; Serbin & Karp, 2004) agree that parenting plays a major role in children's social, cognitive, and emotional development. Parenting, and in particular, mothers' parenting behaviour, is an important mediator in the intergenerational transfer of risk for developmental problems and problematic behaviours in children (Maccoby, 2002; Pevalin, Wade, & Brannigan, 2003). Contexts in which families are reared and nurtured, have become topics of broad interest in the literature.

An important aspect of parenting is the communicative input parents provide to their young children. Studies have consistently shown that a mother's talk to her child is one of the strongest influences on her child's vocabulary (Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Bornstein, Tamis-LeMonda, & Haynes, 1999; Hoff & Naigles, 2002). The linguistic diversity (Bornstein, Haynes, & Painter, 1998) and the number of words (Weizman & Snow, 2001) of mothers interacting with their toddler have both been shown to be related to children's early vocabulary.

A recent investigation (Campisi, Serbin, Stack, Schwartzman, & Ledingham, 2009) found that maternal language complexity predicted the quality of preschoolers' expressive language and mediated the effect of these mothers' early behavioural difficulties on their children's later communicative styles. Moreover, Hoff (2003) found that maternal language has the potential to mediate the effect of socioeconomic

status (SES) on children's later lexical acquisition, thus suggesting that mothers'

language may act as a buffer to the influence of poverty and socio-economic status on

children's language development.

These studies highlight the importance of maternal language as a key element

to parenting and underscore the deleterious effects that failure to produce stimulating

language can have on children's later language development. Hoff's (2003) and

Campisi et al.'s (2009) investigations have focused mainly on understanding the

pathways through which maternal language affects children's subsequent language

development. Little is known however, about the origins and predictors beginning in

a mother's own childhood. Examining the earlier precursors of mothers' language and

maternal child-directed speech is important in terms of preventive strategies and

understanding the processes involved in intergenerational transfer of risk. This is

especially true when considering at-risk families. To our knowledge no study has

comprehensively examined the pathways involved in explaining mothers' child-

directed speech within at-risk populations, although several variables have been

identified as predictors.

Predictors of Maternal Speech

Socioeconomic status. Children who grow up in impoverished families

represent an established high-risk population with respect to health and development

(McLoyd, 1998; Serbin et al., 2000). Several studies (Fish & Pinkerman, 2003;

Laurence & Shipley, 1996; Hoff, 2003; Hoff-Ginsburg, 1998) have reported specific

links between SES and language development. Hart and Risley (1992) found large

differences in the lexicon used by parents of differing socioeconomic classes, with

higher income parents using twice as many words when speaking to their toddlers than working class parents. Similarly, Laurence and Shipley (1996) found that in comparison to working-class mothers, middle class mothers provided their preschoolers with more object labels during play. In a study examining language interactions of African-American mothers with their children, Hammer and Weiss (1999) found that middle-class mothers used a greater variety of words when playing with their children than lower income mothers. These authors suggest that SES differences may be related to mothers' educational experiences. Highly educated women may use linguistic behaviours that are valued in school when interacting with their offspring. This hypothesis is supported by the finding that mothers with higher levels of education use speech characteristics that are positively associated with language development. These mothers talk more, use less directive talk and produce more diverse vocabulary during interactions with their children (Hoff, Laursen, & Tardif, 2002). These studies also suggest that mothers with more education may have greater language skills and more verbal facility when they interact with their children than less educated mothers.

Socioemotional factors. Mothers' affective state has also been suggested to affect their communication with their children. In fact, several studies have shown differences in the speech of depressed versus non-depressed mothers. Herrera, Reissland, and Shepard (2004) found that depressed mothers differed from non-depressed mothers in the function and content of their speech to their infants, using fewer affective and informative features in their speech. Breznitz and Sherman (1987) found that depressed mothers vocalized less with their children who, in turn, spoke

less than children of non-depressed mothers. In a study examining predictors of variation in maternal talk to their children (Rowe, Pan, & Ayoub, 2005), maternal depression, together with SES measures, predicted mothers' child-directed speech.

Researchers have widely investigated the association between mothers' socioemotional functioning and SES and have consistently found that low-income mothers are at particularly high risk for depressive symptoms or a diagnosis of major depression, (Brown & Moran, 1997; Gayal, Gay, & Lee 2010; Lanzi, Pascoe, Keltner, & Ramey, 1999). In a study examining the pathways that explain the development of maternal depression, Malik et al. (2007) found that SES factors (i.e., maternal education, family income) played a large role in accounting for the variance in maternal depression. It is therefore possible that maternal depression may mediate the relation between SES and mothers' speech.

Childhood behaviour patterns. While previous studies have identified several variables that predict maternal speech, the literature to date has largely focused on mothers' current functioning and associated family circumstances. It is also possible that differences in the quality of maternal speech may be related to the behavioural patterns that the mothers acquired earlier in their own development.

This idea is consistent with theoretical models (Elder, Caspi, & Downey, 1986) used to guide research on the development of maladaptive behavioural patterns across the life course. According to these models, maladaptive behaviours that begin in childhood may render certain individuals more likely to face challenges in the course of their development and to encounter obstacles in their adaptation to important life transitions, including parenthood (Caspi, 1993; Caspi & Moffitt, 1995;

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Jaffee, 2002). Two processes have been put forth (Caspi, Elder, & Bem, 1988) to elucidate the relative stability of maladaptive behaviour throughout the life course.

The first, *cumulative continuity*, is the process whereby "behaviours are sustained across time by the progressive accumulation of their own consequences" (Caspi et al., 1988, p. 824). The second process termed *interactional continuity* refers to the "reciprocal, dynamic transaction between the person and the environment" (Caspi et al., 1988, p. 824). From this perspective, individuals' early life events may eventually lead them into environments where they will continue to face challenges and stressors. Both processes could serve to explain the possible link between early childhood difficulties and later communicative problems.

Following Caspi's (1988) model, the specific link between early maladaptive behaviours and a mother's subsequent ability to provide a rich linguistic environment for her child can be understood developmentally. For example, Campisi et al. (2009) found that social withdrawal during mothers' childhood predicted maternal child-directed speech 30 years later. Although a number of processes were speculated to be involved in this association, no clear pathways were defined.

According to the cumulative continuity theory, socially withdrawn girls may lack the social skills necessary to develop appropriate social overtures, creating further social isolation as these women reach adulthood and become parents, and transmitting inappropriate social cues in their interactions with their child. In support of this theory, Saltaris et al. (2004) found that mothers' early history of social withdrawal and aggression was related to the amount of warmth, support, and stimulating environment they provided for their preschool-aged children. Given that

language is a core component of social interactions, it is possible that mothers' early histories of maladaptive behaviour may directly affect the degree of linguistic stimulation mothers provide to their own children.

Campisi et al. (2009) also examined the influence of childhood aggression, a known risk factor for a variety of negative outcomes including grade repetition, school drop-out rates, lower family income in adulthood and impoverished child-rearing environmental conditions (Serbin, Peters, McAffer, & Schwartzman, 1991; Stack, Serbin, Schwartzman, & Ledingham 2005). Though no significant association was found between childhood aggression and maternal speech, the likelihood of an indirect pathway mediated by other known risk factors such as socioeconomic status, was raised by the authors.

The current investigation was designed to explore the pathways involved from young girls' childhood problematic behaviour to their later parenting ability, specifically in relation to their child-directed speech. We hypothesized that an early behavioural pattern of childhood difficulties may subsequently influence mothers' linguistic interactions with their offspring through a variety of mechanisms and pathways. Specifically, maladaptive behaviours during the mother's childhood (e.g., aggression, social withdrawal) may hinder her ability to function in school, placing her at a heightened risk of dropping out. Low educational attainment, in turn, may lead to occupational instability and a greater risk for family poverty. These life challenges and stressors may also place the individual at greater risk for psychopathology.

As mentioned above, these negative outcomes may have particularly deleterious effects on a mother's ability to parent and interact with her child. In this way, maladaptive behaviour patterns in childhood may have both direct and indirect effects on the linguistic environment in which a subsequent generation is being raised. The theoretical model of pathways that guided the current study is presented in Figure 2. In this model, direct and indirect pathways (via mother's educational attainment, family income and maternal depression) from childhood behaviour to child-directed speech in adulthood are illustrated.

The Present Study

Having previously examined the precursors of child language and its relationship with mothers' talk (Campisi et al., 2009), findings suggest that mothers' linguistic input to their preschoolers is an important predictor of child language ability. The principle aim of the present study was to examine the trajectory from problematic childhood behaviour patterns to mothers' child-directed speech. Two theoretical pathways were investigated: a direct pathway in which mothers' histories of early social withdrawal and aggression leads to a problematic parenting style characterized by reduced speech. A second, indirect pathway was also examined whereby social withdrawal and childhood aggression influence a series of events such as limited educational attainment, family poverty and maternal depression that, in turn, serve to decrease a mother's linguistic interaction with her child. In keeping with previously reviewed literature we expected that evidence for both direct and indirect paths would be identified.

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A second related aim was to investigate whether maternal depression might mediate the effect of SES on mothers' speech. Evidence presented above showed robust associations between SES and maternal depression and both these factors have been postulated as predictors of mothers' child-directed speech. Thus, we predicted that maternal depression would mediate the relation between SES and mothers' speech.

Method

Participants

Identification of the original Concordia sample. The participants in the present study were recruited from participants in the *Concordia Longitudinal Risk Project,* a prospective, community-based longitudinal study that began in 1976. The children attended French-language public schools in lower socio-economic, inner-city neighborhoods of Montreal, Canada. In addition to social and economic risk, many of the original participants had profiles of problematic behaviour profiles that included aggression and social withdrawal. See Serbin et al. (1998) for a review of the original sample.

Current sample. For the present study, female participants from the Concordia Longitudinal Research Project who had children between the ages of 2- and 5-years-old at the time of testing were invited to participate in this phase of the study. Out of a total of 144 families who were eligible (i.e., original female participants currently with a child of the appropriate age), 114 mothers and their children agreed to participate in the study. Of this number, a final sample of 101 mother-child dyads was included in this study. The 13 dyads that were excluded from

the final sample were those who spoke a language other than French ($n = 4$), those

children who failed to produce a minimum number of utterances needed for reliable

language analysis ($n = 3$) and those whose taped interactions were missing due to

equipment malfunction ($n = 6$). The current study's participants ($N = 101$) did not

differ significantly from the original 144 families with respect to childhood

aggression and withdrawal scores, SES or marital status.

At the time of the data collection, the mothers ranged in age from 25.35 to

34.06 years ($M = 30.4$, $SD = 2.53$). In terms of marital status, 74 (73%) were living in

intact families, 23 (23%) were single, or divorced/separated and 4 (4%) were living

with a partner other than their child's biological father.

Mothers had a mean of 11.65 ($SD = 2.31$) years of schooling. In Quebec, high

school is completed in Grade 11. In this sample, 28% had not completed their

secondary education. With respect to income, families in the current sample had a

mean annual family income of CAD$38,553 ($SD = 24,618$; range from CAD$8430 to

CAD$152,885). In single-parent families, the mean annual income was CAD$21,777

($SD = 15,887$ range CAD$8430 to CAD$57,688), whereas in two-parent families the

mean income was CAD$44,596 ($SD = 24,540$ range CAD$8430 to CAD$152,885).

The Canadian average family income for this time period (Statistics Canada 1996) is

CAD$27,721 for single mothers, and CAD$54,583 for dual-income earners, so both

single-parent and two-parent families in this sample fell substantially below the

national average. Approximately 21% of the sample was dependent on government

social assistance (i.e., receiving welfare) at the time of the study and an additional

22% of the families were considered to be ''working poor'', given that their annual

income fell below the Canadian low-income cutoff (Statistics Canada, 1996). In total, 43% of families had incomes below the poverty line, as their annual income fell below the Canadian low-income cutoff (Statistics Canada, 1996).

In sum, the descriptive information on the families included in this current sample confirmed the continuing risk status of the Concordia sample. On average, the current sample fell below population norms on several important measures of psychosocial adjustment and functioning, including educational attainment, family income and percentage living in poverty. It should however be noted that the current sample of individuals evidenced a range of functioning on each of the original and current risk factors (i.e., childhood social withdrawal, childhood aggression, maternal education, family income etc.). This was an important element of the design giving us an opportunity to detect the influence of these variables on the outcomes of interest.

Procedure

Participants were contacted by phone to invite them to participate. Two subsequent home visits were arranged. On the first visit, a psychometrician performed intellectual and behavioural assessments of the children while a research assistant interviewed the mothers and administered questionnaires on psychological and family functioning. During the second visit, mother and child were videotaped engaging in a 10 minute free-play interaction. The participants were given a standard set of toys consisting of a tea set, Lego blocks, a telephone and age-appropriate books, and mothers were instructed to play with their children as they normally would. The experimenter then left the room. After this time period, the experimenter returned and

proceeded to complete all measures and questionnaires that had not been completed on the first day.

Mothers' and children's language samples were obtained during the free-play interactions. For the purpose of the present study, only mothers' language was examined. Data and information relating to the children's language, and the relationship between mother and child language was previously addressed and discussed in Campisi et al. (2009).

Measures

Parent's level of childhood aggression and withdrawal. To examine childhood levels of aggression and withdrawal of the parents in this study, we drew from information that was collected as part of the original longitudinal study. Between 1976 and 1978, when these parents were children, they were screened using a French translation of the Pupil Evaluation Inventory (PEI; Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976), a peer nomination instrument. The PEI consists of 35 items that load onto three factors: Aggression, Withdrawal and Likeability. For the purpose of the study, only the Aggression and Withdrawal constructs were examined. With respect to aggression, items tapped both physical (e.g., "Those who start fights") and verbal (e.g., "Those who make fun of people") aggression. Social withdrawal items involved shyness (e.g., "Those who are too shy to make friends"), reports of target behaviours (e.g., "Those who have few friends") or peer behaviour in relation to the target child (e.g., "Those who aren't noticed much").

The number of nominations received by each child was summed for the Aggression and Withdrawal factors. These total scores were then subjected to a

square root transformation to decrease skewness. Finally, transformed scores were then converted to z-scores for each sex, within each classroom, to control for class size and sex differences in base rates of aggression and withdrawal. This procedure allowed for the appropriate comparison of each child against relevant norms for sex and age.

Studies have shown that peer nominations represent a reliable method of rating children's behavior (Lyons, Serbin, & Marchessault, 1988). Peer nominations have also been found to be related to parent and teacher ratings of social skills, behaviour problems and academic competence (Wright & Torrey, 2001).

Family Demographics. Socio-demographic information on the families was obtained with a demographic information questionnaire which was administered by phone prior to the home visits. For purposes of the analyses, mothers' years of education and poverty level (1 = poor based on Canadian low-income cutoff; 2 = not poor) were used.

Depressive symptomatology. To obtain a measure of the mothers' depressive symptoms, mothers completed the Global Symptoms Index, a widely used measure of overall psychological distress, including symptoms of anxiety and depression, derived from the Symptoms Checklist-90-Revised (SCL-90-R; Derogatis, 1983). For the purpose of the current investigation, only the depression subscale of this index was selected. This measure has been shown to have good psychometric properties (Derogatis, 1983).

Maternal Speech. Recent studies, examining mothers' linguistic output, have indicated that both the amount of talk mothers direct to their children (i.e., the total

number of words produced; Huttenlocher et al., 1991; Barnes, Gutfreun, Satterly, & Wells, 1983), and the diversity of maternal vocabulary (i.e., number of different words; Bornstein et al., 1998; Hart & Risley, 1992; Pan, Rowe, Singer & Snow, 2004; Rowe, 2008) have been associated with gains in children's linguistic abilities. An examination of the pathways predicting linguistic input was conducted using both these linguistic features.

For each language sample, lexical diversity (number of different words or word type) and lexical productivity (number of total words or word token) were obtained as indicators of vocabulary use. These two language indices were selected as separate language variables because of their documented differing effects on child vocabulary development (Pan et al., 2004).

Speech samples were transcribed by trained assistants using the Child Language Data Exchange System (CHILDES; MacWhinney, 2000), a widely used language analysis software that accepts and analyses language in up to 25 different languages including French. Specific instructions for French transcripts and coding decisions, including how to segment utterances, were based on the criteria described in the CHILDES manual, which allows for the computation of linguistic production using its analysis program CLAN.

Regarding transcript sizes, the study selected samples of a minimum of 50 consecutive utterances, given the varying degree of talkativeness of the participants and the limited time duration of the interactions (i.e., 10 minutes). The use of transcript sizes of 50 utterances has been shown to provide as much reliable information as transcripts of 100 utterances (Watkins, Kelly, Harbers, & Hollis,

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1995). This method has been suggested as a diagnostic strategy for clinicians in the field (MacWhinney, 2000), who routinely use transcripts of 50 utterances in diagnosing language impairment (Kemp & Klee, 1997).

Reliability was calculated using an exact agreement procedure in which the total number of agreements was divided by the total number of agreements plus disagreements and multiplied by 100. Word-for-word percentage agreement between the original investigator and an independent judge ranged from 75% to 98% ($M =$ 88%, $SD = 6.1$). Finally, because of the strong correlation of child age with mothers' language ($r = .47$ between child age and word-type, and $r = .60$ between child age and word-token), z-scores were computed for the language variables, using children's age groups. After standardization, no relation was obtained between mothers' language measures and child age.

Results

Preliminary Analyses

Table 1 presents means and standard deviations for the predictor and outcome variables in this study. An analysis of the intercorrelations between the language variables revealed that word type and word token were highly correlated ($r = .79$, $p <$ .001), which would have rendered their effects statistically indistinguishable. To account for this, word type and word token were combined to form a composite measure of maternal speech by averaging z-scores for the two measures. A correlation matrix for the study variables in this sample is presented in Table 2.

As can be seen from the correlations, the analyses revealed that childhood behaviour patterns (i.e., aggression and social withdrawal) were related to later SES

factors (i.e., years of education and family income). Childhood social withdrawal was related to maternal speech. No significant association between childhood aggression and maternal speech was obtained. Neither childhood aggression nor social withdrawal was related to maternal depression. Maternal education did not relate to maternal depression

or maternal speech. In contrast, family poverty related to both measures. Finally, maternal depression was linked with maternal speech. These correlations supported subsequent model testing and further investigation of the pathways involved.

Statistical Design

The aim of this study was to investigate the pathways involved in predicting maternal speech from childhood behaviour patterns. The role of SES and maternal socio-emotional functioning was also examined. As mentioned previously, in light of the significant intercorrelations between word type and word token, the composite measure of language was selected as the maternal speech measure. Structural equation modeling (SEM; Bentler, 2004) was selected to test the adequacy of the proposed model presented in Figure 2. SEM provides several advantages over other analytic techniques, including the ability to account for measurement error and allows researchers to examine multiple regression equations simultaneously. To evaluate the overall goodness of fit of the path model, a number of fit indices are reported namely: (a) the overall chi-square (χ^2) (b) the comparative fit index (CFI) and (c) the root mean square error of approximation (RMSEA).

Models are considered satisfactory if (a) the chi-square test is statistically nonsignificant, (b) the RMSEA is less than .05 and (c) the CFI is greater than .09.

Pathway Predicting Maternal Speech

Given the low correlations between childhood aggression and maternal speech, and both childhood aggression and withdrawal with maternal depression, a trimmed model was designed that better fit the data. The results of the path model are presented in Figure 3.

The fit of the overall model was good, ($\chi^2 = 5.14$, $p = 0.64$; CFI = 1.00, RMSEA = 0.00). In all, the model accounted for 12% of the variance in mothers' speech. As such, the model predicting maternal speech appears to be supported by the data. In this model, childhood social withdrawal was found to directly predict maternal speech over time, ($\beta = -0.23$, $p < .05$), supporting the prediction that socially withdrawn girls show reduced language use in their interactions with their children.

As predicted, an indirect path was also found between the childhood behavioural measures and maternal education. Specifically, childhood aggression, ($\beta = -0.27$, $p < .05$, and withdrawal, ($\beta = -0.19$, $p < .05$), each produced significant paths to maternal education. Both childhood behaviour measures accounted for 11% of the variance in maternal education. In turn, lower educational attainment predicted family poverty level, ($\beta = 0.35$, $p < .05$), accounting for 12% of the variance. While neither of the SES variables was shown to directly predict maternal speech, family poverty did predict greater risk for depressive symptomatology, ($\beta = -0.26$, $p < .05$). The model accounted for 7% of the variance for maternal depressive symptomatology. Moreover, depression symptomatology was, in turn, found to predict maternal speech, ($\beta = -0.24$, $p < .05$).

Overall, results provided support for both a direct path from childhood withdrawal to maternal speech and indirect paths from childhood withdrawal and aggression to maternal speech.

Testing Depression as a Mediator

Following these analyses, a mediation model was used to test the hypothesis that maternal depressive symptomatology would serve as the mechanism linking the relation between SES (i.e., poverty level) and maternal speech. Following guidelines for establishing statistical mediation (Baron & Kenny, 1986), four conditions must be satisfied. First, the predictor variable (poverty level) must be related to the mediator (depression). Second, the predictor (poverty level) must be related to the outcome (maternal speech). Third, the mediator (depression) must relate to the outcome (maternal speech). The fourth and final condition holds that the relation between the predictor (poverty level) and outcome (maternal speech) should become nonsignificant when the mediator (depression) is added to the equation. The variables were first examined using the correlation matrix presented in Table 2.

Findings supported the first two conditions for poverty level, which was associated with higher rates of depression, ($r = -.26, p < .01$), and lower rates of speech, ($r = .20, p < .05$). Maternal depression was also associated with lower rates of speech ($r = -.24, p < .01$), supporting the third condition. Finally, the path model presented in Figure 3 shows that when tested in a model that includes the proposed mediator (depression), the relation between family poverty and maternal speech becomes nonsignificant. This satisfies the fourth and final condition, confirming that maternal depression acts as a mediator between SES and maternal speech.

Discussion and Conclusions

This longitudinal study of high-risk mothers aimed to investigate the trajectory to mothers' speech from a history of maladaptive childhood behaviour patterns. Specifically, the study examined the presence of direct and indirect pathways from problematic childhood behaviours (i.e., aggression and social withdrawal) that predicted mothers' speech to their offspring. A second aim was to establish whether mothers' depressive state might mediate the well-known relation between SES and maternal speech.

Results confirmed the presence of a direct pathway between social withdrawal in childhood and later maternal speech. This finding points to the heterotypic stability of this behavioural style continuing well into adulthood and affecting mothers' parenting behaviour. The results of this study add further support for the earlier established link between social withdrawal and maternal speech (Campisi et al., 2009). The current investigation extends these findings by identifying the intervening variables contributing to this relation.

The present study failed to establish a direct pathway between childhood aggression and maternal speech. In contrast, the investigation revealed the presence of indirect pathways from childhood aggression and social withdrawal to maternal speech operating via SES variables (mother's education, family income) and maternal depression.

Childhood risk profiles have consistently shown to contribute to subsequent socioeconomic disadvantage (including low educational attainment, occupational prestige, and income) and impoverished environmental conditions (Serbin et al.,

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1991; Serbin et al., 1998; Stack et al., 2005). Parental education, ongoing family poverty, and related elevated stress levels have all shown to impact parents' ability to stimulate the cognitive development of their young children (Bradley & Corwyn, 2002).

The relation between SES and maternal depression may also be understood from an ecological framework (Bronfenbrenner, 1986) in which a host of contextual factors associated with low SES (i.e., low social support, marital conflict, parenting stress, and so forth) lead to maternal depression.

The study replicated earlier findings from Rowe, Pan and Ayoub (2005), showing links between SES, maternal depression and maternal speech. Moreover, results of the meditational analysis provided support for a model in which maternal depression mediates the relationship between SES and maternal speech. These results also complement more recent findings by Rowe (2008), which revealed that parent's knowledge of their children's development mediated the relation between SES and maternal speech. The author suggested that knowledge of child development allowed mothers to "fine-tune" their language or adjust their speech to the child's cognitive capacity, in line with Vygosky's (1978) notion of the zone of proximal development. Depressed mothers often lack synchrony and attunement in interactions with their children (Van Doesum, Hosman & Riksen-Walraven, 2005). In our sample, mothers with depressive symptomatology may be behaving similarly in their linguistic interactions. As such, they may be less likely to "fine-tune" their language according to the child's own capacity.

It should be noted that education was not a significant predictor of maternal speech. There are three possible explanations for this finding. First, the significant association between education and poverty status, ($r = .36$, $p < .01$, suggests that education is acting on maternal speech through the income variable. Second, it is possible education has no effect on the quality of maternal speech within a high-risk sample, as is implied by the lack of direct correlation between education and speech in Table 2. Third, it is possible that mothers' years of education attainment may not be as good an index of a mothers' verbal ability as academic achievement (i.e., school performance). In addition to academic ability, a host of factors may have caused mothers to discontinue their education prematurely (e.g., teen pregnancy, delinquency, economic need), which may not have an impact on maternal speech.

The present longitudinal study had a number of original findings and advances in the literature. Most studies on the topic of maternal language focus on mothers' current functioning and its associated contextual variables. This study allowed us to examine the childhood histories of these mothers and their impact on mothers' later communicative behaviours with their child. It is, to our knowledge, the first to do so. The findings from the study confirm that there are specific individual and environmental characteristics identifiable in childhood, which have an enduring impact into adulthood. Specifically, these characteristics may have an impact on future parenting abilities. The finding that depression mediated the relation between SES and maternal speech also adds to the literature already in existence. This was an unexpected finding and replication would be necessary before making any definitive conclusions about this meditational effect.

Despite its several contributions, this study presented a number of limitations. First, the effect size obtained in this study was rather small, with 12% of the variance accounted for. It should, however, be noted that the childhood behaviour variables were collected close to 30 years prior to the outcome variables. Despite the small effect size, these results offer insight into long-term outcomes of childhood aggression and withdrawal on mothers' linguistic functioning.

Second, while the aim of the study was to examine precursors of maternal linguistic variables, given the bi-directional influence of mother-child language (Campisi et al. 2009), it is highly likely that children's characteristics such as age and child vocabulary production, during these linguistic interactions, may have influenced mothers' child-directed speech. To avoid these variables from affecting the outcome of this study, two procedures were carried out. First, mothers' language measures were standardized according to their children's age using z-scores, rendering the association of child age and mothers' speech nonsignificant. In addition, post-hoc analyses were conducted to examine the effect of child language on the relations between the predictors and maternal speech. Consistent with earlier findings (Campisi et al.), child vocabulary positively predicted mother's child-directed language. However, even with the inclusion of child vocabulary in the analysis, the effect of social withdrawal and maternal depression variables on maternal speech remained significant, thus confirming the robust association between these predictors and maternal speech.

Finally, the study did not take into account the heritability of language or other genetic effects. One study that examined the effect of genetic influence on

language acquisition (Hohnen & Stevenson, 1999) found that close to 50% of the variance in language ability was inherited and that a large component of this operated through IQ. While mothers' IQ was not available as a control variable within the study, maternal education was included. There was no significant association between education and future child-directed speech. However, as mentioned previously, the selected measure of education may have reflected educational attainment as opposed to academic or general cognitive ability. In future research, a pure measure of cognitive ability may be helpful in addressing this issue.

The results of this study highlight the stability and continuity of risk of socially withdrawn behavioural pattern into adulthood. In contrast with childhood aggression, relatively little attention has been paid to the long-term outcomes and consequences of childhood social withdrawal. Interventions in childhood aimed at improving children's social and communicative skills may serve to improve their communicative skills when they become parents themselves. The study also highlights the need for intervention with mothers showing symptoms of depression. While low SES appears to play a role in mothers' language productivity, mothers' socio-emotional functioning appears to buffer this effect. Interventions focusing on improving maternal mood may also serve to help low SES mothers' communication with their child. Low cost home-based interventions emphasizing the use of lexically rich language may be implemented with little inconvenience to families in the context of playtime or mealtime activities.

To our knowledge, no interventions focusing specifically on language per se have been developed. However, an investigation of two Early Head Start programs

(Robinson & Emde, 2004) with low-income mothers and their toddlers found that home-based interventions focusing on increasing maternal sensitivity and reducing hostility towards their children in the context of play interactions, had a significant impact on children's subsequent language comprehension. Moreover, the study identified maternal depression as a moderating variable to the treatment's effectiveness, in that the depressed group responded more positively to the treatment's effectiveness than the non-depressed control group. While the treatment group did not show a significant reduction in depressive symptoms post-intervention, the study underscores the importance of considering mental health when implementing such intervention programs and that behavioural change can occur with or without a change in emotional state.

In conclusion, motherhood seems to emerge as a critical period for girls from high-risk settings. Research with a more diverse sample would expand the generalizability and implications of these findings to a wider population. It would also be interesting to examine whether the identified trajectories would be found at play in samples of fathers from similar backgrounds.

Connecting Study 1 to Study 2

The purpose of Study 1 was to examine the trajectory of risk transmission from problematic childhood behaviour patterns to maternal child-directed speech. The study identified predictors of maternal language that originated in childhood and extended up until adulthood. Campisi et al.'s (2009) earlier study found evidence of a bi-directional relationship between mothers' child-directed speech and preschoolers' language. The study also established that mothers' language mediated the relationship between mothers' problematic childhood histories and the second-generation children's language. Together these studies provide evidence for intergenerational transfer of risk between mothers and their children, operating through language and extending at least into the second generation's preschool years.

Yet, it remains to be seen how these second-generation children's language abilities continue to serve as risk or protective factors throughout childhood. Study 2 will attempt to address this question by examining elementary-aged children's language skills and their impact on academic readiness in pre-adolescence. More specifically, Study 2 will follow the linguistic trajectory of the second-generation children of the Concordia Longitudinal Risk Project, up until the end of their elementary years. The study will focus on children's narrative skills as predictors of academic success. Together, the studies will highlight the role of language as both a risk and protective factor in mothers and their children.

Children's early speech samples as predictors of high-school readiness:

A longitudinal investigation of high-risk francophone children.

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Abstract

Children's narrative skills provide a useful method to study oral language abilities. Microstructural and macrostructural elements of narratives have been linked to emerging literacy skills and later academic abilities. Using data from the Concordia Longitudinal Risk Project, the current project investigated children's narrative skills in the early elementary years as predictors of school success in late elementary. A total of 106 children's narratives were collected at Time 1. Microstructural (i.e. number of different words, number of total words) and macrostructural (i.e. narrative structure) language variables were investigated as predictors of school success. Report card grades were used as outcome measures at Time 2. Using multiple linear regression analyses, early elementary narrative abilities were found to predict overall school success and grades in all language-based subjects. Narrative skills differentially affected children's later academic abilities, with narrative macrostructure being a better predictor of achievement than microstructural language variables. Findings suggest that children's narrative skills in early elementary can be used as predictors of academic ability. These results have important implications for the use of narratives as a cost-effective diagnostic and intervention tool.

Children's early speech samples as predictors of high-school readiness:

A longitudinal investigation of high-risk Francophone children.

With human capital constituting a critical requirement to success in today's global economy, a nation's economic competitiveness is only as strong as its students entering the workforce. It then comes as no surprise that academic underachievement, grade retention and high school drop out rates are areas of national concern. In Canada and the United States, estimates are that over 10% of children fail to complete high school (National Center for Education Statistics, 2006; Statistics Canada 2006). And while these numbers have been steadily decreasing over the years, students in the province of Quebec have continued to struggle. Statistics indicate that over a quarter of these students failing to complete their high school or vocational education by their twentieth birthday (Ministère de l'Éducation, du Loisir et du Sport, 2008). These worrying statistics have created an impetus for educators, policy makers, and governments to address these issues and identify the precursors of school failure and those that promote school success.

Predictors of High-School Readiness

Socioeconomic status. Family income and poverty status have consistently been shown to be associated with academic attainment (Capella & Weinstein, 2001; Gutman & Midgley, 2000; Hoff, 2003; Sirin, 2005; Snow, Burns, & Griffin, 1998; Walker, Greenwood, Hart, & Carta, 1994). Likewise, maternal education has also been shown to be an important predictor of children's achievement (Haveman & Wolf 1995; Smith, Brooks-Gunn, & Klebanov, 1997). In a longitudinal study of over 20,000 eight-grade American students (Department of Education, National Center for Education Statistics, 2002) investigators found that only 50% of children completed high-school when risk

factors such as poverty, sibling school drop-out and single-parent households were considered. Data come from the Columbia County Longitudinal Study (Dubow, Boxer, & Husmann, 2009) found that parents' educational level when their children were 8 years-old, significantly predicted their children's educational and occupational attainment 40 years later.

While this paints a rather bleak picture of the educational trajectories of underprivileged children, the fact remains that not all socio-economically challenged children go on to follow the same negative trajectory as their parents. A recent meta-review of fifty-eight studies (Sirin, 2005) conducted between 1990 and 2000, revealed only a medium association between SES and academic achievement. The results suggest that although background and SES undoubtedly factor into at-risk status for poor and minority students, these variables may only partially account for differences in achievement outcomes.

Student factors. Identifying student-based risk factors can also represent a more attractive avenue for education researchers, as these factors may be more amenable to interventions than SES. In their meta-analysis, La Paro and Pianta, (2000) examined the effects of student factors in predicting children's academic competence in the early school years. The study considered the effects of social and behavioural variables, which included problematic behaviour and peer relations, as well as cognitive and academic variable, such as general knowledge, IQ, academic grades, and linguistic skills. Results revealed a small effect size for social and behavioural measures. In contrast, academic and cognitive factors were shown to have a moderate effect size, accounting for 25% of the variance in children's academic success. Results were interpreted to highlight the

stability of academic and cognitive measures across the preschool to elementary school years.

Among those student factors, linguistic skills have consistently been shown to predict academic achievement (Bliss, McCabe, & Miranda, 1996; Craig, Connor, & Washington 2003; Walker, Greenwood, Hart, & Carta, 1994; Young, Beitchman, Johnson, Douglas, & Atkinson, 2002). A recent longitudinal investigation (Hohm, Jennen-Steinmetz, Schmidt, & Laucht, 2007), found that as early as 10 months of age, children's receptive and expressive language ability predicted their educational outcome ten years later. In line with these studies, there are reports that between 50 to 100% of children with speech and/or language disorders will show evidence of academic difficulties at one point or another point during their academic years (Lewis, Freebairn & Taylor, 2000).

A number of oral language skills have been identified to explain the prediction of later school success. Studies investigating children's spontaneous language abilities have found increasing evidence linking preschoolers' lexical ability and syntactic development to later reading and academic achievement (Campisi, et al., 2009; Lambrecht-Smith, 2009; Walker, Greenwood, & Carta, 1994). These measures of language are widely used during the preschool years, though less is known of their usefulness in older age groups (Hewitt, Hammer, Yont, & Tomblin, 2005). Leadholm and Miller (1992), examined some of the most commonly used preschool measures of syntactic (i.e., Mean Length of Utterance [MLU]) and semantic development (number of different words; NDW) across early childhood. They reported a stable progression of both NDW and MLU up to 13 years of age. However, these results have been criticized (Eisenberg, Fersko, &

Lundgren, 2001) for their small sample size. Others (Bernstein & Tiegerman-Farber, 1997; Klee, 1992) have challenged the use of MLU for children beyond the preschool stage. More recently, researchers have shown that NDW could reliably distinguish language-impaired children from normally-developing children up to 6 years of age (Watkins, Kelly, Harbers, & Hollis, 1995; Hewitt, et al. 2005). There is, nonetheless, little information as to its usefulness beyond these age groups.

Narratives and Achievement

A narrative is a complex form of oral discourse that provides a useful method of examining various aspects of children's oral language ability. During a narrative, children use sentences of different length and complexity to form a cohesive account of a made-up (fictional narrative) or true event (personal narrative). Moreover, narratives are among the most frequently used types of naturally occurring conversations among school-aged children (McCabe, Bliss, Barra, Bennett, & 2008). Ghezzi, Bijou, Umbreit, & Chao, (1987) examined school-aged children's conversational content and found that narratives were the most frequently occurring types of conversation, regardless of who the children were interacting with: younger children, same-aged peers or adults. It has also been argued (Mainess, Champion, & McCabe, 2002) that narratives may provide a less biased language sampling method than standardized tests in underprivileged children as they represent one of the most ecologically valid (Botting, 2002) and culturally-sensitive (Guttierez-Clellen & Quinn, 1993) method of language assessment As well, given the informal nature of storytelling, narratives may also provide a less threatening approach to language assessment, relative to formal language measures.

There is also mounting evidence to suggest that children's narrative skills are linked to later academic achievement (Fang, 2001; Kaderavek & Sulzby, 2000; Rhea, Hernandez, & Taylor, 1996). A number of studies (Elster, 1994; Fang, 2001; Sulzby, 1985) have provided evidence to suggest that narrative and monologue skills are better predictors of reading ability than other measures of language complexity. Narrative ability is also considered one of the best predictors of school success in children with learning disabilities (Feagan & Appelbaum, 1986; Kaderavek & Sulzby, 2000), as these children often show persistent difficulty with spontaneous story generation across the elementary school years (Roth & Spekman, 1986).

Narrative language skills have also been shown to improve achievement in children with limited language proficiency. One such study (Miller et al., 2006) investigated whether Latin-American children's storytelling skills could predict reading achievement in both their native (Spanish) and second language (English). Results showed evidence for cross-linguistic prediction, whereby children performed better on measures of English reading proficiency, when oral storytelling tasks were presented in their native language.

In their efforts to identify the linguistic skills involved in children's abilities to narrate events, Justice et al. (2006) have used the term *macrostructural* variables as the linguistic elements involved in the organization, grammar and structure contained in narratives. These authors also defined *microstructural* variables, as the internal linguistic structure comprised in children's speech including their lexical productivity, lexical diversity and syntactical complexity. Because of the numerous linguistic demands

involved in narration, it has been suggested (Rhea et al., 1996) that narratives may provide a useful prognostic indicator of children's later academic success.

With respect to microstructural variables, lexical diversity, as measured by the number of different words (NDW), has been shown to be a useful measure of identifying language disordered children (Klee, 1992; Watkins, et al., 1995). However, studies examining the association between children's language production and literacy have revealed conflicting results. Scarborough (1990) found that lexical diversity, as measured by the NDW factor, did not emerge as a significant predictor of reading ability. In contrast, Lambrecht-Smith (2009) found that preschoolers' lexical diversity predicted later reading ability, once these children were in grade two. There is also some evidence to suggest that children's lexical knowledge is one of the best predictors of writing quality (Jarvis, 2002). Yu (2009) examined the association between lexical diversity and written and spoken discourses of adults. Significant and positive associations were revealed between the lexical diversity and spoken and written performance, though lexical diversity was found to be a better predictor of speaking than writing performance.

Griffin, Hemphill, Camp and Wolf (2004) have speculated that microstructural variables may represent a more accurate measure of oral language competency in the earlier periods of development, when vocabulary acquisition is the most important language skill for the child. The authors propose that with increasing maturity and the emergence of reading skills other oral language competencies begin to take precedence as children enter the school age period. Accordingly, macrostructural variables have been put forward as a more useful measure of language mastery in the elementary school years. Griffin et al. explain that the production of well-constructed narratives helps

prepare children to produce longer, more complex texts, which are requirements in the late elementary setting. In learning how to produce fuller and more elaborate narratives, these children may also learn to attend to the elaboration of information in written texts, a critical skill for reading comprehension.

With respect to macrostructural variables, it has been suggested that children's understanding of the global narrative structure, acts as the bridge between oral language and literacy (Rhea et al., 1996). The ability to tell a well-structured and coherent story requires complex vocabulary and syntax skills, which are essential to literacy development. Not surprisingly, preschoolers' narrative ability has been shown to predict emergent literacy (Dickinson & McCabe, 1991). According to Whitehurst and Lonigan (1998), emergent literacy skills are considered those necessary for the formation of reading and writing ability. The association between storytelling ability and reading and writing is well documented in the literature (Catts, Hogan, & Fey, 2003; Griffin, Hemphill, Camp, & Wolf, 2004; McCardle, Scarborough, & Catts, 2001; Scarborough, 2001; Snow et al., 1998; Tabors, Snow, & Dickinson, 2001). Griffin et al. (2004) found that preschoolers' understanding of narrative structure predicted reading comprehension in the middle-school period. Furthermore, a review study (Snow et al., 1998) showed that narrative recall in kindergarteners was the single best predictor of reading difficulty in the later elementary years.

There is also evidence that children's ability to tell a well-organized and constructed narrative helps to predict children's writing skills. In a small study examining narrative skills of children with and without language impairments (Botting, 2002), children's story structure was the only predictor of formal language scores and was also

significantly associated with grammar comprehension and grammar production. There have also been associations between poor narrative skills and language impairments (Merritt & Liles, 1987; Tager-Flusberg, 1995; Van der Lely, 1997; Liles, Duffy, Merritt, & Purcell, 1995). Bishop and Edmundson (1987) highlighted this issue by providing evidence that oral narratives in preschoolers could be used as predictors of language impairments several years later. More recently, Eisenberg et al. (2008) reported that narrative ability can be used to distinguish children with language impairment from their typically-developing peers and is a reliable predictor of school success.

The Present Study

The present study examined both the microstructural and macrostructural elements contained in children's depiction of fictional narratives during early elementary school period (grades 1, 2, and 3) and their subsequent relationship with academic achievement in the later elementary grades (grades 4, 5, and 6).

There have been strong association between children's narrative structure and their reading and writing skills in middle elementary (Fitzgerald & Teasley 1986; Griffin et al., 2004). There is also some evidence suggesting a link between lexical diversity and oral language abilities (Yu, 2009) and language difficulties (Klee, 1992; Watkins, Kelly, Harbers, & Hollis, 1995). The current study aimed to investigate whether early elementary-aged children's narrative skills continued to predict their academic achievement in the later elementary years.

First, we hypothesized that narrative abilities in the early elementary could be used as predictors of school success and achievement. Second, we hypothesized that narrative skills could most reliably predict achievement in language-based subjects.

Third, we hypothesized that specific dimensions of narrative abilities would show differentiated patterns of association with language achievement, with narrative macrostructure better predicting achievement in language-based subjects in the school-aged children.

The studies were based on a longitudinal investigation that began in the 1970s when a community sample of over 4000 children, attending inner-city schools in Montreal, Canada, were selected based on their ratings of childhood behavioural risk patterns. The original participants have been followed for over 30 years, along with their families, providing a unique opportunity to examine specific processes in the intergenerational transfer of risk. The sub-sample of children and their families who participated in the present study were drawn from this heterogeneous, lower-income, community-based research population.

The academic outcome variables examined were firstly, overall achievement, as measured by children's average grade scores across all subjects. Secondly, achievement in Language Arts was investigated. This included grades in French, the children's mother tongue. Moreover, grade scores in English, their second language, were also investigated given the evidence supporting a cross-linguistic effect of narrative skills on language ability (Miller et al., 2006). Grade scores in math were also investigated to explore predictive accuracy in non-language-based subjects.

Other variables were also included in the study design. Demographic variables included age and sex. Children's developmental stage is known to influence academic performance, with the growth of more advanced reading and language skills (Cotton & Crewther, 2009). With respect to the role of sex on achievement, there has long been a

belief that boys are better suited for math and science and girls are better suited for language (Eccles et al., 1993; Hedges & Nowell, 1995). However, in more recent years, there has been mounting evidence (Cole, 1997; Marks, 2008; Stowe, Arnold, & Ortiz, 2000) to suggest that girls are closing the gender gap in math and science, though they continue to outperform boys in languages.

As mentioned earlier, SES factors (maternal education and family income) are also believed to account for a significant proportion of the variance in children's academic achievement (Capella & Weinstein, 2001; Gutman & Midgley, 2000; Hoff, 2003; Sirin, 2005; Walker et al., 1994). These variables were thus entered into the analyses. Children's cognitive functioning was also entered into the predictive model, given its known association (Deary, Strand, Smith, & Fernandes, 2007; La Paro & Pianta, 2000) with academic functioning.

The current study investigated the long-term impact of language ability within a disadvantaged, high-risk sample. Earlier findings with this sample (Campisi et al., 2009) previously established an intergenerational transfer of risk between mothers' and child language extending into the preschool period. Guided by ecological and developmental perspectives and using longitudinal methods, the study adds to the existing body of literature by providing insight into the trajectory of language of a second-generation of at-risk individuals as they prepare their transition to high-school. This investigation was unique in its focus on a francophone population. To our knowledge, no study has measured the long-term impact of children's early speech patterns on their academic skills, using a francophone sample.

Method

Participants

A total of 106 children and their families participated in this study. These families were drawn from a larger pool of participants from the *Concordia Longitudinal Risk Project* (Serbin et al., 1998), a prospective, intergenerational and longitudinal investigation. Participating families had been previously assessed when their children were in preschool. A total of 175 families were initially recruited for this study with children between the age of 2- to 5-years-old and living within one hour drive from the Montreal Metropolitan area.

Time 1 of the present study was conducted between years 1999 and 2003, when the children were in the early elementary years. Of the original 175 families, 132 families with children between grades 1 to 3 agreed to participate. A total of 106 participants were retained for this analysis. The 25 children that were not included in the analysis were those for whom a narrative sample was not provided due to participant refusal ($n = 3$), absence ($n = 7$) or due to equipment failure such as inaudible or poor sound quality of narratives ($n = 13$). The final sample included 49 boys (46%) and 57 girls (54%) ranging in age between 6.32 and 9.79 years old, with a mean age of 7.62. All children were predominantly French-speaking and attended French language public schools.

Families showed a wide variability with respect to family income and years of education, however the means (and medians) of these variables are considered below the Canadian and Quebec averages. Parents had completed an average of 12.04 years of education ($SD = 2.47$), whereby a quarter had ($n = 28$) failed to complete their high school diploma (Grade 11), and over half ($n = 64$) had educations of one year of post-

secondary education or less. Families in the current sample had a mean annual income of
$42,774.25 Canadian dollars (range = $8,430.48 – $152,885.20; SD = $26,187; range =
$8,430-$152,885) and 84% fell below 65,218$, the mean income level for families in
Québec (Institut de la Statistique Québec, 2009). Moreover, 11% of the sample was
receiving welfare at the time of the study and an additional 26% of the families were
considered to be ''working poor'', given that their annual income fell below the Canadian
low-income cutoff (Statistics Canada, 2008). In total, 37% of families had incomes below
the poverty line.

Of note, the 106 participants did not differ significantly from the original 175
families with respect to education and income levels, thus suggesting that the selected
families were representative of the original sample.

Time 2 took place between 2003 and 2006, when children were between grades 4
to 6. Children's age at Time 2 ranged between 9.32 and 13.29, with a mean age of 10.90.
The time difference between these two assessments ranged between 2 and 4 years (M =
3.24, SD = 0.60). Of the 106 participants retained for Time 1, data were available for 95
children at Time 2. The remaining families in the study had a mean annual income of
$51,876.51 Canadian dollars (range = $7,926.10 – $178,573.20; SD = $26,130.13), and
79% of families fell below the mean income level in Québec, which at the time was
$72,153 (Institut de la Statistique Québec, 2009). At Time 2, 5% of families were
receiving social assistance, and an additional 29% of families fell below the Canadian
low-income cutoff. Thus, a total of 44% of the families at Time 2 fell below the poverty
line for (Statistics Canada, 2008).

While families generally showed higher family incomes at Time 2, the mean income at Time 2 was not significantly greater than the mean income at Time 1, t (86) = -1.26, *n.s.*

Missing Data. As missing data were found to be non-random using Little's Chi-Square test for MCAR (χ^2 = 708.77, $p < .05$), a bootstrapping-based algorithm (AMELIA; Honaker, King, & Blackwell, 2006) was implemented to estimate missing data for those variables with fewer than 20% of its cases missing (McKnight, McKnight, Sidani, & Figueredo, 2007). The imputed data was used for all subsequent analyses. This technique therefore allowed for the final N to remain constant ($N = 106$).

General Procedure

Procedure at Time 1. During the first testing period parents were contacted by phone to solicit their child's participation. Those who agreed completed a demographic questionnaire over the telephone. Parents and teachers also completed questionnaires concerning the child. Then, a trained research assistant went to visit the children at their respective school. Narratives were collected during this school visit. All children were tested in individual 45-minute sessions in private areas of their schools (e.g., , an empty classroom, private office). Individual administration of cognitive and achievement tests were also administered during this time. Final report card grades were also collected from the schools.

For the narrative collection, children were asked to tell the research assistant a story about a book, television show or movie they had heard or seen recently. They were reminded that stories have ''a beginning, middle and an ending'' and were instructed to tell the best story possible. When the participants appeared to be finished with their story,

the examiner asked whether they wanted to add any additional information. When the children's story production appeared complete, they were thanked and returned to their classrooms.

Children's narratives were tape-recorded in their entirety and were subsequently transcribed verbatim in university laboratories by trained graduate students and research assistants using the Child Language Data Exchange System (CHILDES; MacWhinney, 2000). This widely used language analysis software is compatible with and analyses up to twenty-five different languages, including French. The transcription was done using normal conventions of French spelling, grammar and syntax. Instructions for French transcription and coding decisions were based on the criteria described in the CHILDES manual (MacWhinney, 2000). Interrater agreement between two trained scorers was established for 20% of randomly selected transcripts. Reliability was calculated using an exact agreement procedure in which the total number of agreements was divided by the total number of agreements plus disagreements and multiplied by 100. Word-for-word percentage agreement between the original investigator and an independent judge ranged from 77% to 99% ($M = 87\%$, $SD = 6.1$).

Then, each narrative was categorized into one of the six narrative patterns identified by McCabe and Peterson (1984) and given scores from 1 to 6, where scores of 1 represented the least sophisticated narrative pattern and scores of 6 represented the most sophisticated narrative patterns (see below for definitions). To assess interrater agreement for type of narrative pattern we used Cohen's *kappa*, which corrects for chance rates of agreement. Agreement between the raters resulted in a *kappa* of 0.76 for

type of narrative pattern, representing a substantial interrater agreement (Landis & Koch, 1977).

Procedure at Time 2. For the second testing period, parents were again contacted by phone to solicit their children's participation. Parents and teachers were also asked to complete questionnaires concerning the child. Once more, school visits were scheduled where trained research assistants administered cognitive and achievement tests. At the end of the school year, the students' final report card grades were collected from the schools.

Measures

Time 1 Measures.

Microstructural language. The two indices of microstructure were Total Number of Words (TNW) and Total Number of Different Words (NDW). The former is considered a measure of general language proficiency and volubility, whereas the latter is generally viewed as an index of semantic diversity or productive vocabulary size (Dethorne, Johnson, & Loeb, 2005). Both of these measures are frequently used as indices of lexical diversity (Hoff & Naigles, 2002; Le Normand, Parisse, & Cohen, 2008), though NDW is considered by some as a more useful measure, given its higher correlation with other language measures (Dethorne et al., 2005) and its documented ability to show greater developmental progression beyond the preschool years (Hewitt, et al., 2005).

Macrostructural language. To assess the quality, form and general structure of the children's storytelling, we used Labov's (1972) high-point analysis. According to Labov, (1972) narratives begin with the narrator providing orientation about the *whom*,

what, *where* and *when* of the story. A good storyteller will then create a build up of events, termed the "high-point" (Labov, 1972) or crisis point. This high-point should then end with a resolution of the events. This method of narrative analysis has long been used to study the personal narratives of typically-developing children and adolescents (Peterson & McCabe, 1983), as well as school-aged children with learning disabilities (Celinska, 2008). More recently, it has been applied to fictional narratives (McCabe, Bliss, Barra, & Bennett, 2008) in an effort to look at the overall form of the narrative. This approach to narratives also has the advantage of requiring only a sequence of two temporally ordered clauses to obtain a minimal narrative (Labov, 1972). The current study used Peterson and McCabe's (1983) adaptation of Labov's high-point analysis.

Each narrative was categorized into one of the six following narrative patterns elaborated by Peterson and McCabe: (1) disoriented, (2) impoverished, (3) chronological, (4) leap-frogging, (5) end-at-the-high-point, and (6) classic. Each of these narrative patterns represents a progressively more complex and sophisticate narrative structure, where classical narratives represent the most sophisticated of these structures. See Appendix for a complete definition and examples of the six narrative patterns.

Time 2 measures. Children's grades from selected subject matters were also obtained. Since grading and evaluation systems differed depending on which school and school board the child was enrolled in at the time, a standardized system of classification was created to evaluate and compare the children's school marks. According to this new scale, academic grades were coded as follows: 1 = does not meet expectations; 2 = partially meets expectations; 3 = meets expectations; 4 = surpasses expectations. A score

from 1 to 4 was then assigned for each academic subject on the report card, and these scores were then averaged to produce mean scores as described below.

Language abilities. Children's overall Language Arts grades from school report cards were obtained providing information on children's abilities in oral, written, comprehension and reading of French. In addition, grades in children's second language, English, were examined to further investigate the impact of narratives on a non-native language.

Math abilities. Math grade scores were also obtained through school report cards providing information on children's skills in arithmetic, geometry and logic. Only the composite math grade score was retained for this study's purpose.

Overall academic achievement. Children's report card grades across all subjects (i.e.,

Language Arts, English, Math, Natural Science, Human Science) were averaged to provide an overall achievement score.

Cognitive functioning. To control for children's cognitive functioning, child IQ was collected at Time 2 using the Wechsler Intelligence Scale for Children – Third Edition (WISC-III; Wechsler 1991). The composite Full Scale Intelligence Quotient (FSIQ) was used as an index of general intellectual functioning.

Results

Study Design

To evaluate the hypotheses of the current study, hierarchical multiple regressions were used. This allowed us to examine the contribution of a particular variable, while controlling for the effects of other independent variables.

Regression analyses were carried out on the four measures of achievement: (1) Overall report card grade scores, (2) French report card grade scores, (3) English report card grade scores, and (4) Math report card grade scores. Demographic variables, including child's sex and age at Time 1 (the time at which narratives were elicited) were included in the first level of the analyses. SES variables, including maternal education and family income were included in the second level of the regression. The third level controlled for children's cognitive functioning, as measured by children's full-scale IQ at Time 2. Narrative measures were included in the fourth and final level of the analyses.

Preliminary Analyses

Means and standard deviation for the predictor and outcome variables are presented in Table 3. Descriptive statistics for type of narrative pattern produced by each child are presented in Table 4. Data indicated that the children predominantly produced classic and chronological narratives. Impoverished, leapfrogging and end-at-the-high-point occurred somewhat less frequently. Disoriented narrative patterns were rarely produced.

The intercorrelation matrix between predictor variables is presented in Table 5. As expected, a positive association was obtained between the SES measures of maternal education and family income. Child IQ was also positively associated with maternal education and narrative microstructure (i.e., NDW and TNW). Moreover, the intercorrelation between these two narrative measures suggested a high degree of collinearity ($r = .97$, $p < .01$), suggesting that the two measures did not possess sufficient unique variance to allow reliable estimation.

The intercorrelation matrix between outcome variables is presented in Table 6. As shown in this table, all achievement measures were strongly and positively correlated to one another. Of note, overall achievement was strongly associated with achievement in French and math. Moreover, in light of the very strong correlations ($r \geq .70$) between all three subdomains of the French achievement measures, only the overall French measure was retained for the predictive analyses of French language achievement.

The correlation matrix between predictor and outcome variables can be found in Table 7. As shown in this table, both NDW and TNW variables failed to produce significant associations with any of the achievement variables. Subsequent predictive analyses also failed to produce significant findings. These results suggested that these commonly used preschool measures of lexical diversity failed as predictors of school success in school-aged population. They were thus removed from the analyses.

To examine our first hypothesis regarding narratives predicting overall school success, results of the regression analyses are presented in Table 8. The overall equation was statistically significant ($p < .01$) and all predictors together accounted for 21% of the variance in overall achievement. Child demographic variables were not associated with overall school success. Regarding SES variables, mothers' educational attainment positively predicted children's overall grades ($\beta = .24$, $p < .05$), suggesting that the more educated mothers have children with higher overall school success. Child cognitive functioning was also positively associated with school achievement ($\beta = .33$, $p < .01$), suggesting that performance on standardized tests of intelligence is related to children's overall achievement. Narrative pattern also predicted children's overall achievement ($\beta = .19$, $p < .05$), suggesting that children who produced highly sophisticated narratives in

early elementary have higher overall achievement in the late elementary period. Therefore the prediction that children's narrative skills predicted overall achievement was supported.

The second hypothesis was that children's narrative skills would reliably predict achievement in language-related subjects. Results of the regression equations for Language Arts subjects (French and English as a second language), are presented in Table 9. The overall equations for both French and English report card grade scores were significant ($p < .01$) thus supporting our overall prediction. Regarding achievement in French, 34% of the variance was accounted by the predictors. Predictors accounted for 45% of the variance in English grade scores. In both analyses, sex positively predicted achievement in language-based subjects ($\beta = .22$, $p < .05$ for French; $\beta = .40$, $p < .01$ for English), suggesting that girls outperform boys on language-based subjects. Child age was a significant predictor of English report card grade scores ($\beta = .22$, $p < .05$). These results suggest that older students performed better in English than the younger ones. Regarding SES variables, maternal education positively predicted achievement in both subjects ($\beta = .29$, $p < .01$ for French; $\beta = .25$, $p < .05$ for English), suggesting that mothers with higher levels of education have children who perform better on language-based achievement measures. Child IQ was also significantly predictive of achievement in both languages ($\beta = .41$, $p < .01$ for French; $\beta = .38$, $p < .01$ for English). This suggests that the higher the child's IQ, the higher the performance on these achievement measures. Moreover, narrative macrostructure also predicted achievement in French ($\beta = .25$, $p < .05$) and English ($\beta = .25$, $p < .05$),

suggesting that children who produce more complex stories have higher achievement scores in language-based subjects.

To further support our prediction that narratives better predict language-based achievement, grade scores in math achievement were also investigated. Results of the regression equation are presented in Table 10. The overall equation was significant ($p < .01$) and all the predictors accounted for 22% of the variance in math achievement. Child age was marginally predictive of math achievement ($\beta = -.18$, $p < .10$). This result suggests that relative to expectations, performance in math appeared to decline over time. Mothers' educational attainment was also a positive predictor of math achievement ($\beta = .23$, $p < .05$), suggesting that highly educated mothers have children who perform better in math. Child cognitive functioning was also a significant predictor of math abilities ($\beta = .38$, $p < .01$), thus suggesting that children with higher IQ perform better in math tests. Consistent with our predictions, child narrative ability did not predict achievement in math.

Discussion and Conclusions

Consistent with our expectations, the current study provided evidence that narrative skills could predict academic achievement in the late elementary period. Specifically, those narrative skills associated with narrative macrostructure were found to positively predict overall achievement, as measured by children's overall report card grades. Narrative macrostructure was also a positive predictor of student achievement in language-based subjects including French (language of instruction) and English as a second language. These results provided robust evidence for the predictive power of narrative skills in early elementary.

Contrary to expectations, microstructural elements of the narratives (i.e., NDW and TNW) were not associated with any of the achievement variables. A number of reasons could explain this finding. First, while these measures are routinely used in preschool-aged populations (Klee, 1992; Le Normand et al., 2008; Watkins et al., 1995) the evidence supporting the use of lexical diversity measures beyond this age-group is limited (Hewitt et al., 2005). Moreover, Griffin et al. (2004) suggested that microstructural variables are better indices of oral language in early childhood, when the focus is on vocabulary acquisition and, as children reach further stages of development other language skills may begin to take precedence. It is thus possible that these measures no longer reflect children's developmental progression once these children enter school. Second, it is possible that the language sampling method (i.e., narratives) impacted children's vocabulary use. Those studies with established links between lexical diversity and achievement in older populations (Jarvis, 2002; Yu, 2009) have relied primarily on spontaneous language samples rather than fictional narrative recounting. The use of narratives may have an effect on vocabulary richness and volubility, since the type of method used to elicit language has an impact on its content.

The study also highlighted a number of important variables associated with achievement. With respect to sex, girls were found to outperform boys on language-based subjects in French and English. Boys only marginally outperformed girls on math subjects. This is consistent with recent evidence (Ma & Klinger, 2000) suggesting that girls are closing the previously reported gap in math achievement (i.e., males scoring higher than females in some studies) while they continue to outperform boys on in languages.

Conversely, children's age did not predict any of the achievement variables, with the exception of grades in English. Results suggested that the older children performed better on report card grades in English. This finding could be explained by the fact that in Quebec, second-language education is only taught from grade 4 onwards. Thus the older cohort of children would have benefited from more English exposure than the younger ones. This added exposure time may explain why the older group performed better on this subject.

With respect to the socio-economic variables, only maternal education was a significant and positive predictor of achievement. Specifically, mothers with higher educational attainment had children who performed better in overall report card grades, as well as grades in French, English and math. This is consistent with the body of literature suggesting a link between maternal education and achievement (Haveman & Wolf 1995; Smith, Brooks-Gunn, & Klebanov, 1997). Contrary to expectations, family income did not predict achievement. It is possible that the effects of income on language may not have been captured given the working class nature of the sample. In other words, once the sample's overall mean income was below a certain threshold, it may no longer have been related to ability. Another possibility to explain this result is due to attrition bias. While the families that remained in the study did not statistically differ from the original sample with respect to maternal education and family income levels, they may differ from comparable families on other dimensions, not considered in this study's design (e.g. father's education, family social support etc.). As such, these families may have other resources at their disposal that may serve to create more resilient, and by the same token, higher achieving students.

The results of the current study add to the body of evidence that suggest a link between children's narrative ability and later academic success (Fang, 2001; Feagan, & Appelbaum, 1986; Kaderavek & Sulzby, 2000; Rhea et al., 1996). These findings suggest that children's early storytelling skills represent an important support for later school success. The study makes important contributions to the field of intergenerational transfer of risk and resiliency in vulnerable families and is unique with its focus of a French-speaking population of underprivileged students.

Nevertheless, the study did have certain limitations, which should be addressed. Given the prospective nature of the study's design, the current investigation was limited in the selection of the Time 1 language variable. For our current study purposes, other language production measures could have been beneficial in providing a comprehensive index of students' language ability. However, narrative sampling techniques such as those used in the study represent a great source of information. It has also been suggested that narratives may have greater ecological validity relative to other formal testing techniques (Botting, 2002) and may also be subject to less cultural biases (Mainess, Champion, & McCabe, 2002). Similarly, the wide age and grade range of the children in the current study may not have fully captured the developmental progression of children's narrative skills. Nevertheless, narratives have been shown to be developmentally-appropriate for a wide age range. In a blind analysis using university students to assess the narrative quality of 3- to 9-year-old children's narratives (McCabe & Peterson, 1984), age accounted for 19% of the variance. While age, was a determining factor of narrative quality, the authors noted that some of the best rating narratives were obtained by the younger cohort. Our study included a narrower age-range of children, all

of whom were of school age, at the time of narrative collection. Further, preliminary analyses examining the association between children's age and narrative skills proved nonsignificant ($p > .05$). Taken together, it is our belief that the measures provided in the study represent a comprehensive and age-appropriate estimate of the students' language abilities. Another study limitation was the relatively small sample size ($N = 106$), which limited the statistical power. However, the moderate to large effect sizes obtained in the study ($R^2 = .15$ to $.45$) suggests that a relatively large proportion of the variance in the outcome measures was detected, despite the relatively small sample.

The results of the study also provide a number of implications for clinicians, educators and policymakers. In this respect, narrative skills have been shown to be amenable to interventions. In an early study (Fitzgerald & Teasley, 1986), the authors found that instruction given to children about the structure of narratives, improved children's organization in story-writing and by the same token, improved the quality of the children's written composition. Studies of learning-disabled children have also found that narrative interventions could improve children's writing abilities (Montague & Leavell, 1994) and oral comprehension skills (Westerveld & Gillon, 2008). Future studies should be conducted with high-risk children and should be the focus of earlier preventative interventions in childhood, particularly because narrative interventions are easy to implement, inexpensive and are generally motivating for children. This type of intervention can also be targeted towards various age groups.

Along these lines, the finding that narratives obtained in children's mother tongue predicted children's grade scores in their second language, adds evidence to support the robust impact of narratives on children's language abilities. These findings are also

consistent with evidence supporting for a cross-linguistic effect of narratives on achievement in a second language (Miller et al., 2006). These results suggest a role for narrative interventions to facilitate second language learning. Support for such interventions was demonstrated by Shoenbrodt, Kerins, and Gesell (2003), who showed that narrative intervention skills improved Spanish-speaking children's ability to learn English. The study also found that improvements in English were seen irrespective of whether the language of intervention was conducted in the children's native language or in their second language. These results have significant implications for allophone and immigrant families. Future investigations are needed to examine whether the same results can be replicated with a French-speaking population.

The sex differences obtained in language-based grade scores continue to provide evidence for boys' underperformance in language-based domains. This is a worrying concern particularly because achievement in language-based has implications for later academic success and occupational attainment (Burgess, McConnell, Propper, & Wilson, 2004; Sum, Kirsch, & Taggert, 2002) and highlights the need for early intervention with this population.

In conclusion, the current investigation focused on examining whether children's narrative abilities in early elementary could predict later achievement, once these children approached the end of the elementary period. The findings supported our expectations. Specifically, children's narrative structure predicted overall achievement, as well as achievement in language-based subjects including scores in reading, writing and oral languages. These findings have significant implications for the use of narratives in interventions with at-risk children.

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General discussion

The purpose of this thesis was to present a picture of the risk and protective

factors involved in mother-child language and its later effect on academic success within

an at-risk French-speaking population. The three questions that were examined in these

studies were: (1) What were the direct and indirect pathways between mothers'

problematic childhood behavioural profiles and the quality of child-directed speech

towards their children? (2) Do the second-generation children's narrative skills continue

to predict academic success throughout their elementary years? (3) To what extent did

specific dimensions of children's narrative skills differentially affect academic abilities?

These three questions are addressed in this discussion, along with a theorized model

synthesizing our findings. General strengths and limitations of the studies along with

future directions are also discussed.

Proposed Theoretical Model

In order to tie together the present series of studies conceptually as per the model

shown in Figure 1, we carried out post-hoc analyses using data obtained from Studies 1

and 2, along with previously obtained data from Campisi et al. (2009). Although it was

not possible to test the full intergenerational model with the current sample, due to its

limited size and the complexity of the model, parts or sections of the model were

examined empirically. Study 1 in this thesis addressed the first-generation mothers (G1)

from childhood to parenthood. In regards to our first question, the model shows the direct

and indirect effect of maladaptive childhood behaviour, on mothers' child-directed

speech. Indirect effects of childhood aggression, socio-economic status (i.e., maternal

education, family) and maternal depression also contribute to mothers' child-directed

language. The model also shows that maternal depression mediates the relationship between socio-economic status and maternal-child-directed speech. Study 2 addressed the second-generation children (G2) at school-age. The study found that children's narrative abilities, more specifically those skills associated with the qualitative elements of a narrative structure, predicted academic success several years later as these children neared the end of their elementary education. Specifically, narrative skills predicted overall achievement (as measured by children's overall report card grades) and achievement in language-based subjects, which included French and English as a second-language The relationship between mother-child language at preschool and its influence on early academics was addressed in the earlier study (Campisi et al., 2009). Results of this study provided evidence for a bi-directional relationship between mothers' child-directed speech and preschoolers' language. The study also established that mothers' language mediated the relationship childhood maladaptive behaviour (i.e., social withdrawal) and child language, thus providing evidence for intergenerational transfer of risk, operated via mother's language. Remaining to be linked empirically, are mother and child language at preschool age, with language at school age, thus ensuring continuity of language skills as the child progresses through development.

Post-hoc analyses examining the relationship between language at these two time-points, are presented in Appendix B. Correlations between preschool lexical diversity and school-aged narrative ability were significant for both narrative macrostructure ($r = .26$, $p < .01$) and microstructure ($r = .22$, $p < .05$). In contrast, mothers' language at preschool was associated with school-age macrostructural skills, only ($r = .23$, $p < .05$). Controlling for possible confounding variables (i.e., child gender,

age, cognitive functioning, maternal education and family income) via multiple regression, the link between preschool lexical diversity and school-age narrative macrostructure remained statistically significant ($\beta = .23$, $p < .05$). Results of this analysis can be found in Appendix C. Predictive analyses between preschool-age lexical diversity and narrative microstructure, and between mother's language at preschool and both measures of narrative ability failed to establish significant results once confounding variables were entered in the analyses.

The relationship between mothers' academic achievement and their offspring's achievement was also examined in post-hoc analyses. Specifically, we hypothesized that child IQ mediated the relationship between mother's educational attainment and their children's academic performance. In keeping with the guidelines developed by Baron and Kenny (1986), the studies have already satisfied the following conditions for mediation including establishing a positive association between: (1) the predictor variable (maternal education) and the outcome variable (child overall achievement; $r = .25$, $p < .01$), (2) the predictor variable (maternal education) and the mediator variable (child IQ; $r = .25$, $p < .01$) and, (3) between child IQ and overall achievement ($r = .32$, $p < .01$). The fourth and final condition requires that the predictor variable (maternal education) and the outcome variable (child overall achievement) be reduced to nonsignificance upon inclusion of the mediating variable (child IQ). The condition was tested using multiple regression analysis and results can be found in Appendix D. As shown in the table, the inclusion of child IQ to the model reduced the effect of maternal education on child achievement to nonsignificance, whereas child IQ was positively and significantly related to child achievement. These results thus fulfilled the requirements for mediation and help

to explain the role of IQ in the intergenerational transfer of risk from mother to child achievement.

The results also suggest continuity between child language skills at preschool-age and narrative skills associated with macrostructure. Together, these findings suggest that the model presented in Figure 1 accurately describes childhood linguistic processes over time, including a shift from quantitative aspects of language to qualitative aspects as the more useful predictor of children's academic performance. However, as noted earlier, future investigations with a larger sample size are warranted to test whether the relationships presented in Figure 1, using separate analyses, remains present when analyzed as a single model.

Intergeneration continuity and transfer of risk

The studies made several original contributions to the literature regarding intergenerational continuity and the transfer of risk between mothers and their children (Serbin et al., 1998; Serbin, & Karp, 2004). The results provided evidence for the dual processes of intergenerational continuity of risk proposed by Caspi, Elder and Bem (1988). Consistent with *cumulative continuity*, the consequences of early social withdrawal creates a cascade of negative events that include lower educational attainment, lower income levels, and emotional instability. These negative events consequently impact the level of linguistic stimulation the mother provides to her child. *Interactional continuity* is also likely to be a mechanism involved in the continuity of risk for these girls whereby the behavioural profiles displayed by these girls is likely to affect their interactions with others in their environment. This includes their family members, peers and later on, their romantic partners and their future children. The reciprocal

predictive relationship between mother and child language found in Campisi et al. (2009) adds support for the interactional continuity and the transfer of risk from mother to child. The finding that preschoolers' lexical ability influenced academic skills, whereas school-aged lexical abilities had no impact on academics, points to the heterotypic nature of language throughout the life-course.

By adopting an ecological perspective, the study identified multiple precursors and correlates thus allowing for a more complete picture of the elements that threaten or promote children's development. While broad distal factors, like SES were found to be involved in mothers' and children's development, the study also made the positive finding that there were little direct effect on their language and academic outcomes. In Study 1, education and poverty were found to indirectly affect maternal language, whereas in Study 2, these variables no longer made any significant contribution to academic outcomes once child factors such as IQ and narrative skills were entered in the equation. This supports the *environmental specificity theory* and highlights the fact, that growing up in adversity does not inherently commit the individual to a lifetime of negative outcomes.

Strengths and Limitations

The longitudinal and prospective design used in the studies allowed for a unique opportunity to examine development throughout the lifespan. Among the numerous benefits of this methodology is the opportunity to study trajectories of behaviours over time and across multiple generations. As well, the prospective nature of the design provides more convincing causal inferences by eliminating recall biases which are a possibility in retrospective design. The relatively large time-span of the investigation

encompassed several important milestones of child development, including the formative

preschool years to the later elementary years, thus providing important contributions to

the field of developmental psychology and child language development.

The studies also provided a unique opportunity to study language in a culturally

distinct population of French Canadians. While cross-linguistic comparisons were not the

focus of this investigation, the results of this study are consistent with findings from

primarily English-speaking populations showing links between early language skills and

later academic achievement (Fang, 2001; Kaderavek & Sulzby, 2000; Lambrecht-Smith,

2009; Walker et al., 1994). Hence, despite the distinct characteristics of the sample,

findings suggest generalizability to other populations and cultural groups.

Although these features to our studies' designs are considered important

strengths, they also carry a number of limitations. For instance, the prospective design

presented significant limitations with respect to the choice of available language

sampling measures. Selection of the current measures was based on the developmental

level of the participants, the nature of the interaction (i.e., free-play in Study 1, story

retelling in Study 2) and the duration of the linguistic exchange. While the selection of

language measures is appropriate and provides a good baseline of linguistic proficiency,

the current studies could be enhanced by the addition of other language measures (e.g.

receptive vocabulary, oral comprehension, syntactic development, etc.). Future

evaluations with this sample would benefit from the use of formal standardized language

tests.

Similarly, while the studies attempted to include a number of control variables

associated with language ability (e.g., age, sex, income, education), other variables were

not included. For instance, biological and genetic factors are known to account for a large proportion of the variance in language acquisition (Hohnen & Stevenson, 1999). While genetic influences were not the subject of the current investigation they likely contributed a significant amount of variance to both child and mothers' language. Moreover, results of Study 1 showed that childhood behaviour profiles had both direct and indirect effects on maternal language. It is likely that behavioural characteristics of the second-generation children also contributed to the variance in achievement.

Another limitation is the sample sizes of both studies. While comparatively large in relation to other long-running studies of this scope (Walker et al., 1994), the current sample size limited the number and type of variables that could be introduced as control or mediating variables, as this would have reduced statistical power. Nevertheless, the significant results obtained across the three decades of the study, highlights the robust nature of the findings.

Future Directions

Many questions about parenting and its effect on children's language and academic achievement remain to be addressed. The importance of quality parenting of preschoolers is widely known to affect later achievement. Yet, as children go into middle childhood and adolescence and spend less time with their parents and increasing amounts of time with peers, it remains to be seen whether parenting at these later stages of development will continue to mediate the transfer of risk or whether other contributors (siblings, peers, romantic partners) become more important.

Future studies of school adjustment should also look at the cumulative impact of the various environments by including several different time points in their analysis.

Since several childhood predictor variables are likely to change with time, future investigations would benefit from the inclusion of statistical design models such as hierarchical linear modeling (HLM). These models not only allow researchers to chart children's functioning over time, but they also provide an indicator of the impact of risk and protective factors across the life course, as well as focusing in on those critical periods in development.

Implications for Policy, Prevention, and Intervention

The findings of the current studies have important implications for clinicians, educators and policy makers. The first of these implications highlights the need for preventive intervention. The findings of the current studies coupled with those of Campisi et al. (2009), suggest an intergenerational transfer of risk from parent to child language that begins to take root early on in development. These findings also imply that there are early markers of risk for language difficulties. Hence, preventative interventions should begin prior to language acquisition and should start at the parental level. Evidence supporting the environmental specificity theory also have implications with respect to interventions, suggesting that specific interventions targeting families at highest risk should be effective even when they are not with lower risk groups.

The studies also have important implications for educators and teachers working with at-risk children. While regulating problematic behaviour is understandably a main concern for teachers and parents working in high-risk environments, the findings from Study 1 underscore the need for addressing internalizing problems, such as social withdrawal. Socially withdrawn students, and in particular girls, are often more likely to go unnoticed in a classroom comprised of disruptive and typical children. Yet the

findings from this study suggest important long-term negative consequences that can extend well into the next generation. As always, early intervention is key: if the intervention is done early enough and is effective, there is a greater likelihood for success, thus limiting the transmission of risk to the next generation. Such interventions could begin in daycares and preschools and target those children who are rejected or have difficult social interactions. Interventions could focus on developmentally-appropriate social skills training, such as appropriate play, turn-taking and the adoption of prosocial ways of behaving. As children reach more advanced stages of development these interventions could be modified to include a greater focus on communication and problem-solving skills.

The current study also identified aspects of language ability that served as predictors of academic success in the elementary-school period. These findings have important implications for the type of remediation and language intervention programs. Those aimed at improving the language of preschoolers may benefit from improving the quantitative aspects of speech, and as such children's vocabulary skills and language productivity. These programs however, may not be effective in older school-aged children. With this population, a focus on the qualitative aspects of language may be more suitable.

The studies also have important implications for clinicians and highlight the need for the selection of developmentally appropriate language sampling strategies for clinicians attempting to identify risk status for language and developmental difficulties. While spontaneous language in the context of free play may be effective for young children of preschool age, the more complex language skills of school-aged children requires the

selection of appropriate language samples suited to these children's abilities and interests. Narrative storytelling provides a suitable, cost-effective and engaging choice for children in the elementary years, as children are beginning to read and learn to form organized structures. It remains to be seen whether this strategy is as effective with older children.

While prevention and intervention programs are at the heart of many initiatives aimed at children growing up in adversity, often times these programs fail to reach those in greatest need. There are many likely explanations for the failure of these programs; problems are often exacerbated by limited knowledge of these programs within disadvantaged communities and their ease of accessibility. It is therefore important for community members to work together with those in direct contact with the vulnerable families to promote these programs. In addition, there is a need to tailor and implement programs that are best adapted to the community's cultural and economic reality.

Conclusion

These studies examined the pathways and mechanisms through which risk and protective factors affected language and academic outcomes in high-risk families. Taken together, the findings from this research provide strong support for the notion that children's academic success is established early on in development. Consistent with Bronfenbrenner's ecological model, it was found that contextual family factors in addition to child factors combined to determine successful or maladaptive outcomes in children's development. This research highlights the complexity of influence on children's development in the various contexts in which they evolve. While the study focused largely on risk, the results also underscore that several of these children showed great success despite the obstacles they faced. Supportive parenting in the form of

mothers who use more diverse language, is only one of the many protective factors of children growing up in adversity.

Table 1

Descriptive Statistics for Outcome and Predictor Measures of Mothers' Language

Descriptive variables	*M*	*SD*	Min	Max	%
Outcome Measures					
Maternal type (raw score)	93.79	20.43	47.00	143.00	
Maternal type (z-score)	- 0.03	1.03	-2.11	2.91	
Maternal token (raw score)	216.12	39.43	101.00	325.00	
Maternal token (z-score)	-0.09	0.98	-2.21	2.94	
Predictor Measures					
Childhood aggression (z-score)	0.38	1.06	-1.59	2.96	
Childhood withdrawal (z-score)	0.41	0.98	-0.95	2.69	
Maternal education (in years)	11.65	2.33	6.00	17.00	
Poverty Status (1 = poor; 2 = not poor)	1.36	.81	1.00	2.00	
Percent Living in Poverty					43%
Percent Not poor					57%
Maternal depression symptoms	55.83	9.81	34.00	75.00	

Table 2

Correlations between all Variables in the Model

	1	2	3	4	5	6	7	8
1.Childhood Aggression	--	-.06	-.25**	-.24*	.05	-.07	.01	-.03
2.Childhood Withdrawal		--	-.19*	-.15	.07	-.25**	-.26**	-.26**
3. Maternal Education			--	.36**	-.07	.12	.01	.06
4. Family Poverty				--	-.26**	.23*	.18^t	.20*
5. Maternal Depression Symptoms					--	-.25**	-.22*	-.24**
6. Maternal Type						--	.79**	.95**
7. Maternal Token							--	.95**
8. Composite Speech Measure								--

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

Table 3

Descriptive Statistics for Predictor and Outcome Variables of Children's Language

Descriptive variables	*M*	*SD*
Outcome Measures		
French report card grades	3.38	.90
Oral language report card grades	3.52	.87
Reading report card grades	3.36	.93
Writing report card grades	3.25	.86
English report card grades	3.62	.79
Math report card grades	2.49	.75
Total report card grades	2.65	.59
Predictor Measures		
NDW	86.60	40.57
TNW	214.65	148.26
Narrative score (1 to 6)	3.87	1.55

Table 4

Descriptive Statistics by Narrative Patterns

Narrative pattern	*n*	%
1. Disoriented	3	2.8
2. Impoverished	21	19.8
3. Chronological	27	25.5
4. Leapfrogging	17	16.0
5. End-at-the-high-point	12	11.3
6. Classic	26	25.5

Table 5

Intercorrelations between all Predictor Variables

	1	2	3	4	5	6	7	8
1. Child Age	--	-.02	-.13	-.11	-.12	.05	.05	.04
2. Child sex		--	.04	.09	.05	.07	.13	.12
3.Mother's Education			--	.45**	.25**	.09	.06	.07
4. Family Income				--	.15^t	-.01	.12	.14^t
5. Child IQ					--	.09	.25**	.22*
6. Narrative Pattern						--	.27**	.19*
7. NDW							--	.97**
8. TNW								--

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

Table 6

Intercorrelations between Outcome Variables

	French grades	Oral language (French)	Reading (French)	Writing (French)	English	Math	Overall grades
French grades	--	.74**	.73**	.76**	.64**	.57**	.71**
Oral language (French)		--	.79**	.71**	.59**	.44**	.56**
Reading (French)			--	.72**	.62**	.42**	.54**
Writing (French)				--	.38**	.46**	.60**
English					--	.33**	.42**
Math						--	.82**
Overall grades							--

[t] *p* < .10,　　* *p* < .05,　　** *p* < .01

Table 7

Correlations between Predictor Variables and Outcome Variables

	French grades	Oral language (French)	Reading (French)	Writing (French)	English	Math	Overall grades
Child Age	.08	.05	.05	.08	.22*	-.03	.12
Child sex	.16[t]	.15	.15	.12	.39**	.08	.18[t]
Mother's Education	.16[t]	.14	.18[t]	.28**	.27**	.09	.25**
Family Income	-.02	-.01	-.05	-.02	.25**	.09	.13
Child IQ	.45**	.23*	.38**	.32**	.35**	.38**	.32**
Narrative Pattern	.29**	.19[t]	.25**	.22*	.38**	.17[t]	.25**
NDW	.19[t]	.09	.18[t]	.09	.17[t]	.11	.10
TNW	.16	.08	.15	.08	.16[t]	.06	.07

[t] $p < .10$,   * $p < .05$,   ** $p < .01$

Table 8

Regression Equation Predicting Overall Academic Achievement in Late Elementary (based on total report card grades) from Narrative Ability

Variables	Overall report card grades (N = 106)		
	Beta	ΔR^2	ΔF
Model 1			
Child Sex [a]	.14		
Child Age	-.13		
		.03	2.01
Model 2			
Child Sex	.14		
Child Age	.09		
Maternal Education	.24*		
Family Income	.04		
		.05	2.69[t]
Model 3			
Child Sex	.12		
Child Age	.01		
Maternal Education	.18[t]		
Family Income	.06		
Child IQ	.33**		
		.08	10.60**
Model 4			
Child Sex	.11		
Child Age	-.01		
Maternal Education	.16		
Family Income	-.05		
Child IQ	.31**		
Narrative Pattern	.19*		
		.04	4.51*
	$R = .46$	$R^2 = .21$	$F = 4.38**$

[t] $p < .10$, * $p < .05$, ** $p < .01$

Table 9

Regression Equation Predicting Language-Based Achievement in Late Elementary (based on total report card grades) from Narrative Ability

Variables	French N = 106			English – 2nd Language N = 106		
	Beta	ΔR^2	ΔF	*Beta*	ΔR^2	ΔF
Model 1						
Child Sex [a]	.22*			.40**		
Child Age	-.07			.22*		
		.06	2.64[t]		.20	5.75**
Model 2						
Child Sex	.23*			.37**		
Child Age	-.05			.25*		
Maternal Education	.29**			.25*		
Family Income	-.14			.09		
		.06	2.85[t]		.09	2.71[t]
Model 3						
Child Sex	.20*			.29**		
Child Age	-.02			.38**		
Maternal Education	.16			.14		
Family Income	-.14			.09		
Child IQ	.41**			.38**		
		.15	16.48**		.09	6.70**
Model 4						
Child Sex	.16			.26*		
Child Age	-.05			.36**		
Maternal Education	.13			.13		
Family Income	-.11			.09		
Child IQ	.39**			.32**		
Narrative Pattern	.25*			.25*		
		.06	6.78*		.06	4.44*
	R = .58			*R* = .67		
	R^2 = .34			R^2 = .45		
	F = 6.48**			*F* = 5.59**		

[a] 1 = male, 2 = female
[t] $p < .10$,   * $p < .05$,   ** $p < .01$

Table 10

Regression Equation Predicting Math Achievement in Late Elementary (based on total report card grades) from Narrative Ability

Variables	Math grades (N = 106)		
	Beta	ΔR^2	ΔF
Model 1			
Child Sex [a]	.08		
Child Age	-.18 [t]		
		.04	2.04
Model 2			
Child Sex	.08		
Child Age	-.15		
Maternal Education	.23*		
Family Income	-.08		
		.04	2.32
Model 3			
Child Sex	.05		
Child Age	-.02		
Maternal Education	.16		
Family Income	-.09		
Child IQ	.38**		
		.12	15.07**
Model 4			
Child Sex	.05		
Child Age	-.03		
Maternal Education	.15		
Family Income	-.09		
Child IQ	.37**		
Narrative Pattern	.13		
		.02	1.98
	R = .47	R² = .22	F = 4.56**

[t] *p* < .10,   * *p* < .05,   ** *p* < .01

G1 Childhood ➡ G1 Parenthood ➡ G2 Preschool ➡ G2 Early Elementary ➡ G2 Late Elementary

Maternal Depression Symptoms

Maladaptive Behaviour Profiles
- aggression
- social withdrawal

Education

Income

IQ

Maternal Speech

Preschool Lexical Diversity

Narrative Skills
-macrostructure
-microstructure

Early Elementary Achievement
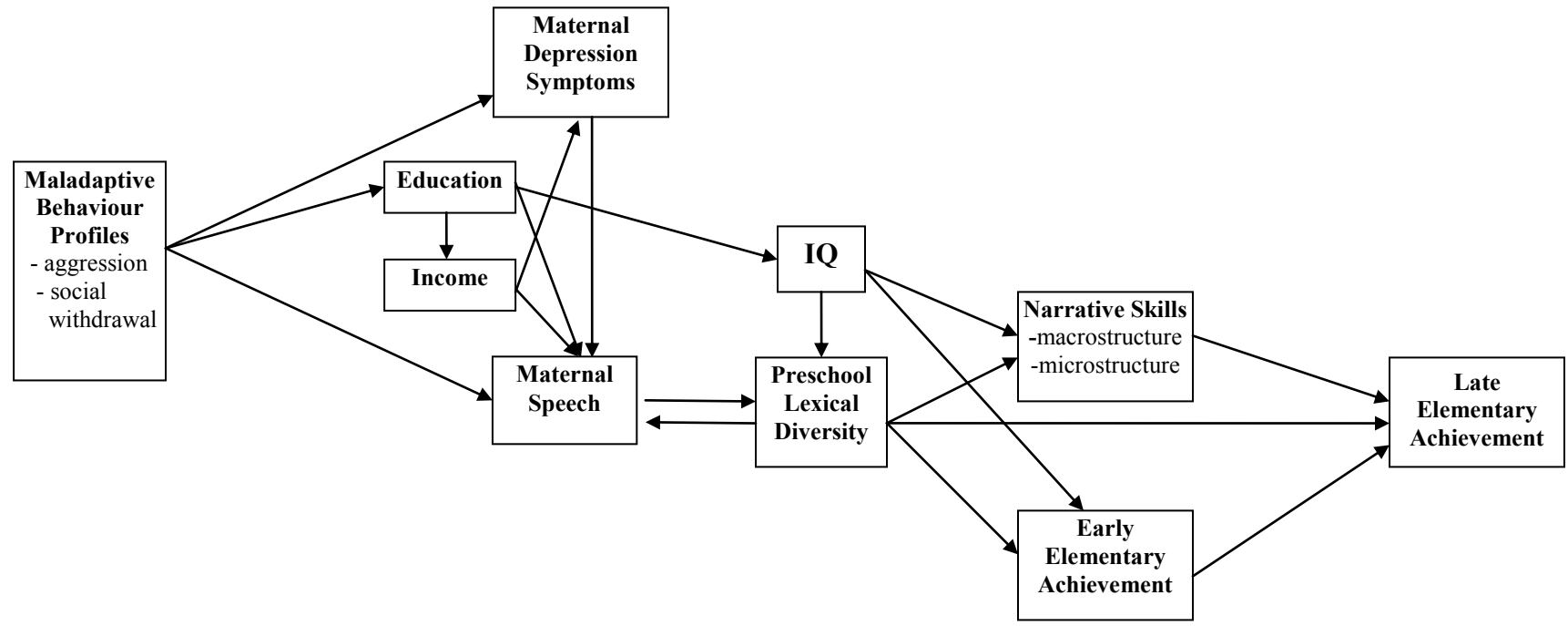
Late Elementary Achievement

Figure 1. Conceptual model of the pathways of linguistic success, based on findings of Campisi et al. (2009), and hypothesized findings of studies 1 and 2.
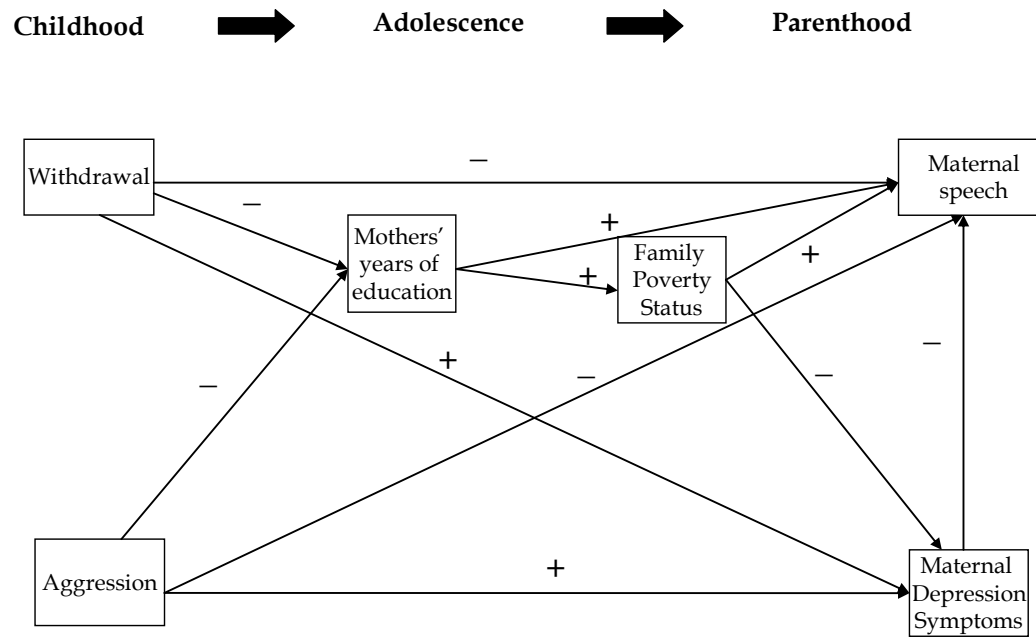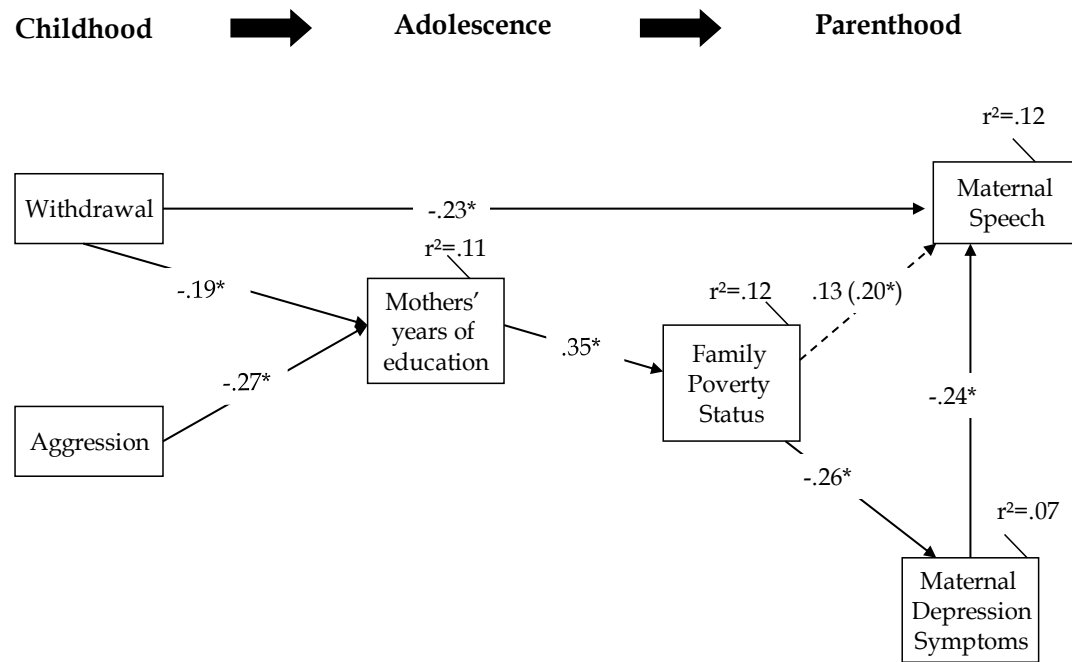
Figure 2. Theoretical model of hypothesized pathways predicting maternal speech

Childhood ➡ **Adolescence** ➡ **Parenthood**

r²=.12

Withdrawal ──── -.23* ────→ Maternal Speech

r²=.11

-.19*

-.27*

Mothers' years of education

.35*

r²=.12   .13 (.20*)

Family Poverty Status

-.24*

-.26*

r²=.07

Maternal Depression Symptoms

Path coefficients represent standardized estimates
Chi-Square= 5.14, p=.64 CFI=1.00 RMSEA=.00
*p<.05   N=101

Figure 3. Path model predicting maternal speech success

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Definitions and Examples of Narrative Patterns According to High-Point Analysis
(Adapted from McCabe & Peterson, 1984)

Disoriented: The narrative cannot be understood either because the child is either confused or disoriented about the events in the story or misuses language. In the following example, the child recounts the movie "Spiderman". There is no high-point and the description of the main character obviously suggests the child is confused about the story:

« Bien il y a Spiderman et pis Spiderman vrai. C'est hum, c'est un genre de bouffon vert. Il est Spiderman. Je l'aime bien. Il joue aussi à la télé »

Impoverished: Two scenarios are presented for narratives to fall under this category: (1) there are too few sentences to allow a recognizable and analysable pattern or (2) the narrator provides only two successive events, repeatedly going over them and often making extensive use of orientation and evaluation of these two events. In this example, the child recounts a movie, but only provides orientation and evaluation (of the child's own internal mental state).

« J'ai vu un film qui est triste au cinéma. J'ai vu le seigneur des anneaux.
Sauf que l'homme là, le méchant là, il lançait des flèches sur l'homme là. J'ai pleuré à cause de ça. »

Chronological : The narrative is not built around a high-point, but is merely a descriptive account of events organized according to the temporal sequence in which events unfold. In this example, the child provides thorough descriptions of the main characters in the movie and accurate descriptions of the events, but the high-point is noticeably absent.

"Mon émission préférée c'est le loup-garou. C'est un loup-garou qui tue les méchants. C'est un petit enfant qui s'est fait mordu par un loup-garou. Pis quand qu'il est fâché ou bien que qu'il se fait mal, il se reforme en loup-garou. Son nom c'est Tommy Doggins. Mais Martin Dingel, lui c'est celui qui sait beaucoup de choses. Pis des fois il est tannant. C'est une personne qui sait faire beaucoup d'espériences. Pis il sait beaucoup de choses plus que sa classe. Il a déjà inventé une potion pour qu'il soit très intelligent. Pis le loup-garou lui quand y se, y se fait mal, celui qui l'a fait mal, si c' est un méchant, y va lui faire mal. Il va le tuer. Ou bien y va l' faire mal pis après y va lui dire de pas revenir pis y s' en va. »

Leapfrogging : A narrative in which events the child "leaps" back and forth between events and where important events are omitted. While the high-point is still absent, the listener can often infer what event would have served as a high-point based on the collection of events recounted. In this illustration, events are recounted in incorrect sequence with the child going back and forth in time. The reader can make out that events surrounding the death of the father lead to the high-point, but the father's transformation into a snowman can only be inferred based on the child's recollection.

« Mon film préféré c'est petit papa noël. C'est parce que à la fin y s'en va faire, y travaillait dans musique. Heu, pis qu'est ce qu'y faisait son papa, y voulait... Il a loué une cabane pour aller là-bas. Là quand y'est arrivé, là en auto. Y'a quelqu'un qui y ont prêtés l'auto. Là les *whippers* y marchaient pu. Pis y'a foncé dans un poteau pis avec la neige là, y' était mort. Non, c'est le père. Pis là au début y'a mis heu non… quasiment

vers la fin là l'enfant y'a fait un bonhomme de neige. Pis là son papa, y'a joué. C'était drôle là au début, y'a lancé des boules le bonhomme de neige. Y faisait du ski, là y'est tout *effoueré*. Pis là y lançait des boules de neige au méchant. »

Ending-at-the-High-Point: The narrator provides an accurate account of events that lead to a high-point. The narrator dwells on the high-point but the narrative is then promptly terminated before a resolution is reached. In the following example, the child provides appropriate context that build-up to a high-point, but fails to reach a resolution,

« Mon émission préférée c'est Sabrina l'apprenti sorcière. C'est une fille que quand a eu seize ans elle a eu des pouvoirs de sorcière. Parce que son père c'était un sorcier pis sa mère c'était une mortelle.
Sa mère savait que son père c'était un sorcier. Parce que sont séparés, ses parents. Elle pouvait pas l'aider avec sa magie. Ça veut dire qu'elle l'a envoyé chez ses tantes. Pis y'arrive souvent chez eux. Ça veut dire elle peut jamais inviter des amis chez eux. Pis elle aime un gars. Il s'appelle Harvey. Pis une fois c'était la saint-valentin. Pis elle l'a embrassé et il est devenu une grenouille. Il a fallu qu'elle aille au conseil des sorciers. Qu'elle passe des tests pour l'amour véritable. Pis si on aime vraiment la personne y va revenir. Pis si on échoue on devient grenouille. »

Classic: A narrative that presents events in the correct sequence, and leads up to a high point. The action is then suspended at the high point allowing the narrator to dwell on it. The narrator then relates events that bring a resolution to the high point. In the following illustration the child provides a complete account of the story of "Snow White", complete with high point and resolution.

« Mon film préféré c'est Blanche-Neige et les sept nains. Y'a une méchante reine. Elle donne une pomme empoisonnée à Blanche-Neige. Et puis Blanche-Neige tombe endormie parce qu'elle est empoisonnée. Là les nains sont tristes. Pis là y'a un prince qui s'en vient. Pis il lui donne un bec. Pis Blanche-Neige se réveille. Et là elle s'en va sur son cheval. Pis là y s' en vont tout heureux. »

Appendix B

Post-Hoc Correlation Analysis between Language Predictors at Preschool-Age and

Early Elementary-Age

	1	2	3	4	5
1. Preschool-age child language (NDW)	--	.42**	.22*	.12	.26**
2. Mother's child-directed language at preschool-age (NDW)		--	.12	.12	.23*
3. Elementary-age NDW			--	.97**	.27**
4. Elementary-age TNW				--	.19*
5. Narrative pattern					--

[t] $p < .10$,   * $p < .05$,   ** $p < .01$

Appendix C

Post-Hoc Regression Analysis Predicting School-Age Narrative Macrostructure from

Preschool-Age Lexical Diversity

Variables	Narrative Macrostructure		
	(N=106)		
	Beta	ΔR^2	ΔF
Model 1			
Child Language	.26**		
		.07	7.37
Model 2			
Child Language	.23*		
Child Sex[a]	.00		
Child Age	.11		
Maternal Education	.04		
Family Income	-.05		
Child IQ	.07		
		.02	.36
	$R = .29$ $R^2 = .09$ $F = 1.49$		

Appendix D

Post-Hoc Regression Analysis Examining the Role of Child IQ as a Mediator between

Mother and Child Achievement

Variables	Child Overall Achievement (N=106)		
	Beta	ΔR^2	ΔF
Model 1 Maternal Education	.22*		
		.05	5.32**
Model 2 Maternal Education Child IQ	.11 .39**		
		.14	18.01**
	$R = .43$ $R^2 = .19$ $F = 12.10**$		