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The Language-Aggression Hypothesis in Preschoolers: Maternal Scaffolding and Self-Regulation

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THE LANGUAGE-AGGRESSION HYPOTHESIS IN PRESCHOOLERS: MATERNAL
SCAFFOLDING AND SELF-REGULATION

by
Robert Clark

A Dissertation
Submitted to the Faculty of Graduate Studies
through the Department of Psychology
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2011
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The Language-Aggression Hypothesis In Preschoolers: Maternal Scaffolding and Self-Regulation

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AUTHOR'S DECLARATION OF ORIGINALITY

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ABSTRACT

In light of recent findings suggesting that physical aggression peaks during the toddler years then declines steadily beginning in preschool (e.g., Alink et al., 2006; Tremblay et al., 2004), greater emphasis has been placed on identifying early factors that might predispose children to disruptive behaviour problems as they mature. The present study investigated the effects of early language development, executive functioning, and maternal scaffolding on physically aggressive behaviour among a sample of preschool-aged children (N = 126). In step one, regression analyses revealed various preschooler language abilities negatively predicted physical aggression after controlling for potential confounding variables (e.g., children's IQ, family structure, socioeconomic status, maternal education). The second set of analyses showed preschoolers' executive functions (i.e., inhibitory self-control, emergent metacognition) mediated the relation between their language abilities and physical aggression. Maternal scaffolding was introduced in the third step of analyses and was found to predict preschoolers' semantic language abilities. After separating the sample on the basis of scaffolding quality, differences were found in terms of the specific executive functions that mediated the language-aggression relation between groups. The results are interpreted from a developmental perspective, with reference to the work of Vygotsky (1962, 1978). The implications of these findings for early intervention of disruptive behaviour problems are also discussed and recommendations are made for future research in the area of self-regulation.

DEDICATION

For my wife Heather to whom I will always be grateful for reminding me that life is far bigger than any one pursuit.

ACKNOWLEDGEMENTS

There are a number of people without whom this project would not be possible. First and foremost, I would like to thank the many families who volunteered their time, as well as the community agencies and services that supported the study. Also worthy of acknowledgement are the many research assistants who helped with the study and without whom the study would not have run so efficiently. A special thanks goes to my research colleagues, Holly Ambrose, Sara O’Neil, and Adam Kayfitz who lived and breathed the project along with me, but more importantly, helped make it a very meaningful experience. My genuine appreciation also goes to my committee members (Dr. Julie Hakim-Larson, Dr. Dennis Jackson, Dr. Kevin Gorey, and Dr. Marjorie Beeghly) whose insights and suggestions were invaluable. Finally, I liked to express my sincerest gratitude to Dr. Rosanne Menna who first piqued my interest in child development as an undergraduate student, and has patiently “scaffolded” my research endeavours ever since. Her trusted guidance and expertise has helped make this process truly rewarding.

TABLE OF CONTENTS

AUTHOR'S DECLARATION OF ORIGINALITY	iii
ABSTRACT	iv
DEDICATION	v
ACKNOWLEDGEMENTS	vi
LIST OF TABLES	viii
LIST OF FIGURES	x
I. INTRODUCTION	1
General Context and Objectives of the Present Study	1
II. REVIEW OF THE LITERATURE	9
The Problem of Childhood Aggression	9
The Relation between Physical Aggression and Language Development	14
Physical Aggression and Language Delay: The Self-Regulation Pathway	29
Historical Views on the Development of Self-Regulation	32
Contemporary Views on the Development of Self-Regulation	38
Language, Self-Regulation, and Physical Aggression in Early Childhood	47
Parental Socialization of Children's Self-Regulation	63
Summary of the Problems and Objectives of the Present Study	86
III. METHODOLOGY	91
Participants	91
Recruitment and Procedure	95
Measures	99
IV. RESULTS	115
Planned Analyses	115
Data Screening and Preparation	116
Main Analyses: Examination of the Direct Effects Model	123
Main Analyses: Examination of the Mediation Model	128
Main Analyses: The Effects of Scaffolding on the Mediation Model	150
Summary	161
V. DISCUSSION	164
Step One: The Language-Aggression Hypothesis	164
Step Two: The Mediation Model	167
Step Three: The Self-Regulation Pathway as a Function of Maternal Scaffolding	175
Clinical Implications	180
Limitations of the Present Study	183
Future Directions	186
REFERENCES	189
APPENDIX A	221
APPENDIX B	227
APPENDIX C	237
VITA AUCTORIS	239

LIST OF TABLES

Table 1. Demographic Characteristics	93
Table 2. Inter-rater Agreement Statistics for Coding of Maternal Scaffolding	114
Table 3. Descriptive Statistics for Study Variables before Transformations	117
Table 4. Descriptive Statistics for Study Variables following Transformations	120
Table 5. Correlations between Study Variables and Demographic Variables	122
Table 6. Correlations between Study Variables before Transformations	124
Table 7. Correlations between Study Variables following Transformations	125
Table 8. Summary of the Standard Multiple Regression Analyses for the Prediction of Physical Aggression - Transformed from Language Domains	127
Table 9. Summary of the Standard Multiple Regression Analyses for the Prediction of Executive Functioning from Receptive Language – Transformed	131
Table 10. Summary of the Standard Multiple Regression Analyses for the Prediction of Executive Functioning from Expressive Language	133
Table 11. Summary of the Standard Multiple Regression Analyses for the Prediction of Executive Functioning from Semantic Language	134
Table 12. Summary of the Standard Multiple Regression Analyses for the Prediction of Executive Functioning from Semantic Language	136
Table 13. Summary of the Standard Multiple Regression Analyses for the Prediction of Physical Aggression – Transformed from Executive Functioning	139
Table 14. Bias Corrected and Accelerated Confidence Intervals for the Mediation Effect of Inhibitory Self-Control – Transformed on the Relation between Receptive Language – Transformed and Physical Aggression - Transformed	144

Table 15. Bias Corrected and Accelerated Confidence Intervals for the Mediation Effect of Inhibitory Self-Control on the Relation between Expressive Language and Physical Aggression – Transformed	147
Table 16. Summary of the Standard Multiple Regression Analyses for the Prediction of Preschoolers’ Language Abilities from Maternal Scaffolding	152
Table 17. Correlations between Study Variables for High Scaffolding Group	154
Table 18. Correlations between Study Variables for Low Scaffolding Group	158
Table 19. Summary of Standard Multiple Regression Analyses for Low Scaffolding Mother-Child Pairs	159

LIST OF FIGURES

- Figure 1. The Factor Structure for the Preschool Version of the Behavior Rating Inventory of Executive Function (BRIEF-P) 108
- Figure 2. Complete Mediation Effect of Inhibitory Self-Control – Transformed on the Relation between Receptive Language – Transformed and Physical Aggression – Transformed 143
- Figure 3. Partial Mediation Effect of Inhibitory Self-Control on the Relation between Expressive Language and Physical Aggression – Transformed 146
- Figure 4. Partial Mediation Effect of Emergent Metacognition on the Relation between Semantic Language and Physical Aggression – Transformed 149
- Figure 5. Partial Mediation Effect of Cognitive Flexibility on the Relation between Semantic Language and Physical Aggression - Transformed among Preschoolers of High Scaffolding Mothers 157
- Figure 6. Complete Mediation Effect of Emergent Metacognition - Transformed on the Relation between Semantic Language and Physical Aggression - Transformed among Preschoolers of Low Scaffolding Mothers 162

CHAPTER I

Introduction

General Context and Objectives of the Present Study

Despite the wealth of attention childhood aggression has received in the literature to date, it continues to represent one of the most serious problems affecting our society today (Lochman, Whidby, & Fitzgerald, 2000). Its impact is relatively ubiquitous as it places an enormous strain on our education, healthcare, and penal systems. Over the years, research has shown childhood aggression to be related to an array of negative outcomes in both adolescence and adulthood, including an increased likelihood for early school dropout, drug and alcohol use, delinquency, criminality and psychopathology (Broidy et al., 2003; Farrington & Loeber, 2000; Kokko, Tremblay, Lacourse, Nagin, & Vitaro, 2006; Moffitt, Caspi, Harrington, & Milne, 2002; Sourander et al., 2007). From a mental health standpoint, children with disruptive behaviour disorders have been reported to be both the most difficult and the most expensive clients to serve (Waddell, Lipman, & Offord, 1999). Recent estimates suggest that over a seven-year period, children with conduct disorder (CD) exude costs on taxpayers in excess of \$70000 (U.S.) more per child than children without CD in school services, healthcare, and juvenile justice expenditures (Foster & Jones, 2005). Collectively, these facts have impressed upon researchers the need to explore the developmental pathways that lead to such antisocial forms of behaviour.

Contrary to widespread beliefs that suggested aggression peaks during adolescence (e.g., Bandura, 1973; Eysenck & Gudjonsson, 1989), recent studies have found that physical aggression is most prominent during the toddler period, followed by a steady decline across the preschool years and middle childhood (Alink et al., 2006;

Tremblay et al., 2004). These findings have caused researchers in the area to reexamine their beliefs as to the origins of aggressive behaviour, as they seem to imply that physical aggression may be more of an innate quality than a set of behaviours learned over time. Particularly interesting, however, is that these studies consistently identify a small but significant number of children who continue to exhibit high and stable rates of physical aggression past early childhood, into adolescence, and beyond (Alink et al., 2006; Tremblay et al., 2004). Given such persuasive findings, it stands to reason that it is this small subset of exceptionally aggressive children that are exacting such exorbitant costs on our society. Unfortunately, we know little about what separates these highly aggressive youngsters from their more prosocial peers. Thus, in order to develop intervention programs that effectively address aggressive behaviour problems in children, research must elucidate why these children seemingly fail to acquire the skills necessary to regulate their aggression.

An equally important aspect of these studies is that they implicate the preschool years, a period characterized by many developmental milestones, as the point of divergence between more prosocial or antisocial behaviour. Chief among the developmental accomplishments during this stage is increased language proficiency. Following in the tradition of early Russian psycholinguists (e.g., Luria, 1961; Vygotsky, 1962), who saw language as the key to self-regulatory development, Montare and Boone (1973) proposed the *language-aggression hypothesis*, or the notion that physical aggression was a function of poor language skills. While their findings were somewhat inconclusive, studies since have shown repeatedly that language impairments and disruptive behaviour disorders co-occur at rates greater than would be expected by chance (e.g., Baker & Cantwell, 1987; Beitchman, Nair, Clegg, Ferguson, & Patel, 1986, Cohen,

Davine, Horodezsky, Lipsett, & Isaacson, 1993). These studies, nevertheless, fail to identify the factors that might account for this association.

More recently, researchers have begun to investigate the specific pathways through which language delays might lead to aggressive behaviour problems. In a recent review, Dionne (2005) described three separate pathways that have been proposed by researchers to account for the language-aggression link. First, some postulate that language results in highly aggressive behaviour by way of negative social interactions (Brinton, Fujiki, & Higbee, 1998; Brinton, Fujiki, & McKee, 1998; Jerome, Fujiki, Brinton, & James, 2002). According to these researchers, children with impaired language skills struggle to decode the nuances of social interaction. As a result, they are prone to aggression due to a greater likelihood of being teased, ostracized or outright rejected by peers. Others argue that language deficits interfere with adaptive social information processing, or social cognition (Cohen, Menna, et al., 1998). Children with deficits in social cognition tend to misattribute the intent behind others' behaviour, often misperceiving it as hostile or aggressive in nature. In turn, these children generate a disproportionate amount of aggressive responses, and thus, are more likely to select an antisocial response (Lemerise & Arsenio, 2000; Crick & Dodge, 1994). Recent research provides evidence for the validity of both models, albeit only among school-age children and adolescents (e.g., Brinton, Fujiki, & Higbee, 1998; Brinton, Fujiki, & McKee, 1998; Jerome et al., 2002; Zadeh, Im-Bolter, & Cohen, 2007). A third explanation, consistent with the views of the early Russian psycholinguists, and as of yet still unexplored, is that language deficits result in aggression due to problems in the development of self-regulation. Therefore, the aim of this study is to investigate the role played by self-regulation in the relation between language and aggression.

Self-regulation refers to the child's ability to modulate his/her behaviour in relation to the cognitive, affective and social demands of a particular situation (Posner & Rothbart, 2000). The Russian psycholinguists proposed that language was the key to self-regulatory development because it served to organize all primitive psychological functions (i.e., attention, perception, memory), enabling higher, coordinated processes that were uniquely human (i.e., planning and impulse control). According to these theorists, self-regulation emerges sometime during toddlerhood with the synchronization of thought and speech, and the internalization of self-guiding egocentric vocalization (Luria, 1961; Vygotsky, 1962). Caregivers facilitate this process by infusing their children's previously nondescript acts with meaning. Consistent with this view, modern researchers in the area of self-regulation point to a critical transition period between the second and fourth year during which regulatory functions shift from the caregiver to the child (e.g., Kochanska & Askan, 1995; Kopp, 1982; Posner & Rothbart, 2000). It follows that early language impairments might interfere with the transfer of regulatory responsibility by hindering the meaning-making process between parent and child.

The extant literature on parenting suggests that the methods used by parents to promote their children's self-regulatory development fall on two dimensions: control and responsiveness. Control refers to the amount of influence parents exert over their children's functioning during shared interactions. Most in the area agree that a moderate level of parental control is best for children's internalization of skills and directives (e.g., Baumrind, 1991; Cummings, Davies, & Campbell, 2000; Maccoby & Martin, 1983). Responsiveness consists of the actions taken by parents to establish an environment that is optimal for child rearing. Research has consistently shown that beginning with early attachment, parents who are warm, sensitive, and emotionally available have children

who are better able to self-regulate when compared to children of parents who are less responsive (e.g., Ainsworth, Blehar, Waters, & Wall, 1978; Grusec & Goodnow, 1994; Hoffman, 1994). In contrast, when parents are either too controlling or lenient, or alternatively are too harsh or indifferent, the meaning-making process is corrupted such that children are unable to focus on and internalize their parents' moral message. Not surprisingly, these two dimensions have been shown consistently to differentiate parents of aggressive children from parents of non-aggressive children across early and middle childhood (e.g., Campbell, Pierce, March, & Ewing, 1991; Dodge, Pettit, & Bates, 1994; Hay, Zahn-Waxler, Cummings, & Iannotti, 1992; Lamborn, Mounts, Steinberg, & Dornbusch, 1991).

From a parenting perspective, providing optimal levels of control and responsiveness becomes considerably more complicated when children possess speech and language impairments (Hammer, Tomblin, Zhang, & Weiss, 2001). Not only may children have difficulty comprehending their parent's instructions but they may have trouble communicating need states to their caregivers as well (Conti-Ramsden & Friel-Patti, 1984). As a result, children with speech and language impairments (SLIs) may regard parent-child interactions as aversive experiences that result in anger, frustration and hostility. To make matters worse, parents may be unaware of their child's SLI or lack a proper appreciation for the challenges it presents. Consequently, such parents may maintain unreasonable expectations for their children and interpret their inability to follow through as intentional misbehaviour meant to purposely anger or frustrate (Bugental & Happaney, 2002). The end result is that interactions between parents and children with SLIs may be characterized by poor synchrony, high negative affect, and minimal internalization of parental messages.

One way parents promote their children's self-regulatory development is by scaffolding their early problem-solving efforts (Vygotsky, 1978). Scaffolding refers to the adult's control over elements of a task initially outside the child's abilities in order for the child to concentrate their efforts on elements they are currently capable of managing. As scaffolding progresses, the adult remains sensitive to the child's successes and failures, instituting further instruction according to their performance (Wood, Bruner, & Ross, 1976). In many ways, scaffolding encapsulates the qualities identified by researchers in the parenting literature as optimal for self-regulatory development including attenuated control and appropriate responsiveness (Baumrind, 1967; Grusec & Goodnow, 1994; Hoffman, 1983; Maccoby & Martin, 1983). Furthermore, given its emphasis on social interaction and developmentally sensitive instruction, scaffolding is an especially well suited construct for capturing the meaning-making process that underlies self-regulatory development within the parent-child dyad. Despite its obvious utility for the investigation of parent-child interactions, to date parental scaffolding has yet to be examined in relation to the shared problem-solving efforts of aggressive parent-child dyads. In the present study, the relations between language, self-regulation, and aggression will be explored with reference to how parents scaffold early joint regulatory activities.

The primary objectives of the present study are threefold. First, this study will attempt to confirm the existence of the language-aggression link among preschool-age children. Thus far, findings pertaining to the relation between language and aggression have been somewhat inconsistent (e.g., Carson, Klee, Perry, Muskina, & Donaghy, 1998; Dionne, Tremblay, Boivin, Laplante, & Perusse, 2003; Plomin, Price, Eley, Dale, & Stevenson, 2002; Silva, Williams, & McGee, 1987) and have consisted of primarily school-aged and adolescent samples (e.g., Cole, 2001; Mack & Warr-Lepper, 1992; Piel,

1990; Zadeh, Im-Bolter, & Cohen, 2007). Furthermore, these studies, for the most part, have assessed aggression using more global measures of disruptive behaviour that subsume aggression within the broad category of externalizing behaviour problems (e.g., Baker & Cantwell, 1987; Beitchman et al., 1986; Cohen et al., 1993). As a result, this study will seek to demonstrate that language delays are related more to physical aggression than general externalizing. Furthermore, an attempt will be made to explicate the specific language delays underlying the relation between language and aggression. Up to now, literature has been inconclusive with respect to the comparative roles played by particular language functions in the development of aggressive behavior problems in children (e.g., Plomin et al., 2002; Ortiz, Stowe, & Arnold, 2001). Second, because the extant literature is largely bereft of studies that examine the models proposed to account for the language-aggression link, this study will investigate the *self-regulation pathway*, or in other words, the possible mediating effect of self-regulation on the relation between language and aggression. Third, given the importance of meaning making for the development of self-regulation, this study will investigate how maternal scaffolding influences the triangular relations between preschooler language skills, self-regulation, and aggression.

The present study has potential implications both for research in the area of childhood aggression and intervention efforts designed to address externalizing behaviour problems. In keeping with the general aims of research, this study may provide a deeper understanding of the processes that underlie the development of aggression in young children. The aforementioned trajectory modeling studies (e.g., Alink et al., 2006; Tremblay et al., 2004) have turned researchers' attention to factors that may be interfering with children's acquisition of those skills that would otherwise offset aggressive

behaviour. While language skills have long been presented as a contributing factor (e.g., Chess, 1944; Orton, 1937; Pavlov, 1927), the literature still lacks sufficient evidence to explain how language delays may cause or contribute to disruptive behaviour problems. Fortunately, recent efforts (e.g., Zadeh et al., 2007) are beginning to explicate the nature of this association, and it is to this end that the present study is designed. From a clinical perspective, intervention approaches for childhood aggression have been slow to incorporate speech and language components (Gallagher, 1999), perhaps due to the relative inconsistencies in the literature. Thus, in attempting to confirm the language-aggression association in preschoolers, this study may draw attention to the early factors that might be causing or contributing to prolonged disruptive and antisocial behaviour problems. Finally, by examining the effects of parenting variables on the language-aggression link, this study recognizes that treatment efforts need to become integrative in nature (e.g., Landy & Menna, 2006; Webster-Stratton, 2003).

In the chapter that follows, the foremost theories and research findings related to childhood aggression, self-regulation, and parent-child interactions are reviewed. Research pertaining to childhood aggression is presented first, followed by a summary of the various studies that have examined the relation between language and aggression. Thereafter, a few of the more well-known theories regarding self-regulation are presented, including Vygotsky's (1962, 1978) socio-cultural theory, Kopp's (1982) developmental theory, and Barkley's (1997/2005) neuropsychological model of self-regulation. Findings that demonstrate a relation between deficits in self-regulation and aggression are then discussed. The literature review concludes with a synopsis of research in the area of parent-child interaction, and how these relationships influence childhood aggression, language development, and self-regulation.

CHAPTER II

Review of the Literature

The Problem of Childhood Aggression

Prior to the turn of the century, longitudinal studies examining the stability of aggression suggested that it was highly stable across childhood and remained stable well into adolescence and adulthood (e.g., Huesmann, Eron, Lefkowitz, & Walder, 1984; Moskowitz, Schwartzman, & Ledingham, 1985; Olweus, 1979; Verhulst, Koot, & Berden 1990; Verhulst & Van der Ende, 1992). In his widely cited review of 16 studies, Olweus (1979) concluded that aggression approached a degree of stability that was commensurate with intelligence. While notable, these studies were nevertheless limited by methodological design issues that rendered the strength of their conclusions somewhat misleading. First, the construct of aggression lacked a consistent operational definition and was typically assessed by parent-report measures that did not target physical aggression explicitly. Thus, as Tremblay (2000) notes, overt instances of aggression in childhood (e.g., disobedience in class) may not represent the same construct as instances during adolescence or adulthood (e.g., arrests for physical violence). Second, for the most part, the longitudinal designs employed in these studies assessed aggression at two points in time (Tremblay, 2000). This form of measurement fails to provide interpolative data on the frequency of aggression in years not measured. More recently, researchers have capitalized on the group-based approach to trajectory modeling developed by Nagin and Land (1993) that allows for the identification of distinct developmental pathways.

The first of these studies to utilize this technique for the purposes of childhood aggression was conducted by Nagin and Tremblay (1999). Aside from the statistical technique employed, this study was unique in that it isolated aggression from other forms

of externalizing problems such as oppositional behaviour and hyperactivity. A large sample of boys between the ages of 6 and 15 years were repeatedly assessed on measures of the aforementioned disruptive behaviour problems and the resulting developmental trajectories were used to predict delinquent behaviour in late adolescence. Four distinct trajectories were identified for each disruptive behaviour problem ranging from boys who rarely exhibited any form of externalizing problem to those who displayed a chronic pattern of disruptive behaviour over time. While most boys were found to exhibit moderate to high levels of disruptive behaviour problems early on, their displays of such behaviour had largely desisted by age 15. More concerning, however, was the small group of boys (< 5%) who engaged in high levels of disruptive behaviour at age 6 and continued to do so throughout the observation period. This latter group, irrespective of the specific form of disruptive behaviour problem, significantly predicted later delinquency. Moreover, when the oppositional behaviour and hyperactivity trajectories were held constant, the chronic physical aggression trajectory significantly predicted physical violence and the most serious delinquent acts at age 17. Nagin and Tremblay (1999) concluded that the boys who continued on the path of high physical aggression were those who failed to learn how to regulate their aggression in early childhood.

In spite of these impressive findings, Nagin and Tremblay (1999) acknowledged that their study was limited by its use of only White francophone boys. Consequently, a similar yet more complex, six-site, three-country, study was conducted by Broidy et al. (2003) using samples of boys and girls from Canada, New Zealand, and the United States. The results of this study largely confirmed the developmental trajectories identified by Nagin and Tremblay (1999). While most children were not found to display overt physically aggression, there was nevertheless a distinct group of boys and girls (< 10%)

who exhibited significantly higher levels of physical aggression than their peers. Furthermore, these children continued to be more aggressive than their peers as they progressed through childhood and adolescence. Early physical aggression was noted to be especially problematic for boys, as it was found to be the most consistent predictor of adolescent male delinquency. This study yielded one other notable finding, namely that children displayed more physical aggression in kindergarten than in later childhood or adolescence. This result was particularly noteworthy because it largely contradicted the prevailing social learning and biological theories of aggression (e.g., Bandura, 1973; Eysenck & Gudjonsson, 1989), which proposed that adolescents were more likely to exhibit the highest rates of aggression given their greater exposure to aggressive models and high levels of testosterone. It was concluded that further research was needed in order to clarify the preschool predictors of such high and chronic levels of later physical aggression.

The pervasive influence of social learning models of aggression over the last few decades is reflected in the paucity of research focusing on aggression during the preschool years. Recently, this has changed due in large part to the research of Tremblay and his associates. Challenging the notion that aggression is learned, Tremblay et al. (1999) utilized a retrospective approach whereby they asked mothers of 17-month-old children to recall the time at which their child began to exhibit aggressive acts such as hitting, kicking, or biting. The results suggested that aggression was clearly present by 12 months of age and that by 17 months, 80% of these children had shown at least one of these aggressive behaviours. Subsequently, Tremblay et al. (2004) applied trajectory modeling techniques to track developmental changes in aggression between 17 to 42 months. They found dramatic increases in physical aggression during the second year,

which reached a peak between 24 and 42 months, followed by a steady decline at age four. Recent findings by Alink et al. (2006) with a sample of Dutch children between 10 and 50 months of age confirm this pattern of aggression in early childhood. Relying on both maternal and paternal reports, these researchers found that aggression was evident at 12 months of age and steadily increased at both 24 and 36 months, followed by a declining trajectory thereafter. Together, these studies extended findings from prior two-interval longitudinal designs, suggesting that aggression was already highly stable during the preschool years (e.g., Cummings, Iannotti, & Zahn-Waxler, 1989; Keenan & Shaw, 1994). Furthermore, they helped to illustrate that aggression is not only evident, but occurs frequently, during the toddler and preschool years.

The weight of these findings prompted researchers to expand trajectory models of aggression in order to further explicate the developmental pathways of aggression beginning in early childhood. The NICHD Early Child Care Research Network (2004) utilized maternal ratings of physical aggression to identify five trajectories spanning the ages of 24 months to 9 years. While over 80% of the children studied displayed initially low or moderate levels of aggression (labeled trajectories 1, 2, and 3), a minority exhibited moderate to high levels of aggression at 24 months that remained relatively stable until age 9 (labeled trajectories 4 and 5). At age nine, those children with moderate to high levels of persistent aggression were found to be having more academic and social difficulties, and were reported to be engaging in more disruptive behaviour at school, than their low-aggression counterparts. These two trajectories were distinguished by the severity of their adaptive functioning with the high/stable-aggressive children displaying more difficulties than the moderate/stable-aggressive children.

In a follow-up study, Campbell and colleagues (2006) reported on the academic and social functioning of these children at age 12. They found a pattern similar to the one described above, as those children in the high/stable-aggressive and moderate/stable-aggressive groups exhibited poorer academic functioning and social skills, as well as more externalizing problems and inattention than those children with low levels of aggression. The high/stable-aggression group continued to exhibit the most severe difficulties, with behaviour problems consistent with Oppositional Defiant Disorder. In effect, these findings rendered inaccurate previously longstanding beliefs as to the developmental course of aggression, and they implied that the preschool period, rather than middle childhood or adolescence, represents the crucial stage in the development of chronic aggression.

The picture that emerges from these studies is one that holds enormous implications for treatment interventions. In the past, treatment approaches were targeted primarily toward school-age children and adolescents, based on the assumption that rates of aggression increased with age and peaked during the teenage years. The studies reviewed above, however, not only suggest that children exhibit aggression far earlier than previously believed but that for most children, it steadily decreases beginning in preschool. Furthermore, not one of these studies shows aggression to increase during middle childhood or adolescence. Therefore, given this alternative view for the developmental course of aggression, Tremblay and Nagin (2005) assert that children do not learn to aggress, rather they learn how *not* to aggress. It follows that those children who continue to show high rates of aggression beyond preschool have failed to acquire the requisite skills needed to regulate their aggression.

The Relation between Physical Aggression and Language Development

The period identified by Tremblay and colleagues (2004) as the most physically aggressive in the lifespan, corresponds with the phase during which language emerges. As such, physical aggression and language tend to assume opposing developmental trajectories across childhood, with the former following a sharp negative slope, and the latter a similarly sharp positive one. Given the importance of language during early development, the relation between these trends seems more than coincidental. In fact, the notion that early language impairments may be associated with physical aggression, or behaviour problems more generally, did not go unrecognized during the first half of the twentieth century (e.g., Chess, 1944; Orton, 1937; Pavlov, 1927). Nevertheless, few took up the task of actually exploring this association empirically, perhaps because no theory accounted for their connection adequately.

This began to change when researchers in the West were first introduced to the writings of developmental theorists from Russia. Both Luria (1961) and Vygotsky (1962) argued that language, or more specifically, inner dialogue, was crucial for self-regulatory functioning. Their ideas slowly generated interest in the mediational qualities of language for both self-regulation and cognitive processing (Jensen, 1966, 1971; White, 1965, 1970), and served to provide the theoretical explanation for the link between language and aggression. The ensuing interest led to studies that found both externalizing and internalizing behaviours were associated with language immaturity (Caceres, 1971; Chess & Rosenberg, 1974; Wylie, Franchak, & McWilliams, 1965). Nevertheless, it was not until Montare and Boone (1973) proposed the "language-aggression hypothesis" that the two were linked explicitly. According to this theory, language and aggression share an inverse linear relation. In other words, children with immature language skills are

expected to exhibit high levels of aggression, whereas children with mature language skills are expected to show low levels of aggression. This, perhaps overly parsimonious model, represented the first attempt to implicate language as a genuine etiological factor in the formation of aggressive behaviour patterns. The authors' subsequent investigation provided some support for their hypothesis, albeit conditional support. Specifically, Boone and Montare (1976) found the language-aggression hypothesis held but only among minority children. As a result, the language-aggression hypothesis failed to have much of an impact among those interested in children's aggression. Its relevance was recognized only later, when a number of epidemiological studies revealed that language disorders and emotional/behavioural disorders co-occur at staggering rates in both clinical and community samples (e.g., Baker & Cantwell, 1987; Beitchman et al., 1986; Camarata, Hughes, & Ruhl, 1988; Cohen et al., 1993; Kotsopoulos & Boodoosingh, 1987; Love & Thompson, 1988; Stevenson & Richman, 1978).

Much of the early inconsistency regarding the correlation between language and aggression may be attributed to confusion about what constitutes speech and/or language impairments. Currently, language deficits that exact a pervasive impact on communication are referred to as specific language impairments (SLI), and indicate that the child's language skills are significantly below what would be expected given his/her overall IQ (Dionne, 2005). SLIs take the form of speech disorders, language disorders, or combined disorders (American Speech-Language-Hearing Association, 2007). Speech disorders refer to problems with the production of sounds and are further divided into problems with fluency (e.g., stuttering), articulation (e.g., how words are enunciated), and voice disorders (e.g., inappropriate pitch). On the other hand, language disorders refer to difficulties in understanding and/or using systems of language (e.g., oral, written, sign,

etc.). Like speech disorders they are separated threefold into disorders of form (e.g., syntax or how words are combined to form sentences), content (e.g., semantics or the meaning of words and sentences), and function (e.g., pragmatics or the use of language according to social norms). Early studies exploring the link between language and aggression often failed to specify the exact nature of the SLI under investigation. However, according to both Luria (1961) and Vygotsky (1962), language more so than speech, is the factor most critical for self-regulation. Language deficits, whether expressive or receptive, served to mitigate the coordinating effect language had on the psychological functions required for self-regulation (Luria, 1961; Vygotsky, 1962). In line with their theorizing, contemporary research shows language-based SLIs to be strongly associated with emotional/behavioural disorders (Beitchman, Cohen, Konstantareas, & Tannock, 1996; Beitchman et al., 1999; Cohen et al., 1993), while speech disorders show either no relation with such problems or are associated with comparatively better outcomes (Beitchman et al., 1999, Cantwell & Baker, 1987; Love & Thompson, 1988).

Given these findings, one would suspect that the early identification and remediation of language-impairments would be crucial for children's later functioning. Complicating this process, however, is the fact that language disorders are especially difficult to recognize (Beeghly, 2006; Dale, Price, Bishop, & Plomin, 2003). Consequently, many children with language disorders are referred for intervention due to problems with disruptive behaviour rather than problems with speech and/or language. Cohen and colleagues (Cohen et al., 1993; Cohen, Barwick, Horodezky, & Isaacson, 1996; Cohen, Barwick, Horodezky, Vallance, & Im, 1998; Cohen, Davine, & Meloche-Kelly, 1989; Cohen & Lipsett, 1991; Cohen, Menna, et al., 1998) have made such

unsuspected language impairments the focus of their research program. Their most comprehensive study focused on 399 children, aged 4 to 12, who had been referred to children's mental health centers for psychiatric services. After screening out children with potentially confounding impairments (e.g., hearing impairments, neurocognitive impairments, low non-verbal IQ), three groups of children were identified based on a battery of standardized language measures: those with previously identified language impairments (PILI), those with language impairments that were previously unsuspected (ULI), and those with psychiatric disorders without language impairments (PD). Consistent with the high rates of co-occurrence noted above, Cohen and colleagues (1993) found that nearly two-thirds of the total sample exhibited clinically significant language impairments. More astonishing however, was the fact that of those children with language impairments, over half, possessed ULIs. In addition, the authors compared the two language impaired groups in terms of their behavioural and language characteristics. Their results revealed that although the two groups were similar in receptive language skills, the PILI group was characterized by more severe expressive language problems and more frequent internalizing behaviour problems, whereas the ULI group displayed less severe expressive language difficulties and greater externalizing behaviour problems. This pattern of results is likely to hold particular importance for the form of treatment such children are likely to receive.

Cohen and colleagues (1993, 1996) have speculated that these differences determine largely the reason why these children are referred for psychiatric services. That is, the child's most obvious and pressing concerns become the primary, and often exclusive, focus of intervention. The problem with this trend is twofold. First, if children with ULIs are primarily being referred for treatment of their behaviour problems, this

suggests that a remarkable number of children will fail to receive services for the problem that either caused, or is contributing, to their current difficulties. Second, because many treatment approaches for children's behaviour problems are heavily language-based, the extent to which children with ULIs will benefit from such interventions is likely to be undermined considerably by their language difficulties. In fact, unsuspected language deficits may explain why some children continue to display high rates of disruptive behaviour problems following treatment, while others show marked improvements. The work of Cohen and colleagues (1993, 1996), has prompted some (e.g., Gallagher, 1999) to argue that what is needed are more integrative treatment approaches for childhood aggression that focus not only on reducing disruptive behaviour patterns but improving children's language skills as well. While some steps have been taken in this regard, more information is still required with respect to how language and aggression influence each other across early development.

The language-aggression link across development

The toddler years represent the first period during which the relation between language and aggression can be examined meaningfully. In fact, it is during toddlerhood that the developmental trajectories that characterize language and aggression intersect. Unfortunately, research examining the language-aggression link among children this age is mixed with some studies showing modest but significant inverse relations, and others showing virtually no association whatsoever. To date, the youngest age at which researchers have examined the link between language and aggression is just prior to the child's second birthday. Dionne and colleagues (2003) found a modest, albeit significant, inverse relation between expressive vocabulary and physical aggression at 19 months. When these researchers compared children above the 15th percentile on expressive

vocabulary to those below, they found that those children with weaker language scores exhibited significantly higher rates of physical aggression. Similar results have been found with 3-year-olds. For instance, Stevenson and Richman (1978) found over half of their sample of 828 language-delayed (i.e., syntax) 3-year-olds in the U.K., displayed overt behaviour problems including aggression. Likewise, Silva et al. (1987) reported that language-delayed 3-year-olds in New Zealand displayed more behaviour problems than controls according to both parent- and teacher-reports. This finding, however, held only for children with general language delays and comprehension problems but not for children with deficits in expressive language. In contrast, other studies have reported little to no relation between language delays and more general conduct problems among 24-month-olds (Carson et al., 1998; Plomin et al., 2002). Null findings such as these have rendered it difficult to form strong conclusions regarding the language-aggression link in toddlerhood.

The work of Tremblay and colleagues (2004) provides a rationale for why these results are so inconsistent. Recall that these researchers demonstrated that rates of aggressive behaviour reach a peak during toddlerhood followed by a steady decline across preschool, middle childhood, and adolescence. Given the generally high prevalence of aggression during this period, any attempt to establish differences between groups may be particularly difficult. In other words, aggression might simply be a behaviour that is common to many children at this age. The effect of early language delays may become evident only later, when researchers (Alink et al., 2006; Tremblay et al., 2004) suggest that aggressive behaviour should be declining.

In keeping with this explanation, research with preschool age children, shows that such early language delays begin to translate into more noticeable behaviour problems,

especially among boys. For instance, Ortiz and colleagues (2001) reported that weaker expressive and receptive vocabulary skills were significantly related to disruptive behaviour as determined by video observation and teacher-report. Similarly, Estrem (2005) found that both preschoolers' relational and physical aggression, as rated by their teachers, increased as their language scores decreased, with poor receptive language skills emerging as an especially strong predictor of physical aggression. Perhaps because the trajectories that characterize language development and aggression begin to diverge rapidly following toddlerhood, the preschool years offer the first opportunity to document significant correlations between these variables. Thus, despite null findings, Plomin et al. (2002) nevertheless found the size of the (negative) correlation between vocabulary and conduct problems increased for both boys and girls from 24 months to 36 months, and again from 36 months to 48 months.

This trend continues across middle childhood and adolescence among both clinical and community samples. Indeed, most of what is known about the association between language development and aggressive behaviour is based on studies with clinical samples of children between the ages of 7 and 17 years. Given the wider range of measurement devices and assessment techniques for use with older children, these studies have been better able to identify the specific nature of the language deficits underlying the association between poor language skills and aggression. Together, they show that language difficulties and behaviour problems are linked at the form, content, and function levels. For instance, Camarata and associates (1988) found that among their sample of 38 mildly to moderately behaviourally disordered children, almost all (i.e., 37) scored a minimum of one standard deviation below the normative mean on at least one measure of their language skills, with many scoring two or more standard deviations below the

normative mean. Camarata et al. (1988) noted that these children exhibited problems with expressive syntax but their grasp of vocabulary was relatively sound. Likewise, Cohen and colleagues (1993) identified syntactical problems, as well as difficulties with semantics and phonology, among the difficulties exhibited by children with PILIs. Children with ULIs showed greater problems with receptive syntax, auditory memory, and overall fluency. As discussed above, Cohen et al. (1993) also found children with ULIs to exhibit more externalizing-type behaviour problems than children in the PILI group. Taken together, these studies suggest a different relation between language and aggression than the one seen in younger children. Specifically, while Dionne et al. (2003) identified vocabulary deficits as distinguishing between aggressive and non-aggressive toddlers, the findings of Camarata et al. (1988) and Cohen et al. (1993) imply that aggressive school-age children suffer from specific difficulties with the use and comprehension of complex language structures, more so than with lexical understanding, per se (Dionne, 2005).

In addition to problems with syntax and semantics, deficits in pragmatic language skills have also been shown to separate clinical samples of aggressive and non-aggressive school-age children and adolescents. Mack and Warr-Leeper (1992) employed an array of language measures to assess the language abilities of 20 boys, described as having chronic behaviour disorders. They found that 80% of their sample scored below average on at least 4 of the 20 language measures utilized. The most common weaknesses included complex linguistic structures, use of abstract language, and use of concepts. Cole (2001) compared aggressive and non-aggressive boys, aged 8.5 to 13 years, on both a standardized language measure and a measure of their narrative language skills. When administered the standardized language measure, no differences were found with respect

to either expressive or receptive language skills. Where Cole (2001) found the groups differed was on a measure of narrative language that assessed the mean length of the boys' utterances. In effect, the oral narratives provided by aggressive boys in response to a wordless picture book were characterized by more syntactical errors and fewer pieces of information than those of controls. Finally, Miniutti (1991), in her study with 6- to 9-year-olds, reported that the most salient deficit exhibited by the language-deficient children was related to structuring sentences coherently enough to convey meaning. Together, these findings suggest that the language difficulties of clinic-referred aggressive children tend to become more pervasive during middle childhood and adolescence.

Similar results have been found with community samples of school-aged children and adolescents. Piel (1990) employed a rather unique approach to explore the relation between language maturity and aggression with a sample of 7- to 9-year-olds. The participants were characterized as aggressive or non-aggressive based on their responses to an apperceptive test. Language maturity was determined by how children responded to a word association task. For instance, if children's responses were semantically consistent with the target word, it was considered paradigmatic, and thus, mature. On the other hand, if their response was based on personal reference, it was considered egocentric or syntagmatic, and classified as immature. Using this design, Piel (1990) found that children's language immaturity was the best predictor of aggressive behaviour over and above both sex and socioeconomic status.

Tomblin, Zhang, Buckwalter, and Catts (2000) found children's reading skills were also a factor in the relation between language and externalizing behaviour. Among a large sample of 8-year-olds, these researchers found that scores on a composite

language measure were negatively related to parent- and teacher-rated externalizing behaviour problems. Children were then divided into two groups based on whether or not they exhibited a reading disorder. As expected, children's language scores were inversely related to their reading problems, while their externalizing behaviour problem scores were positively related to reading difficulties. More interesting, however, was the finding that reading problems mediated the relation between language impairment and behaviour problems but language impairment failed to have a reciprocal effect on the relation between reading disorders and behaviour problems. Given the inner dialogue that characterizes reading efficiency, these findings imply indirectly the importance of verbal mediation for the control of disruptive behaviour. Others (e.g., Camp, van Doorninck, Zimet, & Dahlem, 1977) have proposed a similar interpretation in attempting to explain differences between aggressive and non-aggressive children on measures of their non-verbal abilities. In summarizing the findings, one might suggest that aggressive children, when compared to non-aggressive children, have more trouble encoding their thoughts into language.

Longitudinal studies examining the impact of early language impairment on later functioning have shown that poor outcomes are often likely. Stattin and Klackenberglarsson (1993) followed 122 Swedish males from infancy to age 17 years, collecting measures of their language development beginning as early as 3 months. They found that language scores at 6-, 18-, and 24-months were significantly negatively correlated with criminality at age 17. Similarly, language scores based on psychological assessment at ages 3 and 5 years were also negatively associated with criminality in late adolescence, as was mother-report problems with interpretability at 4 and 5 years. Many of these correlations remained once socioeconomic status and IQ were controlled. Beitchman and

colleagues (1999) found similar results with a Canadian sample of language-impaired children followed from age 5 to 19 years. They reported that at age 19, antisocial personality disorder was the most common diagnosis for boys in the language-impaired group, while girls tended to show more internalizing symptoms. Thus, it would appear that early language impairments serve as a considerable risk factor for later behaviour problems, particularly among males.

Theoretical pathways

As striking as these results are, they only speculate as to the pathway between language and aggression. In fact, only a few studies have actually sought to identify the mechanism underlying this relation. Models proposed to account for the association between language and aggression generally take two forms: those that purport a common etiological pathway, and those that contend that one problem causes the other. Given the high rates of co-occurrence between language deficits and psychiatric disorders, one would suspect that a common underlying factor was at the root of both problems. On the contrary, very little evidence exists to support either a common genetic or a common environmental factor. In fact, the evidence that does exist is based on implication from studies investigating related areas. For instance, it is only through findings that show a common genetic factor underlies both reading impairments and hyperactivity (Stevenson, Pennington, Gilger, DeFries, & Gillis, 1993), that a biological factor has been proposed for the link between language and aggression. However, when the shared genetic liability pathway has been evaluated more directly, little evidence has been found to support it (Dionne et al., 2003). Similarly, in terms of shared environmental factors, proponents point to the association between parenting styles and aggression (Baumrind, 1993; Patterson, Reid, & Dishion, 1992), and the relation between parenting styles and language

development (Bohannon & Stanowicz, 1988; Storch & Whitehurst, 2001), in suggesting that poor parenting may account for the child's difficulties in both areas. Unfortunately, no studies have actually undertaken the task of examining this pathway empirically. Should research emerge that supports the triangular relationship between language, parenting, and aggression, it would likely have an impact on future and/or existing treatment approaches for childhood behaviour problems. However, until such findings are reported, this three-way association remains grounded in theoretical conjecture.

Unlike the shared etiological pathway, causal pathways have received greater attention in the literature. The most commonly held view is that language delays precede, and thus, in some way cause aggressive behaviour patterns. In the past, researchers used findings from intervention studies to infer that the documented change was a function of one or more components of the treatment. Shortly after the language-aggression hypothesis began to circulate, Slaby and Crowley (1977) conducted an intervention study in which they attempted to improve the social language skills of children with externalizing behaviour problems. After identifying children with disruptive behaviour problems, two groups were formed: an intervention group and a control group. Based on teacher-ratings, children in the intervention group were found to have significantly decreased their disruptive behaviour within the classroom, while no change was noted in the control group. Methodological limitations notwithstanding, these findings imply that the language component was responsible for the improvements in the children's behaviour. Dionne and colleagues (2003) also evaluated the causal pathway from language impairment to aggressive behaviour but with structural equation modeling. As reported above, their results refuted a shared etiological pathway. However, they found support for a phenotype-to-phenotype model, in which covariance could be explained

entirely by a causal path from expressive vocabulary to physical aggression. Still, these studies fall short of identifying what factors language delays influence that in turn, might lead to aggressive behaviour.

Dionne (2003) has outlined three possible explanations to account for just how language impairments may cause disruptive behaviour problems. The first specifies that language delays lead to aggression through negative social interactions. According to this micro-social pathway, children with SLIs are compromised in their ability to enter, participate, and sustain interactions with peers, which in turn, increases the risk for confrontation. Research by Brinton, Fujiki, and colleagues (Brinton, Fujiki, & Higbee, 1998; Brinton, Fujiki, & McKee, 1998; Jerome, Fujiki, Brinton, & James, 2002) has demonstrated that during interactions with controls, children with SLIs show both poor cooperation skills and immature negotiation skills. Over time, these limitations may lead to rejection, ridicule, or outright hostility from peers, and foster negative expectations about social interactions.

The second pathway noted by Dionne (2003) is the self-regulation pathway. Consistent with the views of the Russian psycholinguists, language skills facilitate the child's internalization of caregiver messages, the growth of emotional understanding, and the capacity to engage in planned behaviour (Luria, 1961; Vygotsky, 1962). Not only are self-regulation strategies often verbally encoded but they are typically verbally mediated as well. For example, when faced with problems that induce anger, children use language to label their emotional experience, to access self-regulatory strategies, and in many cases, to implement such strategies. Children with SLIs however, may encounter problems with self-regulation because their language delays interfere with the proper encoding of strategies and the appropriate use of inner language to regulate their

functioning. Furthermore, to the extent that self-regulation has its origins in parent-child interactions involving mutual regulation (Kopp, 1982), language delays will likely interfere with harmonized exchanges, increasing the likelihood that conflict and frustration will ensue. As a result, when problems are encountered these children may lack the necessary means to regulate their experiences independently, leading to dysregulation and ultimately aggression. Only once has the relation between language development and self-regulation been examined. In that study, Fujiki, Brinton, and Clarke (2002) found children (boys in particular) with language delays scored significantly lower on a measure of emotion regulation than children with intact language skills. While these findings are promising, it is clear that more research is needed in order to clarify how this association relates to aggression and social functioning, in general.

The final pathway discussed by Dionne (2003) is the social cognition pathway. This model suggests that language delays compromise the child's ability to engage in social problem solving. Crick and Dodge's (1994) social information processing model suggests that aggression is a product of errors relating to how children process events in their environment, their attributions about those events, and their ability to generate and select adaptive responses for those events. Some argue that because children with SLIs are more likely to have negative exchanges with others, they are more likely to exhibit biases in the way they process social information (Cohen, et al., 1998). Given that aggressive children show a proclivity towards attributing events in a hostile manner (Lochman & Dodge, 1994), it follows that children with SLIs would be susceptible to similar social information processing errors.

Zadeh and colleagues (2007) recently found evidence to support this pathway. These researchers assessed the relations between language skills (i.e. syntax), social

cognition, and externalizing behaviour among a clinical sample of children ages 7 to 14 years. In order to determine how these factors best fit the data, they compared three models: two direct models and one mediational model. After controlling for potential confounding variables (i.e., working memory, age), Zadeh et al. (2007) found both direct models (e.g., language skills and social cognition skills, respectively) predicted externalizing behaviour independently. However, these researchers found that a third model, one that assessed children's language skills as the mediating variable in the relation between social cognition and externalizing behaviour, provided a better fit for the data than either of the direct models. In fact, they found children's language skills mediated the path from social cognition to externalizing behaviour completely. Given that many existing treatment approaches for children's aggression are designed to build social cognitive skills, these results would seem to make a strong case for speech and language services to be included in such programs.

In summarizing the research pertaining to language and aggression, it is apparent that much is still to be determined. First, the relation between language and aggression needs to be replicated using measures that target physical aggression explicitly. As this review indicates, much of what is known about the relation between language and aggression is extrapolated from studies in which aggression is subsumed within general externalizing. Establishing a specific link between language delays and aggression will be critical for treatment planning. Second, the exact nature of the language delays that relate to aggression need to be determined. The existing literature is inconsistent with some studies implicating deficits in receptive language, others alluding to delays in expressive language, and still others citing both domains. Furthermore, research regarding the specific forms (e.g., form, content, use) of these deficits will also be critical

for informing treatment approaches. Third, as Dionne (2003) points out, the literature lacks studies that focus on the role of variables that may mediate the relation between language and aggression. This is beginning to change with the emergence of research examining both shared etiological pathways (e.g., Dionne et al., 2003) and causal pathways (e.g., Zadeh et al., 2007). Still in many ways, our understanding of the language-aggression link will remain in its infancy without the examination of alternative pathways. Finally, more information is needed in regards to the link between language and aggression in early childhood. Given that aggression is expected to decline substantially during preschool, this period would seem optimal for identifying children with SLIs that may be at-risk for elevated rates of aggression as they mature. In some measure, the present study attempts to address these questions.

Physical Aggression and Language Delay: The Self-Regulatory Pathway

As indicated, the aim of the present study is to investigate the link between language and aggression via the self-regulation pathway. In asserting that children do not learn to aggress but how *not* to aggress, Nagin and Tremblay (1999) imply that, for most children, regulatory processes emerge which serve to offset aggressive impulses. It stands to reason that the small subset of children who continue to exhibit high rates of aggression across childhood and adolescence have failed to acquire the requisite skills needed to control their aggression. These researchers have gone so far as to compare physical aggression to other characteristically innate behaviours of young children like eating, sleeping, and running (Tremblay & Nagin, 2005). They suggest that infants begin to demonstrate these behaviours once their physical development permits them. The challenge for children is to adjust their behaviours to the established norms of their society. Thus, inasmuch as children learn routines that impose some order on acts like

eating or sleeping, they must learn to control their aggressive impulses so that they can interact with others. In essence, these "learning-to-control processes" (Tremblay & Nagin, 2005, p. 95) are tantamount to the development of self-regulation.

Bidirectional effects

Within the literature, debate continues as to whether self-regulation is more the product of genetics or early socialization experiences with caregivers. From a temperamental perspective, researchers view self-regulatory development as largely a function of constitutionally based individual differences in the balance of approach/avoidance tendencies (Kagan, 1998), emotional reactivity (Rothbart & Bates, 2006), and attentional and inhibitory control processes (Rothbart & Posner, 2006). According to these researchers, psychopathology, or personality more generally, is primarily the result of one's inherited predisposition towards particular traits. Along these lines, heritability estimates for aggression, based on animal studies, as well as twin and adoption research, generally range from 30% to 50% (Ebert & Hyde, 1976; Miles & Carey, 1997; Rhee & Waldman, 2002; Van Oortmerssen & Baker, 1981).

On the other hand, some view self-regulation as due more to early parent-child interactions, whereby the onus for regulation gradually shifts from caregiver to child (Baumrind, 1991; Kopp, 1982). It is suggested that caregivers promote their children's development of self-regulation by modulating emotion while teaching and guiding them through the sorts of situations that require planning and forethought. In this way, children are modeled the emotional control and adaptive coping strategies that are required for problem solving, task persistence and goal-directed action. Aggressive children may lack these early experiences, or have been exposed to models of dysregulation, leaving them with a deficit in the understanding and use of self-control. Victims of child maltreatment,

particularly physical abuse, have long been known to have difficulties with aggression (Dodge, Bates, & Pettit, 1990; Dodge, Pettit, Bates, & Valente, 1995, Erickson, Egeland, & Pianta, 1989).

To a large extent, however, research has moved beyond distinguishing the separate effects of nature and nurture, with many studies now identifying gene-environment interactions as the key determinant in behaviour. This change reflects the increasing appreciation for bidirectionality, or the inherent characteristics that both parents and children bring to their interactions. For instance, Belsky et al. (1998) reported that the association between parenting and externalizing behaviour problems was stronger when, as infants, children were classified as high in temperamental negativity. Similarly, Bates et al. (1998) found a significant interaction between toddlers' resistance to control and mother's restrictive control in predicting externalizing behaviour problems in middle childhood. Specifically, stronger relations were found between toddlers' temperamental resistance and later externalizing when mothers exerted low levels of restrictive control. This pattern extends beyond childhood, as evidenced by the research of Caspi et al. (2002) who found that men with abnormal neurotransmitter activity were only aggressive when maltreated as children. Even among animals, research has shown that despite a biological predisposition towards aggression, monkeys are not aggressive unless maternally deprived (Suomi, 2005). Taken together, these studies suggest that rather than debating the relative weight of temperamental or environmental causes for externalizing behaviour, it is perhaps more important to assess how caregivers adapt their child-rearing approaches to suit the rapidly emerging cognitive, emotional, and physiological developments taking place within their children (Cummings, Davies, & Campbell, 2000; Thomas & Chess, 1977).

Possibly the most noticeable of these developments is the emergence of language. Language permits greater depth and meaning to parent-child interactions, and eventually leads to more sophisticated self-regulatory strategies. Such was the position held by Vygotsky (1962) and Luria (1961), who saw language as the medium for the transmission of culture. They postulated that language sets humans apart from other species by allowing elders to impart the principles and values necessary for members of the succeeding generations to function as the “highest self-regulation system” (Luria, 1961, p. 96).

Historical Views on the Development of Self-Regulation

Vygotsky's Socio-Cultural View of Self-Regulation

Self-regulation represents a multi-faceted construct that encompasses a person's ability to consciously control and coordinate various psychological functions in order to meet the demands imposed by their environment. In many respects, it is the hallmark of development as it allows humans to orient their attention, modulate their emotions, and manage their behaviour in the service of goal-directed behaviour. Over the last half of the twentieth century, the concept of self-regulation has proliferated in the literature. However, in many respects, its modern roots can be traced to the pioneering work of developmental theorists like Vygotsky (1962), Luria (1961), and Piaget (1932).

Vygotsky's (1962, 1978) belief that self-regulation is acquired through social interaction is particularly salient to the study of aggressive preschoolers, a group typically viewed as being under-regulated. Perhaps his most important contribution to the field of psychology is his notion of the zone of proximal development (ZPD). He defined the ZPD as, "...the distance between the actual developmental level as determined by independent problem-solving and the level of potential development as determined

through problem-solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). As reflected in this definition, Vygotsky was not interested in what children are capable of independently; rather, he was concerned with children's potential for higher mental functions as they were mediated through social interaction. For Vygotsky, development proceeds from an inter-psychological plane to an intra-psychological plane (Wertsch, 1979). That is, he believed that all higher mental functions initially exist outside the child, within a social realm, prior to being internalized. In this way, the ZPD assumes an inherently developmental focus, as it emphasizes the emergence of higher psychological functions from more primary functions, or "primitive" processes (Kozulin, 1990). According to Vygotsky (1978), the transformation from primitive to higher psychological processes was achieved through language.

In order to understand how Vygotsky saw language as influencing development, it is necessary to understand how he defined it. He characterized language broadly, suggesting that it encompasses more than mere verbal output (Wertsch, 1979). He was particularly concerned with the act of speech (i.e., language), or as his colleague Leontiev (1969) suggested, "...the activity-oriented conception of speech" (p.76). Framed this way, Vygotsky (1978) saw language as including all aspects of communication, including both verbal (e.g., words, intonation.) and non-verbal forms (e.g., facial expressions, gestures), as well as the overall context in which information is conveyed (e.g., situational determinants). He viewed language as a tool, much like other more tangible tools children learn to use, that could be used to effect change not only in the child's external environment but in his/her internal experience as well.

According to Vygotsky (1962, 1978), the greatest achievement in childhood is the synchronization of thought and speech (i.e., language). He saw this as the moment when

children transition from more primitive forms of behaviour to uniquely human forms in which they become able to capitalize on their practical intellect to plan, monitor and control action. While his contemporaries viewed thought and language as different forms of the same function (e.g., Watson, 1929), Vygotsky (1978) saw them as separate but related functions that initially develop independently of each other. He described the difference between the two in terms of their developmental course. Thought is inherently deeper than language and is revealed to humans in whole, whereas language involves separate units that are uncovered in a step-by-step fashion (Vygotsky, 1962). In explaining this distinction he suggested, "What is contained simultaneously in thought unfolds sequentially in speech..." (Vygotsky, 1962, p. 106). Because the two do not initially correspond, young children are limited in the extent to which they can convey their needs, emotions, and intentions. In essence, during this period of development children's speech is pre-intellectual and their thought is pre-verbal (Kozulin, 1990). It is only when the two become synthesized that children begin to expand their problem-solving capabilities and transition from more other-regulated to self-regulated functioning. He suggested, however, that this synthesis was not automatic; rather, it required a catalyst to initiate their co-development.

Vygotsky (1962, 1978) proposed that the path by which humans transfer thought to language was found through meaning. Consistent with the notion of the ZPD, meaning is introduced to children's early pre-intellectual utterances by more experienced individuals who decipher the underlying motives behind their "primitive" speech-acts. Rommetveit (1979) described this interaction as reflecting a state of intersubjectivity, or a highly affiliative state in which two individuals, interacting within a shared context, co-construct meaning without the need to specify situational determinants. In many ways,

this implies the role of caregivers who, given their proximity to children during this period of development, are the most frequent participants in these early interactions. In providing developmentally appropriate responses (i.e., within the ZPD) to children's speech-acts, caregivers serve to infuse meaning into their children's previously undefined or nondescript behaviour. Through these interactions, children learn the semantic value of their "speech-acts" and gradually internalize the relationship between thought and word such that their pre-intellectual language now corresponds with their pre-verbal thought.

Vygotsky's (1962, 1978) theory is not presented as a stage theory in the formal sense however he described the synthesis of thought and speech as occurring in four general phases. The first, or the *primitive phase*, is the period during which language and thought have yet to be synthesized (Kozulin, 1990). This begins to change with the emergence of basic grammatical forms, which are still independent of their intellectual origins. At this phase, the phase of *practical intelligence*, children begin to use words that reflect causal relations without an understanding of their semantic value (Kozulin, 1990). Children at this phase are primarily repeating caregiver messages from prior interactions that they have begun to internalize. As Vygotsky (1962) explained, the syntax of speech precedes the syntax of thought. The following phase is characterized by children's production of *egocentric speech*, or spoken language that is devoid of any social purpose, but that nevertheless accompanies their actions. During this stage, children begin to use external symbolic means for directing their problem solving (Kozulin, 1990). Vygotsky (1962) saw this as the key transitional phase between more primitive forms of regulating oneself and mature self-regulation. This transition is completed in the fourth phase when children internalize their egocentric speech and are

thus no longer reliant on external mediators. At this phase, their egocentric speech becomes subvocal, *inner speech* and serves to coordinate all psychological processes.

Vygotsky saw the progression from egocentric to inner speech as assuming an inverted U-shape course through the preschool and early school age years (Berk, 1992). These developments feature structural changes in children's egocentric speech that Vygotsky (1978) posited were due to an increased capacity for interacting with oneself. For instance, he suggested that egocentric speech becomes progressively more abbreviated and differentiated from social speech. Because children are interacting with themselves, they no longer need to include the subject within their egocentric utterances. Instead, only the predicate is maintained, which children recognize as the novel aspect of their actions. Furthermore, children begin to condense multiple words into single expressions reflecting a more tailored form of interacting with themselves. At this point, the syntactic and phonological aspects of egocentric speech diminish, while the semantic elements increase until the internal representation of objects and concepts is reduced to single words. Interestingly, Vygotsky (1978) also suggested that these developments occur simultaneously with changes in the temporal relationship between egocentric speech and action. Specifically, his observations of young children led him to conclude that egocentric speech evolved from initially following action, to co-occurring with action, to finally preceding action. Vygotsky (1978) believed these changes were indicative of children's increasing capacity to use language for planning and forethought, or more simply, to regulate themselves.

Although his description of these changes suggests a unidirectional path of development, children's ability to self-regulate is nevertheless still largely dependent on the quality of their early interactions with more skilled persons in their environment. As

such, the progression from egocentric to inner speech, vis-à-vis the capacity for self-regulation, is prone to delayed, maladaptive, or even regressive development (Tudge & Rogoff, 1989). As a theory of cultural transmission, as well as one of development, Vygotsky implicates those more skilled adults (i.e., caregivers) as responsible for conveying the qualities deemed important by one's culture to a new generation. However, in certain circumstances the transmission of such culturally meaningful messages can be conveyed inadequately. This is the case when caregivers themselves poorly communicate these qualities or doubt their children's capacity for development (Vygotsky, 1978). That is to say, the development of self-regulation can be hindered by the failure of caregivers to work within the ZPD.

Luria's Theory of Verbal Mediation

Following in the footsteps of Vygotsky, Luria's (1961) work served to further clarify the role of language in the regulation of mental processes. Like Vygotsky (1962, 1978), Luria (1961) believed that children acquired knowledge and skills through interactions with adults, even going so far as to suggest that, "this fact becomes the basic law in a child's development" (p. 17). Based on a series of experiments he conducted with preschool-age children, he recognized that the naming function of language was integral for children's organization of mental activities, and ultimately, their regulation of behaviour. This was particularly evident with respect to initiating and inhibiting action. According to Luria (1961), once adults label an object or event, children begin to generate verbally formulated rules that govern their actions thenceforth.

Luria (1961) described this process as unfolding in four stages. He noticed that very early in child development, the nominative function of speech is more developed than the regulatory function. As a result, children are impelled to act on simple

instructions and are almost incapable of inhibiting this action when provided with contradictory directions. In other words, children at this age are constitutionally impulsive and inherently poor self-regulators. During the second stage, speech continues to have a greater excitatory than inhibitory effect on action, although children are now able to incorporate these verbal instructions as part of their own language. Consequently, they begin to use these instructions, albeit inconsistently, to mediate their motoric responses. By the third stage, egocentric speech is commonplace, further limiting the excitatory effects of language on action, and leading to a balance between the initiation and inhibition of action. Luria (1961), too, saw this as the key transitional phase in self-regulatory development. Like Vygotsky (1962, 1978), Luria suggested that by preschool, egocentric speech turns inward, enabling the coordination of underlying psychological processes, and resulting in the voluntary regulation of behaviour. In sum, the stages proposed by Luria (1961) correspond roughly with those outlined by Vygotsky (1978); however, Luria's (1961) research demonstrated more concretely, how pervasive the role of speech was for regulating cognitions.

Contemporary Views on the Development of Self-Regulation

Since the work of the Vygotsky (1962, 1978) and Luria (1961), researchers interested in self-regulation have tried increasingly to operationalize the construct. This is made difficult by the fact that self-regulation manifests itself in diverse ways and is subject to the rapid cognitive, emotional, and physiological changes characteristic of early development. The operationalizing of self-regulation has resulted in research examining a number of separate but interrelated processes, which correspond roughly to the regulation of cognitions, emotions, and behaviours. While these processes are believed to be a function of both child temperament and environmental influences, most researchers

acknowledge that caregivers play a particularly important role in fostering their children's self-regulation. Contemporary research on self-regulation echoes the work of Vygotsky (1962, 1978) in two important ways. First, the development of each self-regulatory skill is viewed by many to follow an inter- to intra-psychological path, with children gradually internalizing the self-regulatory skills learned during interactions with adults. Second, researchers in each domain consistently note the presence of a transition period during which children gradually assume the onus for regulating themselves. Not surprisingly, these transition periods usually coincide with the emergence of language, and thus, it follows that language delays may underlie the relation between poor self-regulation and aggression.

Kopp's developmental model of self-regulation

Among the more contemporary researchers in the area of self-regulation, Kopp's (1982, 1989) work has been particularly pivotal. In outlining the developmental antecedents of self-regulation, Kopp's model draws upon early perspectives (Piaget, 1952; Luria, 1961; Vygotsky, 1962), while simultaneously integrating a number of separate but complimentary lines of research including control and system organization (Als, 1978), compliance (Stayton, Hogan, & Ainsworth, 1971), and impulse control (Mahler, Pine, & Bergman, 1975). Thus, in many ways Kopp's model of self-regulation serves as a bridge between Vygotsky's theory and the approaches of those currently investigating self-regulation.

Kopp (1982) postulated that children progress through a series of qualitatively different, yet potentially overlapping, phases on their way toward self-regulation. Her model suggests that self-regulation is predicated on the maturation and coordination of cognitive, emotional, and physiological processes. This is particularly evident during the

first year of life when children progresses through what Kopp (1982) termed the *neurophysiological* and *sensorimotor modulation* phases. According to Kopp (1982), the first signs of self-regulation occur when children are able to organize reflex movements in order to modulate arousal levels (e.g., thumb sucking). Over the course of the first year, infants' self-regulatory repertoire continues to evolve. Gradually, they acquire the ability to voluntarily engage in motor acts to distract themselves from overly arousing stimuli, to signal for caregiver assistance, and to encourage continued interaction with others. Kopp (1982) noted, however, that significant variability exists during this phase due to both temperamental differences and variation in how processes mature. This leads to periods of regulatory instability during which caregiver practices play a crucial role in the establishment of routines such as consistent sleep-wake cycles. When consistent routines cannot be realized, children may be susceptible to delays in the acquisition of more sophisticated self-regulation strategies. Thus, despite impressive developments in the first year, children are almost entirely dependent on caregivers to regulate them during this period in lifespan.

Kopp (1982) considered the *control phase*, which lasts from the end of the first year to at least 18 months, to represent a key transition period. During this phase, children develop more advanced cognitive capacities and undergo physical changes that permit even greater exploration of the environment. These developments allow children to differentiate themselves more readily from objects in their environment (including caregivers), and to develop a greater understanding of the effect their actions have on the world. The result is a basic awareness of the situational demands imposed upon them by their caregivers and the first signs of the ability to "initiate, maintain, modulate, or cease physical acts, communication, and emotional signals accordingly" (Kopp, 1982, p. 204).

In many respects, this phase corresponds to the period of egocentric speech described by Vygotsky (1962). Much like Vygotsky (1962) described egocentric speech as the predecessor to subvocal inner speech, Kopp (1982) suggested that the control phase is a prerequisite for intrinsic regulation. She asserts that because children have yet to develop representational thinking, they have trouble encoding regulatory strategies to memory, generalizing regulatory strategies to different situations, and ultimately internalizing the regulatory strategies of their caregivers. In essence, their ability to "regulate" is almost entirely dependent on their caregivers' ability to interpret their cues in relation to the particular context or situation. Thus, while children exhibit the first signs of intrinsic regulation during the control stage, their regulation is still carried out primarily by caregivers. Given these limitations, it is not surprising that Tremblay and colleagues (2004) have found children as young as 17 months of age to be members of what they describe as the most aggressive period in the lifespan.

According to Kopp (1982, 1989), two specific cognitive developments separate *self-control* and *self-regulation* from mere control. Both occur during the third and fourth years of life and facilitate the internalization of socially acceptable forms of behaviour. The first is the emergence of representational thinking, which refers to the ability to use symbols to signify objects. This fosters the second major development, or the appearance of what Kopp (1982) terms "evocative memory" (pg. 206). Together, these developments enable children to sustain thoughts and/or images in mind in order to engage in more flexible and adaptive problem solving. Because both skills are verbally mediated they are heavily reliant on language development. In other words, the self-control and self-regulation phases in Kopp's (1982) model are analogous to the process described by Vygotsky (1978), whereby egocentric speech turns inward to become subvocal inner

speech. Simply put, language, once internalized, becomes the tool that enables representational thinking and evocative memory. In time, these capacities not only allow children to interact in a more sophisticated fashion with people and/or objects in their environment, but with themselves as well. This allows for more flexible and adaptive use of regulatory strategies, as well as the capacity for self-reflection. As such, children begin to evaluate their actions in relation to the standards of acceptability, once conveyed by their caregivers, and now internalized as their own. The result is that by preschool, children begin to regulate themselves more consistently.

Barkley's neuropsychological model of self-regulation

Although intended as an explanation for the development of attention-deficit/hyperactivity disorder, Barkley's (1997/2005, 2001) description of executive functioning readily extends to all forms of externalizing behaviour problems, including aggression. In drawing on research from both pediatric neuropsychology, (Bronowski, 1967/1977; Fuster, 1989; Goldman-Rakic, 1995) and developmental psychology (Berk & Potts, 1991; Kopp, 1982), his model is in many ways an attempt to unite the literature to explain problems with self-regulation. Barkley (1997/2005, 2001) maintains that the executive functions represent those cognitive processes that ultimately enable or assist in self-regulation. Rooted in the work of Vygotsky (1962, 1978) and Luria (1961), he suggests that the executive functions emerge initially as observable behaviours but that over development they become progressively more internalized and eventually, entirely covert. Once privatized, the executive functions serve as means for children to interact with themselves for the purposes of bringing their behaviour under self-control. Barkley (1997/2005, 2001) outlines five such interacting executive functions, with each assuming a unique developmental trajectory.

Barkley (1997/2005) proposes that behavioural inhibition emerges first in development and occupies a central role in relation to the other executive functions. He suggests that behavioural inhibition involves three interrelated processes: response inhibition, interference control, and the interruption of ongoing responses. *Response inhibition* refers to the ability to “inhibit prepotent responses, either prior to or once initiated, creating a delay in the response to an event” (Barkley, 2003, p. 83). In other words, by postponing those responses for which immediate rewards may be likely, response inhibition provides children with the occasion to utilize the executive functions in order to plan, reflect and guide future behaviours. Early on, however, various stimuli can interrupt this delay, thus preventing or hindering the actions of the other executive functions. As a result, Barkley (1997/2005, 2001) suggests that *interference control*, or the capacity to protect the delay from potentially competing events, is also critically important for effective self-regulation. Children must also be able to stop a current sequence of behaviour when it is proving ineffective. This ability to *interrupt ongoing responses* enables the other executive functions to reanalyze problems and form new patterns of response. In describing the role of behavioural inhibition, Barkley (1997/2005) stressed that it does not cause the executive functions, rather it simply provides the pause required for them to operate. Still, given its superordinate position in the model, Barkley (1997/2005) theorized that when behavioural inhibition is impaired, deficits in the four other executive functions will almost certainly follow.

Within the delay created by behavioural inhibition, Barkley (1997/2005, 2001) maintains that children’s *nonverbal working memory* is often the first of the subordinate executive functions utilized. He describes nonverbal working memory as “covert sensing to oneself” (Barkley, 2005, pg. 162). As such, he sees nonverbal working memory as

consisting of the ability to use internalized visual images (and other sensory information) from past situations to direct current problem solving endeavours. In this way, Barkley's (1997/2005, 2001) nonverbal working memory is similar to Kopp's (1982) notion of evocative memory insofar as it involves drawing upon nonverbal sensory information from past cause-effect relations in order to guide future decision-making. Implicit to this idea, is that children hold the temporal sequence of events in mind such that the "complex behavioral chains" needed to solve problems can be executed (Barkley, 1997, p. 71). Consequently, Barkley (1997/2005, 2001) suggests that when there are deficits with respect to nonverbal working memory, children will exhibit diminished capacities for hindsight, forethought, self-awareness, imitation and vicarious learning, and the general cross-temporal organization of behaviour. In a sense, they are temporally myopic (Barkley, 1997/2005). The result is that children with weaknesses in nonverbal working memory will have trouble combining and executing the steps required to problem solve effectively.

The third of the executive functions described by Barkley (1997/2005, 2001) involves the capacity for *verbal working memory*. Of the five executive functions outlined by Barkley (1997/2005, 2001), verbal working memory is the most synonymous with Vygotsky's (1962, 1978) notion of internalized speech. Barkley (1997/2005, 2001), too, claims that the changes noted in preschoolers' speech are reflective of the increasing role played by language in self-regulation. Among these changes, he points to the transition during the preschool years from more descriptive to instructive language, suggesting this change is indicative of both the increasing power of rules to guide behaviour and the greater capacity for self-reflection. Through problem-solving experiences, these rules are adjusted and combined to form novel or more universal rules,

which then apply to a wider array of situations (Barkley, 1997/2005). He concludes, like Vygotsky (1962, 1978), that the emergence of verbal working memory frees children from the control of their immediate environment, shifting instead to control by their own representational thinking (see above Kopp, 1982). Not surprisingly, Barkley (1997/2005, 2001) predicts that delays in verbal working memory will manifest in problems with rule governed behaviour, such that children will be more likely to follow immediate contingencies than self-directed rules. This, in turn, contributes to problems with the development of moral reasoning, as he implicates verbal working memory in the formation of meta-rules, or more general rules about the norms and societal expectations for behaviour.

Barkley (1997/2005, 2001) also views emotions as subject to the same delay created by behavioural inhibition. He postulates that once children experience an emotion, behavioural inhibition prevents the rash emotional displays and potentially socially inappropriate acts that often follow. In the window provided by behavioural inhibition, children can use the executive functions (e.g., verbal and nonverbal working memory) to modulate their emotional and behavioural reactions to the circumstances of the emotion-eliciting event. Furthermore, Barkley (1997/2005, 2001) suggests that the executive functions not only mitigate emotional responses but they can amplify the components of emotion, including motivation and arousal, in the service of goal-directed action. In this way, children learn to intrinsically generate the drive needed for task persistence, particularly when few immediate rewards are available. Deficits in the *internalization and self-regulation of affect* are purported by Barkley (1997/2005, 2001) to lead to many of the characteristics shown by aggressive children such as limited emotional self-control, biased response selection, poor social perspective taking, and a

diminished capacity to induce the motivation needed for task persistence (Crick & Dodge, 1994; Quiggle, Garber, Panak, & Dodge, 1992).

The last and most advanced of the executive functions to develop, according to Barkley (1997/2005, 2001), is termed *reconstitution*. It involves two complimentary processes, namely analysis and synthesis. Analysis consists of the ability to dissect sequences of events into their component parts, while synthesis involves reconstituting these parts into novel chains of behaviour (Barkley, 1997/2005). Together, these processes allow children to build upon previously acquired verbal and behavioural sequences in order to devise new and more sophisticated responses to the challenges that confront them increasingly in their ever-expanding environment. In short, reconstitution provides children with more flexible and diverse repertoire of problem-solving strategies. Although Barkley (1997/2005) deemphasizes the role of socialization in the emergence of executive functions, his position on the development of reconstitution intimates that caregivers might play an important role. Specifically, he equates the emergence of reconstitution with the internalization of play, and in doing so, implicates, albeit unintentionally, the importance of early parent-child interactions. During these interactions, it is often caregivers who structure, in a step-by-step fashion, how their children might deconstruct or reconstitute problems in novel ways. Barkley (1997/2005, 2001) contends that reconstitution is demonstrated through both verbal and behavioural fluency whereby children rapidly combine parts (speech or motor) in unique and meaningful ways to solve problems. When children exhibit delays in reconstitution, they are less creative and/or flexible problem-solvers, and they have trouble simulating and organizing their behaviour to meet situational demands (Barkley 1997/2005, 2001).

The maturation of the executive functions is believed to result in “more purposive, intentional, and future-oriented” behaviour (Barkley, 2005, pg. 192). Inherent to this process is the transition from a reliance on environmental contingencies to self-guided behaviour. As the executive functions emerge, they serve to coordinate cognitive, emotional, and sensorimotor processes, thereby enabling more advanced problem solving and greater motor control. While Barkley (1997/2005, 2001) argues against the role of socialization for the development of executive functions, he concurs with Vygotsky (1962, 1978) and Kopp (1982) in placing language at the center of self-regulatory development. In keeping with the views of Vygotsky (1962, 1978), Kopp (1982, 1989), and Barkley (1997/2005, 2001), research over the past few decades has demonstrated that self-regulatory problems in childhood are associated with both language delays and aggressive behaviour problems.

Language, Self-Regulation, and Physical Aggression in Early Childhood

As Kopp (1982, 1989) and Barkley (1997/2005, 2001) have stressed, the development of self-regulation is dependent on the emergence and coordination of various cognitive, emotional, and sensorimotor processes. Regulation, therefore, can go awry when children's functioning in any of these domains fails to unfold according to developmental expectations. The result is children who are described as "under-regulated", a label frequently applied to children who display aggressive behaviour problems (Achenbach, 1991; Cummings, Davies, & Campbell, 2000). Research has shown consistently that aggressive children exhibit self-regulatory delays in terms of their ability to regulate themselves both cognitively and emotionally (Seguin & Zelazo, 2005; Denham, Blair, Schmidt, & DeMulder, 2002). In turn, they have a diminished capacity to control their behaviour, which results in volatile and often explosive conduct that serves

to isolate them from peers and limit their acquisition of otherwise positive social skills. The review that follows catalogues the extant literature regarding the relation between self-regulation and aggression as it pertains to cognitive-behavioural and emotional regulation, as well as how language influences these relations.

Cognitive and Behavioural Regulation

Research in the area of early cognitive regulation focuses on the development of executive functions, impulse control, and the effortful control of attention. While these constructs could theoretically be separated into separate domains of cognitive and behavioural regulation, they are presented together given emphasis in the literature on the relation between cognitive control mechanisms and their overall influence on behavioural symptoms (Barkley, 1997/2005, 2001). These studies provide evidence for both the historical and contemporary models of self-regulation described above.

The executive functions refer generally to the self-regulation of thought, action, and emotion (Seguin & Zelazo, 2005), or the processes believed to be governed by the neural systems in the prefrontal cortex (Owen et al., 1999; Robbins, 1996; Stuss, 1992). Attesting to the precision of Luria's (1961) experiments, research more recently has identified that the age estimates he proposed for changes in the ability to initiate and inhibit responses are relatively accurate (Zelazo & Muller, 2002). Thus, at approximately the age of three, children acquire the ability to use two rules (i.e., initiation and inhibition) simultaneously (Zelazo, Frye, & Rapus, 1996; Zelazo & Reznick, 1991). However, it is not until roughly five years of age, that children show cognitive flexibility, or the capacity to alternate seamlessly between two incompatible rules or perspectives (Frye, Zelazo, Brooks, & Samuels, 1996; Zelazo et al., 1996; Zelazo, Helwig, & Lau, 1996; Wellman, Cross, & Watson, 2001). Remarkably, these age-related changes have not only been

identified by researchers who study executive functioning, but by those exploring related areas as well, such as delay of gratification (Mischel, 1974; Mischel & Mischel, 1983) and effortful attention control (Posner & Rothbart, 2000). Unfortunately, findings from each line of research are consistent in suggesting that for physically aggressive children, these skills are often impaired.

From a practical standpoint, the executive functions are most readily observed during complex problem solving. For instance, in order to solve problems effectively children must represent a problem mentally, generate possible solutions, select a plan of action, hold that plan in memory long enough to enact it, then evaluate their performance, and make corrections accordingly. Difficulties arise when cognitive inflexibility causes children to perseverate at any step in this process (Seguin & Zelazo, 2005). Using a frequently employed measure of executive functioning (i.e., Wisconsin Card Sorting Test; Robinson, Heaton, Lehman, & Stilson, 1980), both children and adolescents with externalizing behaviour problems have been found to exhibit high rates of perseveration (Hughes, Dunn, & White, 1998; Matson & Fisher, 1991; Toupin, Dery, Pauze, Mercier, & Fortin, 2000). Others, too, using alternative measures, have found that physically aggressive children show deficits in executive functioning even after controlling for IQ, cerebral dominance, and other externalizing behaviour problems (Giancola, Mezzich, & Tarter, 1998; Seguin, Arseneault, Boulerice, Harden, & Tremblay, 2002; Seguin, Boulerice, Harden, Tremblay, & Pihl, 1999; Seguin, Pihl, Harden, Tremblay, & Boulerice, 1995). Interestingly, when Hughes and colleagues conducted a follow-up study that required "hard-to-manage" children to play with a teacher-nominated best friend, they found that among hard-to-manage children, verbal abilities were inversely related to hurting the other child physically (Hughes, White, Sharp, & Dunn, 2000).

These findings reflect Luria's (1961) argument that the rules governing problem solving are verbally encoded and thus, highlight how language difficulties interfere with impulse control, leading to aggressive behaviour.

Perhaps a more narrow formulation of executive functioning is assessed by the delay of gratification paradigm, a task that tests the ability to resist temptation through sustained willpower (Mischel, 1974; Mischel et al., 1989). Like Luria (1961), Mischel and colleagues conceptualize behaviour in terms of an interacting two-system model, the dynamics of which determine regulatory functioning. The hot system is considered the "go" system (Mischel & Ayduk, 2004, pg. 109) and is analogous to what in Luria's (1961) studies is the strong initiation tendency. It involves quick, emotional processing that is simple, reflexive, and largely immune to effortful regulatory control (Mischel & Ayduk, 2004). In contrast, the cool system represents the "know" system (Mischel & Ayduk, 2004, pg. 109). Unlike the hot system, it functions at a slower and more deliberate pace, thereby permitting "complex, spatiotemporal and episodic representation and thought" (Metcalf & Mischel, 1999, pg. 4). The product of cool system processing is rational, reflective, and strategic behaviour (Mischel & Ayduk, 2004). In effect, the cool system regulates the responses of the hot system in much the same way that Luria (1961) describes inhibitory processes offset excitatory processes.

The maturation of the hot and cool systems mirrors the emergence of language in young children. According to Mischel and colleagues (Metcalf & Mischel, 1999; Mischel & Ayduk, 2004), the hot system is well developed at birth, while the cool system matures gradually with age. Thus, early in development, the hot system dominates processing leading to impulsive and highly emotional displays. Mischel and associates (Mischel, 1974; Mischel & Mischel, 1983) have demonstrated that before the age of four,

it is nearly impossible for children to restrain themselves for the entire duration of delay of gratification tasks. Over the course of development, the hot and cool systems become increasingly coordinated allowing for more consistent self-regulation. As such, Ayduk and colleagues (2000) found almost 60% of 12-year-olds were able to regulate themselves for the time required to achieve a delayed, but superior reward.

A review of the existing literature reveals that children's ability to delay gratification in early childhood is predictive of their current and later self-regulatory functioning. In fact, a negative relation between inhibitory control (i.e., ego control) and aggression in early childhood has long been established (Funder, Block, & Block, 1983; Livson & Mussen, 1957; Olson & Hoza, 1993). Furthermore, in these studies poor delay of gratification in preschool was predictive of aggression in middle childhood (Funder et al., 1983; Olson & Hoza, 1993). This same pattern of results has been found with adolescents and young adults as well (Ayduk et al., 2000; Krueger, Caspi, Moffitt, White, & Stouthamer-Loeber, 1996; Rodriguez, Mischel, & Shoda, 1989).

Research by Mischel and colleagues (Mischel, Shoda, & Peake, 1988; Shoda, Mischel, & Peake, 1990) provides a picture of the effects inhibitory control has on behavioural outcomes. They have found that adolescents who show more control on delay tasks during preschool were described by their parents as more attentive and better able to concentrate; more capable of coping with stress; and more effective at planning and using forethought at age 15, than their less regulated preschool peers. Moreover, according to their parents these adolescents appeared more skillful, more competent, and more self-assured. Given the evidence for the importance of early impulse control, Olson and Hoza (1993) are accurate in concluding that delay ability may be the single most important developmental correlate of prolonged conduct problems in young boys.

Some view cognitive regulation as more biologically determined (Derryberry & Rothbart, 1997; Posner & Rothbart, 2000; Rothbart, 1989). Rothbart and Bates (1998) propose a model in which both reactivity (i.e., impulsivity) and self-regulation (i.e., the effortful control of attention) are, for the most part, products of children's temperament. According to these researchers, children possess an innate capacity to regulate their attention, which enables general alertness and focus. Following the maturation of the anterior attention network of the midprefrontal cortex, children gradually develop the means to regulate their attention volitionally (Rothbart, Derryberry, & Posner, 1994; Rueda, Posner, & Rothbart, 2004). The skills measured by these researchers are analogous to those assessed by researchers using the delay of gratification paradigm. Thus, effortful control, like gratification delay, involves the capacity to control attention voluntarily such that a dominant response can be inhibited in favour of a subdominant one (Rothbart & Bates, 1998). Not surprisingly, then, researchers studying effortful control also identify a transitional phase that occurs during the third and fourth years of life.

Employing a stroop-like task that required children to shift their attention and inhibit predominant responses, Posner and Rothbart (2000) found dramatic increases in performance at approximately 30 months of age. According to these researchers, this trend continues over the following months as children between the ages of 36 and 38 months performed consistently with high accuracy. These developments translate into greater behavioural regulation during the following year. Additional research by Rothbart and colleagues, using games that require executive-type functions (e.g., "Simon Says"), revealed that children are able to inhibit their behaviour at roughly 44 months, and do so with relative consistency by 4 years of age (Posner & Rothbart, 2000; Reed, Pien, & Rothbart, 1984). Others have extended these results to both preschoolers and school-aged

children, finding that effortful control remains stable after toddlerhood (Kochanska & Knack, 2003; Kochanska, Murray, & Coy, 1997; Murphy, Eisenberg, Fabes, Shepard, & Guthrie, 1999).

Studies have found that the relation between low effortful control and aggression remains consistent across childhood and into adolescence. Calkins and Dedmon (2000) investigated the difference between 2-year-olds rated by their mothers as high, and those rated as low, on externalizing behaviour. They found children who exhibited a high degree of aggressive and destructive behaviour displayed less focused attention than children rated by their mothers as low in disruptive behaviour problems. Similarly, research by Murray and Kochanska (2002) revealed that children who showed low compliance and poor effortful control at 22, 33, and 45 months of age displayed higher rates of externalizing problems at all ages compared to children who were more compliant. Still further, Lemery, Essex, and Smider (2002) demonstrated that parental reports of their 5.5-year-old child's externalizing symptoms were significantly predicted by maternal reports of attention focusing and inhibitory control averaged across scores compiled at 3.5 years and 4.5 years. Numerous other studies have found this pattern continues into middle childhood and adolescence, with poor effortful control in early childhood predicting later externalizing behaviour problems (Caspi, Henry, McGee, Moffitt, & Silva, 1995; Eisenberg et al., 1997; Murphy, Shepard, Eisenberg, & Fabes, 2004; Lengua, West, & Sandler, 1998; Mezzacappa, Kindlon, & Earls, 1999). Perhaps most troubling, is the fact that poor early childhood attentional control has been found to be associated with the number of criminal convictions at age 21 years (Henry, Caspi, Moffitt, Harrington, & Silva, 1999). Considering the sheer abundance of these findings,

it seems clear that the ability to control attention effortfully is needed before children can demonstrate socially competent behaviour on a consistent basis.

Emotion Regulation

While he is primarily known for his views on cognitive development, Vygotsky (1987) briefly explored emotional development as well. Unfortunately, the majority of his work on emotion was not completed and attempts to publish his manuscripts have been unsuccessful (Van der Veer & Valsiner, 1994). His lectures nevertheless reveal that his views on emotion were consistent with more recent positions (e.g., Cicchetti, Ackerman, & Izard, 1995; Greenspan & Shanker, 2004) that stress the synchrony of cognitions and emotions for effective self-regulation. He subjected emotion to the same centripetal process as all other psychological functions, suggesting that once emotions assume meaning they gradually become internalized by children and can be regulated more intrinsically. Greenspan (Greenspan, 2007; Greenspan & Shanker, 2004) has expanded on these views by suggesting that through meaningful interactions with caregivers, primary emotions are transformed and internalized as symbols, which in turn, set the stage for language development, and promote higher cognitive processes such as planning and reflective thinking. Greenspan's stance is similar to Vygotsky's insofar as he sees self-regulation as a product of meaningful social interactions; however, he argues that emotions, as opposed to language, are the primary mechanism through which all psychological processes are coordinated.

In his functional emotional development model (Greenspan, 2007; Greenspan & Shanker, 2004), Greenspan puts forth the notion that parents help children separate emotions from fixed action patterns. He suggests that once an image is perceived, we experience an emotion, and almost simultaneously, a tendency toward a particular

response or action. During infancy, the perception-emotion-action sequence is relatively fixed or automatic, with no pause or delay for more sophisticated problem solving. Greenspan posits that at this stage in development, humans experience emotions in a catastrophic manner insofar as emotions such as fear or rage are felt as intense global emotional states that demand immediate action. The key for emotion regulation, according to Greenspan, is the transformation of these catastrophic emotions into signals, a process facilitated by caregivers when they are able to recognize and respond to the *intent* of their children's emotional reactions. Through recognition of their intent, children progressively learn that their emotions have an effect on their world (most importantly their caregivers), which in turn, promotes their purposeful use of emotions (i.e., signaling) to elicit support for the regulation of their need states. Once children develop the ability to use their emotions to signal, they are no longer tied to fixed action patterns, and have begun the process toward greater self-regulation of emotion.

Greenspan (Greenspan, 2007; Greenspan & Shanker, 2004) further suggests that the separation of catastrophic emotions from fixed action patterns allows for the formation and internalization of symbols. Once emotions are separated from fixed actions, the images that elicit them can exist as freestanding images. No longer is anger necessarily tied to aggression when children perceive a desired object that cannot be obtained. According to Greenspan, this is the critical transition for young children, as freestanding images can then, through continuous "reciprocal co-regulated emotional interactions", be imbued with meaning to form multisensory, affective symbols (Greenspan & Shanker, 2004, p. 30). That is, once images become meaningful, they can be internalized as symbols, which in turn, can be combined with other meaningful images (i.e., symbols) to reflect, plan, or problem-solve. Through more and more co-regulated

interactions, children's symbols become diversified and more adaptable, as they attach them to more affect-laden experiences. Greenspan's view of emotions for self-regulatory development has much in common with Kopp's (1982) position on the role of evocative memory, and Barkley's (1997/2005) ideas concerning nonverbal working memory.

The formation of symbols, Greenspan argues, also sets the foundation for language development. With increased emotional signaling, the aforementioned co-regulated emotional exchanges become increasingly complex and a preference for vocalization over gestural communication emerges (Bretherton, Bates, McNew, Shore, Williamson, & Beeghly-Smith, 1981). Children, in turn, develop a strong desire to master language in order to convey their experiences to caregivers. As these exchanges become more prolonged, children are provided with a seemingly endless array of emotionally charged experiences that foster a desire to understand the meaning of words (i.e., symbols) and a sense of the back-and-forth quality of communication. In this way, early co-regulated emotional exchanges provide the context for the emergence of semantic language. Greenspan and Shanker (2004) assert that the more emotionally charged these exchanges become, the more motivated children will be to master language. This motivation is enhanced when nurturance needs are consistently satisfied, and children's vocal capabilities are freed to enjoy language for its own sake. Through increased language use, children develop new (and perhaps primary) means for representing their emotions symbolically, which deepens their understanding of emotions and introduces them to new methods of emotion regulation.

Many see language as the medium through which children's understanding of emotions develops (Kopp, 1989; Saarni, 1999; Stegge & Meerum Terwogt, 2007). In using language to represent emotional experience, children can begin to reflect on their

experience in more depth; or in other words, elaborate on it, integrate it with other aspects of their experience, and compare it with the experience of those around them (Saarni, 1999; Thompson, 1991). This rapid acquisition of emotion words begins during the toddler years, as part of a general increase in internal-state language (Bretherton & Beeghly, 1982). Initially, children use internal state language more to describe volition and physiological states but gradually become more adept at applying such language to emotions and moral judgments. When it comes to causal statements, however, toddlers' use more affect-related utterances than either physiological or volitional statements (Bretherton & Beeghly, 1982). This finding illustrates how children develop an understanding for the origins and targets of their emotion states quite early. Such cause-effect knowledge about emotions allows for the emergence of progressively more sophisticated regulation strategies.

The functional emotional developmental model, as outlined by Greenspan (Greenspan, 2007; Greenspan & Shanker, 2004), implies that emotions themselves have a regulating effect on psychological processes. This “emotions as regulating” perspective is differentiated from the predominant “emotions as regulated” view that suggests emotions are first experienced then regulated by separate cognitive process (Cole, Martin, & Dennis, 2004, p. 320). The belief that cognitions are distinct from, and oversee, emotions, dates as far back as Ancient Greece, and is reflected more recently in research from the field of neuroscience (e.g., LeDoux, 1996). However, in emphasizing the coordination of cognitive and affective domains for self-regulation, researchers (Greenspan, 2007; Mayer & Salovey, 1997) more recently have explicated how emotions contribute to the higher psychological processes thought to be uniquely human. This is reflected in the attention garnered by the concepts of emotional intelligence (Goleman,

1995; Mayer & Salovey, 1997) and emotion competence (Denham, Blair, Schmidt, & DeMulder, 2002; Saarni, 1999). These authors suggest that the ability to perceive and express emotions accurately (both in oneself and others) is not necessarily a function of cognitive ability but rather facilitates cognitive processes, such as attention, judgment, memory, perspective taking, and inductive reasoning. Together, these “cognitive” abilities are considered the cornerstones of effective problem solving or regulation, but their emergence is largely predicated on their emotional development.

While the “emotions as regulating” perspective suggests that emotions are inherently self-regulating, children nevertheless develop specific strategies to cope with disturbing emotional states. These strategies are often acquired during the “reciprocal co-regulated emotional interactions” described by Greenspan (Greenspan, 2007; Greenspan & Shanker, 2004). Through emotional signaling parents and children engage in evermore prolonged interactions during which children are exposed to more and more patterns. These interactions provide children with an opportunity to notice their physiological and emotional reactions to various stimuli and reflect on the utility of different regulatory strategies for modulating their internal experience. Given the change (or lack thereof) in emotional intensity, regulatory strategies themselves become symbolic, allowing for further elaboration and more flexible implementation. In turn, children develop a progressively more sophisticated repertoire of skills to meet their increasingly complex emotional environment. Greenspan points out, however, that the primary factor for this development is the opportunity for “knowing by doing” during early parent-child interactions (Greenspan & Shanker, 2004, p. 196).

Numerous approaches for regulating emotions have been identified in the literature. Campos, Mumme, Kermoian, and Campos (1994) proposed that these

approaches can be organized according to the timing of the strategy in relation to the perception-emotion-action sequence described above. For instance, they suggest that the first level at which emotions can be regulated is the input level, or prior to perceiving a provocative image. In other words, regulation at the input level involves limiting or preventing exposure to stimuli that might cause unwanted emotions. Perhaps the most obvious way for a person (or caregiver) to regulate their emotions at the input level is to do so through niche picking, or choosing environments selectively so as to avoid the possibility of unwanted emotions (Campos et al., 1994). This strategy, however, can be quite difficult for infants and young children to perform independently given their limited mobility. Other forms of input regulation that have been described in the developmental literature include gaze aversion and distraction (Field, 1977; Fogel, 1982; Gianino & Tronick, 1988; Rothbart, Ziaie, & O'Boyle, 1992; Waters, Matas, & Sroufe, 1975), whereby children or their caregivers direct attention away from overly intense stimulation. Consistently, research has shown gaze aversion and distraction to be effective for regulating emotions, particularly towards the end of the first year and into the second year of life (Buss & Goldsmith, 1998; Calkins & Johnson, 1998; Mangelsdorf, Shapiro, & Marzolf, 1995; Stifter & Braungart, 1995). These strategies may become less effective, however, as children begin to encounter more complex stressors (Altshuler & Ruble, 1989).

According to Campos and colleagues (1994), the second level at which emotions can be regulated is the central processing level. At this level, emotion regulation involves changing the meaning of what has been perceived. Lazarus' (1966) description of reappraisal is consistent with the central processing level insofar it involves reinterpreting an event so that it evokes a positive, or less threatening, emotion. In addition, central

processing emotion regulation involves transforming, minimizing, or heightening an emotion. Campos and colleagues (1994) point out that humour is a common (and adaptive) method for altering emotional experience at this level as it can render concerns less serious and/or introduce a level of pleasure to an otherwise unpleasant experience. Various studies (e.g., Cohn & Tronick, 1987; Cumberland-Li, Eisenberg, Champion, Gershoff, & Fabes, 2003; Eisenberg et al., 2001; Malatesta, 1990) have shown that for both children and caregivers, maintaining positive emotions improves later behavioural regulation and overall social skills.

Finally, Campos et al. (1994) suggest that emotions can be regulated at the output level, or during response selection. They propose that this occurs primarily through inhibition; however, they also note that output regulation may take the form of modification, or controlling one's emotional response such that it is expressed with less intensity. In the developmental literature, instrumental coping is synonymous with output level emotion regulation. This entails the performance of some action to reduce or heighten an emotional experience, and may involve direct problem-solving. Social information processing models (Crick & Dodge, 1994; Lemerise & Arsenio, 2000) point to limitations in output level emotion regulation as a predisposing factor for aggressive behaviour. Furthermore, treatment of aggressive children based on these models suggests emotion regulation at the output level to be a key component in treatment success (Brestan & Eyberg, 1998; Lochman, Burch, Curry, 1984; Lampron, Sukhodolsky, Golub, Stone, Orban, 2005). As the most sophisticated form of emotion regulation, instrumental coping has been observed to increase gradually across childhood (Bernzweig, Eisenberg, & Fabes, 1993; Compas, Malcarne, & Fondacaro, 1988), although at least one study has shown effective instrumental coping as early as age three (Stansbury & Sigman, 2000).

Interestingly, in this study there was a significant correlation between the types of strategies used by parents to regulate their children's emotions, and those used by children to regulate themselves. This finding is consistent with Greenspan's view that through co-regulated emotional interactions, children internalize the means for regulating their emotional experience.

In keeping with Greenspan's functional emotional developmental model, the problem for aggressive children, then, lies in their failure to separate perception from action. For these children, fixed action patterns dominate their functioning, with little pause between perception and action. In fact, Greenspan and Shanker (2004) hypothesize that fixed action patterns are so automatic for aggressive individuals that if asked the reason for lashing out, they are likely to describe the perception and action, with little awareness of the emotion that triggered their response. It follows that the triggers for their aggressive outbursts never exist as freestanding images, and thus, fail to become symbolic. As long as perceptions remain at the presymbolic level, there remains little opportunity to develop effective emotion regulation strategies, nor a strong understanding of when and how to utilize them.

Not surprisingly, the relation between emotion regulation difficulties and physical aggression has been well established. According to Calkins and colleagues (Calkins & Johnson, 1998; Calkins, Gill, Johnson, & Smith, 1999), this is apparent as early as the second year of life. These researchers have demonstrated that 18- and 24-month-olds who utilize less adaptive emotion regulation strategies (i.e., venting, high focal-object focus) are more apt to exhibit distress under frustrating conditions, as well as aggression and conflict with parents and peers. This relation has been found to hold among children during the toddler years (e.g., 3½ years of age), and is predictive of externalizing

difficulties at school entry (Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002). Others theorize that poor emotion knowledge affects how social cues (i.e., perceptions) are interpreted (Denham et al., 2002; Hughes et al., 1998). In keeping with these views, both Crick and Dodge (1994) and Lemerise and Arsenio (2000) assert that emotions drive social information processing. Therefore, children who possess a limited understanding of emotions, and strategies for regulating them, are prone to biases at each step in the process. As evidence, preschoolers who exhibit high levels of anger in response to hypothetical provocations (e.g., vignettes and puppet paradigms) are more likely to choose aggressive responses and enact poor conflict resolution skills with peers (e.g., Denham, Bouril, & Belouad, 1994; Eisenberg, Fabes, Minore, et al., 1994). In theory, these children are not “choosing” their responses at all, but rather are tied to fixed action patterns involving aggression.

Despite these consistent findings, to date no study has investigated explicitly the role played by language in the relation between emotion regulation and aggression. In fact, only one known study has examined the association between children's language skills and emotion regulation. Using the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997), Fujiki and colleagues (2002) assessed the emotion regulation skills of children with and without SLIs. Based on teacher-ratings, children with normally developing language skills scored significantly higher than children with SLIs across a number of domains of emotional competence. Specifically, children with SLIs were rated as significantly lower on both the Lability/Negativity and overall Emotion Regulation subscales, and they were especially low with respect to displaying emotions appropriately, showing empathy, and being aware of one's own emotions. These findings

underscore the importance of language in furthering children's understanding and regulation of emotions, as well as the behavioural responses they select as a result.

Summary

In many ways, contemporary research regarding the development of self-regulation is consistent with the pioneering work of Vygotsky (1962), Luria (1961), and Greenspan (Greenspan, 1979; Greenspan, 2007; Greenspan & Shanker, 2004). Much like the Russian psycholinguists suggested decades before, modern researchers emphasize the existence of a transition period during the toddler years wherein children begin to display more developmentally mature functioning. Vygotsky (1962, 1978) and Luria (1961) attributed these changes to the internalization of egocentric speech. According to them, internalized egocentric speech, or subvocal inner speech, served to coordinate the various processes required for intrinsically governed regulation, beginning in preschool. Greenspan (Greenspan 1979; Greenspan 2007; Greenspan & Shanker, 2004) expanded on these ideas, albeit with reference to the role of emotions. Many contemporary researchers in the area of self-regulation acknowledge the importance of language; however, few have actually tested its role empirically. Those studies that do exist are united in proposing that language delays interfere with self-regulatory development. It may be that delays in language development disrupt the early meaning-making process between parents and their children, which in turn, hinders the development of adaptive self-regulation.

Parental Socialization of Children's Self-Regulation

The methods used by parents to foster their children's self-regulation can be grouped into two broad categories: responsiveness and control (Cummings, Davies, & Campbell, 2000; Maccoby & Martin, 1983). Parental responsiveness includes the myriad

of behaviours parents employ to establish an environment that is optimal for child rearing. This begins early with the formation of the attachment relationship; however, attachment-type practices, including caregiver warmth, sensitivity, and availability, continue to have an influence on children's self-regulatory development across early childhood. Control, in this context, refers to the parent's approach to discipline and skill development. Managing preschoolers' behaviour can be a difficult proposition given their strivings for greater independence. In order for self-regulation to emerge successfully, children must possess a clear understanding of what constitutes socially appropriate and inappropriate forms of behaviour. Parents are charged with communicating these expectations and imposing consequences for violations. Together, optimal parental responsiveness and control promote the internalization of regulatory strategies formed during early interactions. Both Luria (1961) and Vygotsky (1962, 1978) asserted that language was the means for this internalization, as children first mimic adult directives then assume them as their own.

Language impairments can interfere with the fluency of parent-child interactions, and thus, self-regulatory development, in two principle ways. First, deficits in receptive language may limit the extent to which children understand parental instructions (Conti-Ramsden & Friel-Patti, 1984; Leifer & Lewis, 1983). Under these circumstances, parents must recognize their children's level of language development and adjust the complexity of their directives accordingly (Whitehurst et al., 1988). Nevertheless, even when parents are cognizant of their children's weak language comprehension, the potential for misunderstanding remains high. Such misunderstandings may, in turn, be misinterpreted by parents as instances of noncompliance meant purposely to anger or frustrate, resulting in joint regulatory activities characterized by disharmony or outright hostility. Second,

expressive language deficits interfere with the ability of children to initiate and sustain interactions. As a result, children with delays in expressive language are limited when it comes to conveying specific needs to their caregivers. Such children may exhibit aggressive behaviour either out of frustration or as an alternative communication system (Carr & Durand, 1985). In either case, SLIs affect the ways in which parents promote self-regulation (i.e., responsiveness and control) and increase the likelihood that early joint regulatory interactions will be characterized by a lack of parent-child synchrony, high levels of negative affect, and poor internalization of moral messages.

Parental Control: The balance between autonomy and limit setting

Children's self-regulatory development is best facilitated by moderate levels of parental control. This entails characteristics of firm discipline, including delineating clear expectations, implementing rules consistently, and monitoring behaviour closely. However, optimal parental control also involves providing children with the opportunity to manage situations independently. In fact, many consider the relation between parental control and children's adjustment to be curvilinear in nature (Baumrind, 1991; Cummings et al., 2000; Kurdek & Fine, 1994). Grolnick (2003) defines such optimal levels of control as autonomy supportive parenting. This approach consists of parenting practices that promote a sense of personal agency in children insofar as choice, self-initiation, and active participation in decision-making are encouraged. Autonomy supportive parenting is democratic by nature, and features appropriate verbal give-and-take between parents and their children. A number of studies have demonstrated that autonomy supportive parenting is predictive of both emotional and behavioural regulation, as well as a more positive transition to the school environment (Denham, Renwick, & Holt, 1991; Grolnick & Farkas, 2002; Grolnick, Kurowski, & Gurland, 1999; Grolnick, Kurowski,

McMenamy, Rivkin, & Bridges, 1998). Furthermore, these researchers see autonomy support as favourable for children's internalization of prosocial values because it capitalizes on their intrinsic motivation for growth (Grolnick, Deci, & Ryan, 1997).

Baumrind's (1967, 1971) description of authoritative parenting epitomizes the curvilinear relation between parental control and children's adjustment. According to Baumrind, authoritative parents encourage their children's independence by insisting that they meet the standards of conduct deemed appropriate for their stage in development. They are firm in their demands, yet warm and accepting of their children's input, and thus, convey respect for their children's point of view. Perhaps most importantly, authoritative parents reinforce the limits they establish by providing their children with rationales for why rules need to be followed. Children of authoritative parents tend to possess high levels of self-esteem, pleasant dispositions, socially responsible behaviour, and self-reliance (Baumrind, 1991). Despite their ever-increasing independence, however, they maintain a strong sense of communion with both adults and peers (Baumrind, 1967, 1971). Subsequent research has generally supported Baumrind's predictions regarding the positive developmental outcomes for children of authoritative parents (Lamborn, Mounts, Steinberg, & Dornbusch, 1991; Steinberg, Lamborn, Darling, Mounts, & Dornbusch, 1994; Steinberg, Mounts, Lamborn, & Dornbusch, 1991).

It is unfortunately true that many times well-intentioned parents become overly intrusive during joint regulatory activities. This is often a function of their strong desire to see their children succeed (Grolnick, 2003). During such interactions, parental control detracts from self-regulatory development when it is disproportionate to the amount required by children to regulate or problem-solve independently. Such intrusiveness places children in an overly passive role that interferes with skill acquisition and may

engender negative emotions ranging from frustration to self-doubt. Intrusive or over-controlling approaches interfere with the internalization of parental messages because the children's acts fail to be made meaningful by the parent. Instead, children continue to view the responsibility for problem solving as that of the caregiver. Furthermore, with such little opportunity for autonomous regulation, they are slow in developing the skills needed for self-regulation, lagging behind same-aged peers with respect to problem-solving proficiency (Hubbs-Tait, Culp, Culp, & Miller, 2002). Not surprisingly, the literature is rife with examples of the effect parental over-control can have on the development of young children's self-regulation and aggressive behaviour problems (e.g., Calkins, Smith, Gill, & Johnson, 1998; Campbell, Pierce, March, & Ewing, 1991; Silverman & Ragusa, 1990).

Baumrind (1967, 1971) describes such parents as adopting an authoritarian style of parenting. Like authoritative parents, authoritarian parents are firm in their expectations but they tend to be inflexible, strict, and expect unwavering compliance with the parental agenda. When children of authoritarian parents attempt to assert their independence they are typically discouraged forcefully or punished, as their parents expect that they accept their decisions as absolute. Consequently, authoritarian parents rarely provide their children with explanations for why their rule transgressions are considered socially unacceptable. Without any rationale for their misbehaviour, children are left with no standards to internalize and poor self-regulatory development. Baumrind (1967) found children of authoritarian parents to be emotionally dysregulated, irritable, and lacking in initiative. While they are not likely to show disruptive behaviour problems, they still exhibit manifestations of self-regulatory difficulties including internalizing symptoms, social withdrawal, and poor self-esteem (Baumrind, 1991).

The opposite approach to parental control can exact even more detrimental effects on children's self-regulatory and prosocial development. When parents are not invested in early activities requiring mutual regulation, they fail to provide children with the necessary support for skill acquisition. Maccoby and Martin (1983) describe these parents as indifferent or uninvolved in their child's development. According to these researchers, uninvolved parents demand little from their children during interactions, and as a result, are absent from the meaning-making process. At the extreme, these parents are neglectful; they view interactions with their children as an inconvenience and seek to terminate these exchanges as quickly and effortlessly as possible. For children this results in only a modicum, if any, internalization simply because their parents rarely make salient the rationale behind decision-making or problem solving. In effect, children's behaviours are rendered meaningless, leaving them with few skills to carry forward into their relationships with others. Research has revealed that children of indifferent-uninvolved parents are at risk for particularly maladaptive outcomes including aggression, delinquency, substance abuse, and criminality (Lamborn, et al., 1991; Miller, Cowan, Cowan, Hetherington, & Clingempeel, 1993; Patterson, DeBaryshe, & Ramsey, 1989; Pettit, Laird, Dodge, Bates, & Criss, 2001).

Baumrind (1967, 1971) characterized parents who were overly lax in their approach to parenting as permissive. Although permissive parents are not necessarily as indifferent as the uninvolved parents described above, they are overly indulgent and rarely set limits on their child's (mis)behaviour. In effect, these parents tolerate their children's impulsive and disruptive behaviour, and thus, their children lack an appreciation for socially accepted standards of conduct. Not surprisingly, Baumrind (1967) found children of permissive parents to be poor self-regulators, as evidenced by

their demandingness, poor impulse control, and high levels of aggression (particularly among boys).

From a Vygotskian perspective, the curvilinear relation between parental control and children's adjustment reflects the importance of tailoring interactions to the ZPD. Of the parenting styles outlined above, however, only autonomy supportive parenting encourages meaningful parent-child dialogue. In contrast, over-controlling and under-controlling styles of parenting limit the amount of verbal exchange during joint regulatory activities, which in turn, may impede the growth of verbal mediation as a means for self-regulating. In fact, the communication styles characteristic of both intrusive and uninvolved parenting (i.e., basic vocabulary, minimal explanation, and fewer utterances overall) feature none of the qualities identified by researchers as integral for early language development (Huttenlocher, Haight, Bryk, Selyzer, & Lyons, 1991; Smolak & Weinraub, 1983; Tomasello, Mannle, & Kruger, 1986). A history of joint regulatory interactions characterized by such impoverished language use may hinder the coordination of thought and speech, and as a result, delay the internalization of private egocentric speech.

Studies investigating patterns of parent-child interaction and young children's use of private speech suggest that high levels of parental control are associated with disruptive behaviour problems among children (Winsler, 1998; Winsler, Diaz, McCarthy, Atencio, & Chabay, 1999). Winsler and colleagues compared a group of behaviourally at-risk preschoolers and their mothers with matched controls on a problem-solving task. The children were asked to complete the task twice, once in collaboration with their mothers, and once independently, while researchers coded for mother and child speech and behaviours. These researchers found that when compared to comparison dyads,

behaviourally at-risk mother-child pairs featured interactions involving more extrinsic-regulation, more maternal negative control, and less maternal physical withdrawal (i.e., autonomy support). In addition, behaviourally at-risk preschoolers, compared to comparison children, exhibited more *overt*, task-relevant speech during individual problem solving. This finding suggested to Winsler et al., that children with problems in self-regulation do not lack self-guiding speech; rather they are delayed with respect to the internalization of such speech. Given the aforementioned differences in mother-child interaction patterns, these authors concluded that maternal intrusiveness serves to hinder preschoolers' internalization of private speech. Even more notable, maternal withdrawal was found to be the strongest predictor of preschoolers' use of partially internalized private speech during individual problem solving, albeit only among comparison dyads. According to the authors, this reflects comparison parents' use of appropriate levels of control with their children and attests to the importance of operating within the ZPD during shared problem solving.

Parental responsiveness: Warmth, sensitivity, and emotional expression

Despite the fact that parental responsiveness is often treated in the literature as though it were a singular construct, there is much variability in terms of how it is expressed within parent-child relationships. Parenting factors such as warmth, sensitivity, and emotional availability undoubtedly coincide during interactions with children but each may vary according to the particular situation or the characteristics the child and/or parent bring to their interactions. In fact, some research suggests that parenting factors commonly treated as one and the same, are relatively unrelated to each other, and as such, differentially predict children's adjustment in kindergarten and middle childhood (Pettit, Bates, & Dodge, 1997). Furthermore, parenting behaviours such as warmth or sensitivity

can be displayed in a variety of ways, while still serving to facilitate children's self-regulation (Parke & Ladd, 1992). Given its multifaceted nature, the following review of parental responsiveness is divided according to the separate but complimentary lines of research subsumed within its definition.

Caregiver warmth and sensitivity. Emotional availability is central to most conceptualizations of parenting irrespective of whether it is described in terms of positive emotional tones, sensitivity to children's psychological states, or responsiveness to children's needs (Baumrind, 1971, Greenspan, 2007; Grusec & Goodnow, 1994; Hoffman, 1983; Maccoby & Martin, 1983). These parenting characteristics become even more important when children have difficulty expressing states of distress, as is often the case with children who possess SLIs. Maccoby and Martin (1983) describe parental sensitivity as a three-step process that involves interpreting the symptoms and causes of distress states. According to these authors, warm and sensitive parenting involves accurately assessing the child's problem, generating a response that is appropriate to the situation, and evaluating the consequences of the intervention relative to the child. Complicating this process is the fact sensitivity can vary at each step according to the goals of the parent. Sensitive parents are typically accepting and responsive, utilizing praise, encouragement, and positive affect to support their child's autonomous functioning. This is not to suggest, however, that sensitive parents are never demanding of their children; rather, they often redirect their children's misbehaviour assertively, albeit in ways that are never dismissive or rejecting of their efforts. When parents are overly critical, harsh, or worse yet, abusive, their children may internalize a sense that they are not valued or loved unconditionally.

Numerous studies have shown that warm and sensitive parenting is implicated in positive child outcomes. For instance, Bates and Bayles (1988) demonstrated that maternal affection was inversely related to 5- and 6-year-old children's externalizing problems. Similarly, Booth, Rose-Krasnor, McKinnon, and Rubin (1994) found maternal warmth at age 4 was negatively related to externalizing problems at age 8. Findings more recently have linked parental warmth directly with children's compliance or other forms of self-regulation (e.g., Colman, Hardy, Albert, Raffaelli, & Crockett, 2006; Dennis, 2006; Feldman & Klein, 2003; Pettit et al., 1997; Wakschlag & Hans, 1999). Pettit et al. (1997) found supportive maternal parenting (including both warmth and proactive teaching) during interactions with their preschoolers predicted social adjustment when their children were in grade 6. In addition, Feldman and Klein (2003) showed that mothers' sensitive parenting style and warm control were associated with compliance with both parents, as well as caregivers outside the home (e.g., day care).

A warm and sensitive approach to parenting is particularly effective when used in concert with the autonomy supportive practices outlined above. Naturally, when parents utilize autonomy supportive parenting practices they must anticipate that their children will exhibit frequent judgment and performance errors when problem solving. Often the greatest opportunities for meaning-making occur following rule transgressions or faulty decision-making. Under these circumstances, disciplinary approaches that incorporate inductive-reasoning are regarded as the most appropriate for the internalization of rules and standards of conduct (Grusec & Goodnow, 1994; Hoffman, 1983, 1994). According to Hoffman (1983, 1994), inductive disciplinary techniques are effective because they draw on both the child's cognitive and affective experience of problems in order to promote moral and prosocial development. For instance, in addition to redirection and

further instruction, parents who use inductive-reasoning practices direct their children's attention away from the effects their rule violations have had on themselves and toward the effects these mistakes have had on others. This, in turn, promotes feelings of empathy and self-reflective emotions (e.g., guilt) that persist beyond the parent-child disciplinary interaction and motivate the child to repair the situation. When done in a calm and sensitive fashion, parents convey to their children their disapproval, albeit in ways that evoke only mild levels of distress. Stated another way, during these interactions parents' warmth and sensitivity help regulate their children's emotional response so that they may attend to the moral message. Ultimately, inductive disciplinary techniques augment the meaning-making process by making explicit the cause-effect relationships that correspond to children's actions.

On the other hand, when parenting takes on an overly critical or harsh quality, children are less apt to internalize the fundamentals for self-regulation. This is sometimes the case when children's repeated rule violations are misinterpreted by their parents as intentional acts meant to frustrate rather than developmentally appropriate errors inherent to the learning process (Bugental & Happaney, 2002). These types of misattributions are common among parents of aggressive children due to their often poor understanding of their children's development (Sigel & McGillicuddy-DeLisi, 2002), and may be exacerbated when children exhibit SLIs. As a result, parents may resort to harsh parenting tactics and more power-assertive disciplinary approaches (Grolnick, 2003; Grusec & Goodnow, 1994; Hoffman, 1983, 1994) in an attempt to force compliance with the parental agenda. Harsh and power-assertive disciplinary practices typically take the form of commands, threats, or physical force, and effectively usurp children's roles as active agents in problem-solving (Cummings et al., 2000). Not surprisingly, violence

against children has been shown to hinder both language development and self-regulation in young children (Coster, Gersten, Beeghly & Cicchetti, 1989; Eigsti & Cicchetti, 2004; Huth-Bocks, Levendosky, & Semel, 2001).

Hoffman (1970) argues that power-assertive discipline serves to evoke high levels of arousal, which ultimately interferes with children's ability to attend to caregiver redirection. Unlike the inductive-reasoning approach described above, power-assertive strategies dysregulate children emotionally and undermine internalization. For these children, what is made meaningful during parent-child interactions are the consequences for misbehaviour rather than the moral message or rationale for prosocial behaviour. This allows for immediate compliance (given the fear children may have for their well-being) but long-term difficulties. Because they are limited in their ability to self-regulate, and lack a true appreciation for prosocial conduct, Hoffman (1970) suggests these children resort to mimicking their caregiver's characteristic style of discipline with others, a finding that is well established in the literature (Campbell et al., 1996; Dishion, 1990; Dodge, Pettit, & Bates, 1994).

Interestingly, some research suggests that the effects of warm and harsh parenting are not mutually exclusive. Deater-Deckard and colleagues (Deater-Deckard & Dodge, 1997; Deater-Deckard, Ivy, & Petrill, 2006) demonstrated that maternal warmth moderates the effects of harsh parenting on children's externalizing behaviour problems, suggesting that caregiver sensitivity may somewhat offset the potential for disruptive behaviour. It may be that periods of caregiver warmth allow for modest internalization of moral messages. On the other hand, these findings also imply that particularly negative outcomes can be expected for children when parents are both harsh and lack warmth.

Emotional expressivity. During interactions with their children, parents also foster self-regulation by responding in emotionally provocative ways to their children's behaviours. Parents' emotional expressivity enhances the internalization process in that it attenuates their children's emotional experience during shared regulatory activities. For children, actions become more meaningful when they evoke emotional responses from caregivers (Greenspan, 2007; Greenspan & Shanker, 2004). Parents' emotional expressions reinforce for children that their actions have a legitimate impact on those in their environment. This dimension of the parent-child relationship, labeled affective induction (Thompson, 1991), affective attunement (Stern, 1985), or emotion referencing (Campos & Sternberg, 1981; Saarni, 1999) by researchers in the field, refers to parents' purposeful use of emotion signals to modulate their children's emotional experience and socialize them to the emotional display rules accepted by their society. In embellishing facial expressions and exaggerating vocal tones, parents facilitate their children's understanding of emotions and emotional expression, particularly during instances when emotional responses are ambiguous (Zarbatany & Lamb, 1985) or during preverbal interactions (Papousek, 2007). Gottman and colleagues (Gottman, Katz, & Hooven, 1997) believe such practices help children to become cognizant of the thoughts, feelings, and goals associated with emotional expression, resulting in the meta-emotive understanding that essentially underlies emotional self-regulation.

Parents' typically employ emotional expressions in a strategic fashion in order to transform their children's negative affect into positive (Tronick, 1989). Along these lines, a number of studies find that mothers are more likely to imitate infants' positive, as opposed to negative, emotional expressions, and they attempt to quickly reestablish positive emotions when their infants display negative affect (Cohn & Tronick, 1987;

Lavelli & Fogel, 2005; Malatesta, 1990). The importance of maintaining positive affect during early parent-child interactions, and its relation to later self-regulatory outcomes, has been demonstrated repeatedly by Eisenberg and colleagues (e.g., Cumberland-Li, Eisenberg, Champion, Gershoff, & Fabes, 2003; Eisenberg et al., 2001). Findings from these studies suggest that parents who express high levels of positive affect and low levels of negative affect while their children are in preschool are more likely to have children, who in middle childhood, effectively regulate their emotions, and are more socially competent, particularly when it comes to externalizing behaviours. These researchers maintain that by consistently displaying positive affect, especially after ambiguous or otherwise negative events, parents model emotional responses that protect their children from excessive negative emotionality.

Research has consistently shown that the valence of caregivers' emotional expressions has a considerable effect on children's emotion regulation and overall social functioning. For instance, Denham and colleagues (Denham, Workman, Cole, Weissbrod, Kendziora, & Zahn-Waxler, 2000) found that both maternal and paternal displays of anger, as measured during interactions with their preschoolers, were associated with their children's externalizing difficulties in middle childhood. Eisenberg et al. (2001) went a step further in examining how maternal emotional expression affects young children's social competence via children's emotion regulation. They found that children's emotion regulation mediated the relation between mothers' emotional expressivity and children's behavioural adjustment. That is, mothers' who regulated their own emotional expression ineffectively (e.g., high in negative affect, low in positive affect) were more likely to have children who regulated their emotions ineffectively and as a result, were more socially incompetent, particularly with respect to externalizing

behaviours. This finding is made more compelling by the fact that when compared to two child driven models, this maternally driven model, explained more of the variance in children's social competence. Still further, research with children of depressed mothers, a group who typically receive very little in the way of emotional responsiveness, shows that they are prone to self-regulatory difficulties and behaviour problems like aggression (Forbes et al., 2006; Hay, Zahn-Waxler, Cummings, & Iannotti, 1992; Nelson, Hammen, Brennan, & Ullman, 2003). Together, these studies provide strong evidence for the influence parents' emotional expression can have on children's development of emotional self-regulation.

Interestingly, however, research suggests that children's self-regulation is not merely a function of a high ratio of positive to negative parental emotional expressions. Cole, Teti, and Zahn-Waxler (2003) found that mothers and their conducted disordered children, showed less mutual positive emotion, more mutual anger, and more emotional mismatches than controls. While these authors acknowledged the adverse effects of high negative emotionality and low positive emotionality for children's behavioural difficulties, they concluded that the emotional mismatches between parent and child were particularly detrimental for children's development of emotion regulation. Specifically, Cole and colleagues suggested that when mothers respond to their children in ways that do not match the valence of their emotions (i.e. high parental positive emotion in response to high child negative emotion), children infer that their parent lacks a true understanding for their emotional experience. When this occurs, parents fail to make salient the thoughts, feelings, and goals that are associated with the child's negative emotional state. In other words, they overlook opportunities to facilitate the child's meta-emotive understanding. This finding is consistent with the role of emotions in parent-child

interactions, as proposed by Greenspan (Greenspan, 2007; Greenspan & Shanker, 2004), and findings pertaining to the interactions between depressed mothers and infant sons (Weinberg, Olson, Beeghly, & Tronick, 2006). As noted above, Greenspan has suggested that parents initiate their children's self-regulatory development when they accurately respond to the intent of their children's emotions. Emotional mismatches between parents and children hinder emotional signaling and the symbolization of emotion-laden images.

To date, no studies have directly explored the link between parents' emotional responsiveness and children's internalization of private speech. Nevertheless, research has shown consistently that parental responsiveness is a primary predictor of children's language development (Burchinal et al., 2000; McCartney, 1984; NICHD Early Child Care Research Network, 2002). A number of studies have shown that parental sensitivity, whether in the form of warmth, contingent responding, or general stimulation, is associated with children's positive language outcomes (Burchinal, Roberts, Nabors, & Bryant, 1996; Landry, Smith, Swank, Assel, & Vellet, 2001; Weizman & Snow, 2001). Recently, the importance of parental responsiveness for children's language development has been shown in longitudinal studies exploring the consistency of responsiveness and its effects on children's language abilities (Hirsh-Pasek & Burchinal, 2006; Landry et al., 2001; Bornstein & Tamis-LeMonda, 1989). These studies have found that in spite of high levels of early parental responsiveness, subsequent reductions in sensitivity during late toddlerhood predicted corresponding decelerations in children's language development. It may be, as Greenspan (2007) suggests, that parental warmth and sensitivity are essential for sustaining the exchanges - first emotional, then verbal - needed for continued language development at this stage. Coincidentally, this period

corresponds with the key transition phase in self-regulatory development or the point at which the onus for regulatory responsibility begins to shift from other to self. Decreases in sensitivity may thus reflect some parents' tendency to overestimate their children's stage in development, leading to negative consequences for language and self-regulatory development.

Scaffolding

One way to encapsulate the various methods parents use to promote their children's self-regulation is by considering them in reference to Vygotsky's (1962, 1978) notion of the zone of proximal development (ZPD). While the ZPD has traditionally found wide acceptance in the education literature (Evans, Moretti, Shaw, & Fox, 2003; Mattanah, Pratt, Cowan, & Cowan, 2005; Meyer & Turner, 2002; Pratt, Kerig, Cowan, & Cowan, 1988), it has only been in recent years that researchers concerned with children's self-regulation have begun to adopt it, recognizing that self-regulatory skills develop largely in the context of parent-child interactions (e.g., Denham, Mason, & Couchoud, 1995; Winsler et al., 1999). As they mature, children encounter more and more situations in which they are forced to reconcile their own wishes with the demands imposed upon them by their environment. These instances provide parents with ready-made opportunities to foster their children's self-regulatory growth by way of joint problem solving interactions. When these interactions are positive, parents structure problem-solving efforts in accordance with their children's level of ability, while remaining sensitive to their children's emotional arousal. In this way, parents serve as their children's first instructors, imparting meaning to their early problem-solving attempts.

To apply the ZPD systematically in the context of problem-solving interactions, researchers were forced to develop a working definition that enabled empirical study.

Among the first to do so were Wood and Bruner (Wood & Middleton, 1975; Wood, Bruner, & Ross, 1976; Wood, 1980), who introduced the term "scaffolding" (Wood et al., 1976, p. 90) to describe the process by which adults guide children's skill acquisition. Specifically, they suggested, "scaffolding consists essentially of the adult 'controlling' those elements of the task that are initially beyond the learner's capacity, permitting him to concentrate upon and complete only those elements that are within his range of competence" (Wood et al., 1976, p. 90). Therefore, in keeping with Vygotsky's (1978) theory, the purpose of scaffolding was to assist children in accomplishing a task that was beyond their ability reach independently. As the novice (i.e., child) approaches task competence, the expert (i.e., parent) gradually relinquishes control until the task is mastered.

As parents scaffold their children's problem-solving efforts, they must acknowledge their children's region of sensitivity and apply contingency rules accordingly. The region of sensitivity corresponds to the difference between the level of skill acquisition at which children are experiencing difficulty and the one at which they are currently performing successfully (Wood & Middleton, 1975). This presupposes that the parent has a solid understanding of their children's level of development, as instruction that is either too advanced or too basic will stunt skill acquisition. Wood and Middleton (1975) suggest that, ideally, experts add one additional operation or decision to those that the novice is currently performing. This may entail supporting the decision-making process by reducing the degrees of freedom, modeling, accentuating particular features, and maintaining problem-solving efforts in the direction of the overall goal (Wood et al., 1976). In addition, parents must remain vigilant to their children's successes and failures such that when their children succeed, support is reduced, and

when they fail, it is increased. Adherence to such "contingency rules" (Wood & Middleton, 1975, p. 185) provides children with the opportunity for mastery and internalization. These researchers found that effective maternal use of these contingency rules during a tutoring task predicted successful skill acquisition (Wood & Middleton, 1975; Wood, 1980).

Consider, however, that the purpose of the ZPD, and by extension the scaffolding process, is the children's internalization of skills. While the aforementioned instructional strategies represent what Wood and Middleton (1975) propose are the optimal conditions for skill acquisition, internalization assumes that children understands the purpose behind such skills. Accordingly, Wood and colleagues (1976) contend that the learner's (i.e., child's) comprehension of the solution must precede his/her independent skill production. In Vygotskian terms, knowledge of the goal gives meaning to otherwise nondescript problem-solving behaviours. Comprehension of the solution enables understanding of means-ends and/or cause-effect relationships, which in turn, informs the decision-making process, making it more planned and purposeful. Moreover, this understanding makes expert feedback more influential (Wood et al., 1976). Thus, within the context of parent-child relations, parents are responsible for more than merely structuring a task; they must provide children with the metacognitive information necessary to make salient the rationale behind decision-making.

While Wood and colleagues (1976) did not examine the emotional tone of scaffolding interactions, they acknowledged that experts must establish an atmosphere that promotes the involvement of children in the problem-solving process. In their original paper, these authors remarked that the tutor "brought to the task a gentle, appreciative approach to the children" (Wood et al., 1976, p. 92). According to the

authors, the tutor's use of encouragement served to promote and sustain children's interest in the task, while simultaneously acting to regulate their frustration. On the other hand, her well timed use of subtle and non-threatening forms of discouragement helped children shift from less structured, imaginative play to goal-directed behaviour. Much like the qualities inherent in the attachment relationship, when experts are warm and responsive, novices are free to practice their problem-solving skills with the knowledge that their failures will be met with support and not rejection.

Based on the work of Wood and colleagues (Wood, 1980; Wood et al., 1976; Wood & Middleton, 1975), researchers adopting a Vygotskian perspective developed systematic methods for measuring the scaffolding process (Conner, Knight, & Cross, 1997; Pratt et al., 1988). These formulations were effective insofar as they captured the didactic qualities of these interactions. However, they were limited by their almost exclusive focus on the verbal aspects of the interaction and incomplete in their coverage of the metacognitive information. As a result, they failed to capture the true essence of Vygotsky's (1978) conceptualization of speech, which included not only verbal output but non-verbal expressions and the general context of the communication as well. Moreover, little attention was paid to the emotional climate of the scaffolding process. Neitzel and Stright (2003) improved upon these formulations in conceptualizing scaffolding as consisting of three forms of support: cognitive, emotional, and autonomy.

According to Neitzel and Stright's (2003) view of scaffolding, cognitive support refers to the provision of metacognitive content in a manner suited to the child's cognitive needs. Vygotsky (1978) theorized that the expert's use of *metacognitive information* determines how well the novice conceptualizes a problem, recognizes appropriate strategies, and attends to specific elements of the task. Parents' use of metacognitive

information often takes the form of suggestions regarding the use of strategies, such as which ones are available, how they can be employed, and in what contexts they will be effective (Stright, Neitzel, Sears, & Hoke-Sinex, 2001). More importantly, metacognitive information involves explanations regarding the rationale underlying decision-making. For this reason, metacognitive information may be particularly important following children's problem-solving failures when such instruction may help them grasp why their approach was ineffective. Findings from their studies reveal that parents' manner of instruction moderates the effect metacognitive information has on children's self-regulatory competence in the classroom (Neitzel & Stright, 2003; Stright et al., 2001). They discuss parents' manner of instruction as consisting of two techniques. First, parents must *regulate task difficulty* by breaking the task down into manageable steps. Second, they must continually *review* the steps required in relation to the overall goal (Neitzel & Stright, 2003; Stright et al., 2001). These efforts serve to decrease the cognitive load placed on children, which in turn, promotes their mastery of the task and prevents potential discouragement.

The acquisition of skills leading to self-regulation is a painstaking developmental process involving frequent setbacks and periods of negative emotion. To a large extent, these difficulties are critical for self-regulatory development, as they provide the opportunity to repair and regulate states of discomfort (Gianino & Tronick, 1988). However, excessive negative emotionality can hinder the scaffolding process, spoiling parental instruction and impeding children's internalization. Parents establish the atmosphere for effective problem solving in a variety of ways including through praise, motivational statements, and a positive tone of voice (Stright et al., 2001). Furthermore, non-verbal behaviours such as steady eye contact, positive facial expressions, and

comforting gestures convey to children that their efforts are accepted irrespective of their performance. Evidence for the effect of a positive emotional environment on children's internalization comes from research regarding disciplinary styles (Hoffman, 1983). As noted above, Hoffman suggests that moderate levels of arousal, as opposed to low or high levels of arousal, are optimal for internalizing parental messages. Aside from inducing positive affect in these ways, instruction that is tailored to the children's region of sensitivity, and which adheres to contingency rules, conveys to children that their parents are invested in their efforts, and available to assist when needed. Support for the emotional element of scaffolding comes from research showing that children of parents who provide an emotionally supportive environment are more likely to internalize their parents' dictates and model their behaviour (for a review see Grusec & Goodnow, 1994).

In contrast, children's skill acquisition can be adversely effected by parental criticism and/or signs of disapproval. Harsh responding, low affective tones, and minimal encouragement communicate to children a lack of parental interest in their efforts and in many ways are tantamount to *rejection*. Worse yet, when children's problem-solving errors are met with consistent parental disappointment, their motivation to accept subsequent instruction may be reduced (Grusec & Goodnow, 1994). Interestingly, Stright and colleagues (2001) found emotional support moderated the effect of metacognitive information on aspects of children's academic self-regulation. That is, higher quality metacognitive content by parents was associated with children's self-regulatory behaviours in the classroom but only when such information was conveyed in an emotionally supportive manner. This finding attests to the importance of emotional support within scaffolding interactions.

The transfer of task responsibility from parent to child represents the culmination of the scaffolding process (Neitzel & Stright, 2003). In their formulation of scaffolding, Neitzel and Stright (2003) discuss two aspects of autonomy support. The first, *control*, refers to the degree to which parents exercise control over their children's problem-solving attempts beyond what seems necessary for them to do the task. Parental control has been well studied in the self-regulation literature, with researchers differentiating between positive and negative forms (Belsky, Rha, & Park, 2000; Eiden, Leonard, & Morrisey, 2001; Feldman & Klein, 2003; Kochanska & Knaack, 2003; Silverman & Ragusa, 1990; Stansbury & Zimmermann, 1999). Negative control corresponds to the definition of control provided by Neitzel and Stright (2003) and is further characterized by intrusiveness and power-assertion. When parents are overly intrusive, children are prevented opportunities to engage in genuine self-regulation. These children are rendered passive recipients, who although they may be capable of self-regulation, fail to do so because they do not recognize that it is their responsibility (Neitzel & Stright, 2003). Positive control however, is consistent with Wood and Middleton's (1975) concept of the region of sensitivity. It refers to instruction that is more flexible or developmentally sensitive, assuming a more direct or supportive form depending on children's needs. Through independent problem-solving efforts, children build a sense of personal agency that serves to motivate and sustain future attempts. During children's autonomous problem solving, parents provide support by *encouraging the child's active involvement* via prompts, hints, or questions (Neitzel & Stright, 2003). In general, positive control has been found to correlate with self-regulatory development (e.g., Kochanska & Askan, 1995; Putnam, Spritz, & Stifter, 2002; Strand, 2002), while negative control has been

shown to effect children's self-regulation adversely (e.g., Calkins et al., 1998; Campbell et al., 1991; Silverman & Ragusa, 1990).

Overall, Neitzel and Stright's (2003) conceptualization of the scaffolding model is more comprehensive than earlier formulations. This is particularly important for the study of aggressive preschoolers given the multifaceted nature of their self-regulatory difficulties. It has been used once previously in order to distinguish mothers of aggressive and non-aggressive preschoolers, with mothers of non-aggressive children found to be significantly better "scaffolders" in terms of cognitive, emotional, and autonomy support (Clark, 2005). Only one other study is known to have explored the relation between parental scaffolding and children's behaviour problems. Winsler et al. (1999) found that compared to controls, mothers of children who were identified by their teachers as exhibiting behaviour problems displayed increased other-regulation (distinguished from the child's self-regulation), more negative control, and lower amounts of praise. These researchers implicated the dyad's shared history of problem solving as a critical factor in children's poor self-regulatory development. Neitzel and Stright's model of scaffolding should provide further clarification as to the specific parenting processes that facilitate or delay self-regulatory development among aggressive preschoolers.

Summary of the Problem and Objectives of the Present Study

The preceding literature review points to the preschool period as the first stage during which children who exhibit clinically significant levels of physical aggression can be reliably distinguished from their peers. This implies that such children have been slow in developing the self-regulatory skills necessary to manage their aggressive impulses. Without appropriate intervention, these highly aggressive preschoolers will remain at risk for a variety of negative outcomes across the lifespan. In keeping with the views of most

in the area of child development, this study takes the position that self-regulation is best nurtured within the context of supportive parent-child relationships (Ainsworth et al., 1978; Keenan, 2000; Kopp, 1982). Through early mutually regulated interactions, parents facilitate their children's acquisition of self-regulatory skills by imbuing their previously nondescript actions with meaning (Vygotsky, 1978). Still, many parent and/or child factors may complicate the meaning-making process and interfere with children's internalization of self-regulatory skills. Chief among these factors are childhood speech and language impairments (SLIs), which have been proposed by some to predispose children to a variety of emotional/behavioural disorders, including aggression (Baker & Cantwell, 1987; Beitchman et al., 1986; Camarata et al., 1988; Montare & Boone, 1973). While such deficits further tax the already painstaking process that is self-regulatory development, parents can circumvent the challenges posed by their children's SLIs when they appropriately structure, or scaffold, early problem-solving interactions.

Research Questions and Hypotheses

The present study examines a number of hypotheses regarding the association between language and aggression in preschool aged children. First, due to the largely ambiguous findings found in the literature with respect to the language-aggression link in childhood, a primary objective will be to corroborate this association in a preschool sample. Second, this study seeks to identify the specific language deficits (i.e., receptive, expressive, semantics, syntax) implicated in the language-aggression link. Once again, the extant literature is largely inconsistent with some studies attributing the relation to receptive delays (Silva et al., 1987), while others attribute it to expressive language delays (Cole, 2001; Dionne et al., 2003).

In addition to these questions, the current study will assess the language-aggression link via a self-regulatory pathway. As noted in preceding sections, we have yet to determine the mechanism(s) by which language leads to physical aggression. Therefore, as a first step, this study will examine relations between the primary variables of interest (i.e., language skills, physical aggression), the factors believed to account for their relation (i.e., self-regulation as measured by executive functioning), and the conditions under which these factors develop (i.e., scaffolding). Following, the self-regulatory pathway will be analyzed by way of a mediational model that features preschoolers' executive functioning as intervening variables in the relation between language and aggression. In keeping with the work of the major theorists discussed above (Barkley, 1997/2005, 2001; Kopp, 1982, 1989; Luria, 1961; Vygotsky, 1962, 1978), it is expected that the mediational model will clarify just how language deficits predispose children to aggressive behaviour problems, namely by interfering with self-regulatory development.

In order to elucidate further the conditions that set forth this developmental trajectory, maternal scaffolding will be examined in terms of its influence on the triangular relations between preschoolers' language, self-regulation, and physical aggression. As theorized by Vygotsky (1962, 1978), for there to be internalization, caregivers must make meaningful the skills required for children to self-regulate. In the absence of such meaning-making interactions, regulation remains on an inter-psychological plane, or within the purview of caregivers, and thus leaves children vulnerable to regulatory problems as they mature. Therefore, given that high quality parental scaffolding establishes the conditions for internalization to occur, it is expected that for children of effective 'scaffolders', executive functioning will mediate the relation

between preschoolers' language skills and their physical aggression. Should this prove to be the case, this would provide some evidence for the position that these parents facilitated their children's self-regulatory development by promoting the internalization of language and executive functioning. In contrast, because the interactions between poor scaffolding parents and their children are believed to consist of less meaning making, it is expected that the direct-effects model (i.e., language-aggression) will be significant, with no evidence for mediation found. In other words, for these children, the internalization of language is hindered due to the lack of meaning provided by their caregivers.

Overall, it is hoped the results of this study can further our current understanding in regards to the early factors that contribute to high levels of physical aggression in childhood. Such information may prove to be vital for treatment efforts designed to address aggression in preschoolers, particularly given the recent emphasis on more integrated forms of intervention (e.g., Landy & Menna, 2006; Webster-Stratton, 2003). Based on the literature review presented above, the following hypotheses and/or research aims are proposed:

Step One: Examine language-aggression link

1. Preschoolers' overall language skills (i.e., core language index) will be negatively related to their physical aggression.
2. An attempt will be made to determine the particular language domains (i.e., receptive, expressive, semantic, syntactical) implicated in the relation between language and aggression.

Step Two: Investigate the language-aggression link by way of the self-regulatory pathway

3. Preschoolers' executive functions (i.e., self-regulation) will be positively related to their language skills and inversely related to their physical aggression.
4. Preschoolers' executive functions will mediate the relation between their language skills and physical aggression.

Step Three: Analyze the language-aggression link by way of maternal scaffolding

5. Maternal scaffolding will be positively related to preschoolers' language skills and executive functions, but inversely related to their physical aggression.
6. Among children of "high scaffolding" mothers, preschoolers' executive functioning will mediate the relation between their language skills and physical aggression.
7. Among children of "low scaffolding" mothers, the direct-effects model (i.e., language-aggression) will be significant, while no evidence will be found for the mediating effect of executive functioning.

CHAPTER III

Method

Participants

Participants were 144 mother-child pairs. Of these participants, 15 completed less than half of the study battery and were excluded from analyses. Two additional cases were deleted because English was not the primary language spoken in their homes. The detection of significant univariate outliers precluded one further case from inclusion in the analyses. The final sample consisted of 126 mother-child pairs. Based on an a-priori power analyses using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009), this provided a sample large enough to detect a medium effect size ($f^2 = .15$; Cohen, 1992), given a desired statistical power level of .8, and up to four independent variables. Detection of a medium effect size was considered a reasonable expectation based on the anticipated yield from recruitment efforts and the time expected to complete the study. At the same time, a sample of 126 mother-child pairs was sufficiently sensitive to detect substantively significant findings.

Children ranged in age from 3 to 6 years ($M = 58.5$ months, $SD = 10.76$). Of the 126 child participants, 59% were male, 41% were female. Most children were in some form of school or daycare placement at the time of participation, with approximately 21% in preschool or daycare, 38% in junior kindergarten, 27% in senior kindergarten, and 9% in grade 1. Only seven children were not in school at the time of participation. The majority of the mother-child pairs were Caucasian, although various ethnicities were represented, including First Nations, South Asian, East Asian, African Canadian, and Hispanic. While very few children ($n = 2$) had been diagnosed with a learning disability or attention-deficit/hyperactivity disorder, a slightly greater proportion ($n = 16$) was

suspected by their mothers to have a disorder. Six children were receiving psychological services at the time of participation, while another 12 children were taking medication, primarily for allergies. Child participants were predominantly from two parent homes. Of those children from single parent homes, all were reported to reside with their mother. One child was living with the maternal grandparents at the time of participation but had been under the care of her mother until a few weeks prior to participating. This child participated in the study with her mother. The vast majority of children had siblings ($M = 1.29$, $SD = 0.82$), with 57.1% having one sibling, 25.4% having two, and 6.4% having three or more siblings. Only 11.1% of children had no siblings at all. Children for whom English was not their primary language were allowed to participate but were not included in analyses. Demographic information for the children who participated is summarized in Table 1.

Mothers in the sample ranged in age from 24 to 46 years ($M = 35.46$, $SD = 5.04$). Most were married with an additional eight mothers reporting common-law status. Nine others were divorced or separated at the time of participation. Maternal education varied however all but one mother indicated that they had completed high school. Most mothers reported graduating from college or university, while another 18.4% had completed graduate or professional school. An additional 18% of mothers indicated that they had completed at least some college or university. Only 4% of mothers reported that they had graduated high school without any post-secondary degree. Approximately 60% of mothers were employed. Others in the sample identified themselves as “stay-at-home” mothers (22.3%) or were in school (19.0%). Household income was normally distributed, with the \$61,000 to \$100,000 category representing the most frequently reported. The demographic characteristics of the mothers in the sample are summarized in Table 1.

Table 1

Demographic Characteristics (N = 126)

	<i>N</i>	<i>%</i>
Child Gender		
Male	74	58.7
Female	52	41.3
Child's Grade		
Preschool or Daycare	26	20.8
Junior Kindergarten	47	37.6
Senior Kindergarten	34	27.2
Grade 1	11	8.8
Not in School	7	5.6
Missing	1	0.8
Marital Status		
Married	107	84.9
Divorced	2	1.6
Separated	7	5.6
Living Together or Common-Law	8	6.3
Other	2	1.6
Family Structure		
Two Parent	106	84.1
Single Parent	19	15.1
Other	1	0.8
Mothers' Education		
Some High School	1	0.8
Graduated High School	5	4.0
Some College or University	22	17.5
Graduated College or University	74	58.7
Completed Graduate or Professional School	23	18.3
Missing	1	0.8
Mothers' Ethnicity		
Caucasian	100	79.4
South Asian	4	3.2
East Asian	4	3.2
African Canadian	1	0.8
Hispanic	1	0.8
First Nations	4	3.2
Biracial	3	2.4
Other	9	7.2

Table 1 Continued

Demographic Characteristics (N = 126)

	<i>N</i>	<i>%</i>
Household Income		
Below \$30,000	13	10.3
\$30,000 to \$60,000	28	22.2
\$61,000 to \$100,000	44	34.9
\$101,000 to \$150,000	28	22.2
\$151,000 to \$250,000	12	9.5
Above \$250,000	1	0.8
Recruitment Source		
Preschool or Daycare Facilities	1	0.8
Elementary Schools	1	0.8
Children's Mental Health Agency	5	4.0
Parenting Magazines	26	20.6
Parenting Websites	24	19.1
Community Events	4	3.2
Participant Pool	16	12.7
Referral	21	16.7
Missing	28	22.2

Recruitment and Procedure

After securing clearance from the Research Ethics Board at the University of Windsor, children, age three to six, and their parents were recruited to participate in a larger project investigating the relations between parenting practices, quality of the parent-child relationship, and young children's social behaviour and overall adjustment and (Dr. R. Menna, Primary Investigator; funded by the University of Windsor Internal Humanities and Social Sciences Research Grant). Children who had been diagnosed with developmental disabilities (e.g., PDD, FASD) were not eligible to participate. Mother-child pairs were recruited from daycare settings, elementary schools, parent resource centers, parenting websites, parenting magazines, children's community events, psychology courses at the University of Windsor, and through general referral. Prospective participants were contacted by phone, or electronic mail, and provided information on the study, including a brief description of the study aims, the activities and time required to participate (for both parent and child), as well as compensation for participation. Parents who expressed interest in participating were scheduled for two one and a half hour sessions. All sessions took place in a laboratory at the University of Windsor. As a token of appreciation, child participants were allowed to choose a small prize (e.g., toy, sticker, colouring book) after completion of the study, while parents received compensation in the form of \$10 (for parking and/or transportation costs) and a \$5 gift certificate to a popular coffee chain (for completing a series of questionnaires). Mothers who were enrolled in a psychology course at the University of Windsor were also eligible to receive 3 bonus marks toward one psychology course of their choice. Participants who were unable to complete the study, either by choice or lack of availability, were still offered compensation for any time contributed to the study.

Prior to test administration, participation requirements were reviewed and informed consent was obtained from the parent and assent was obtained from the child. The general aims of the study were reiterated, as well as the terms of confidentiality, and possible risks and benefits (for both mother and child) to participation. The researcher and/or research assistant also reviewed with the parent the purpose of videotaping and the subsequent handling of their recorded interaction. Parents were provided with a document for their records detailing the aforementioned information.

Once informed consent was obtained, mothers and their children were invited to begin the study. Participation requirements for the child consisted of completing the videotaped interaction with their mother, an evaluation of cognitive ability, an assessment of language skills, and three additional tasks that were part of the larger project but not used in the present study. Tasks were randomly selected so as to avoid confounding effects based on the sequence of instruments. Mothers were asked to complete a series of questionnaires, of which only three were used in the present study. The order in which questionnaires were presented was also randomly selected. Given the length of time required to complete all measures, the completion of questionnaires was spread over two sessions.

Videotaped interaction. Prior to the session, the laboratory room in which the interaction was to take place was prepared. The room featured a preschool-sized worktable and two preschool-sized chairs, as well as a digital video camera, positioned in one corner of the room. A toy was placed in the centre of the table in clear view of the child as they entered the room. The camera lens was adjusted so that it provided a reasonable view of the participants, including their facial expressions and mannerisms, as well as their use of the materials during the interactive tasks. Potentially distracting items

were removed from the room prior to the participants' arrival. The room featured a one-way mirror, behind which the researcher or research assistant monitored task progress.

Upon entering the room, mothers and children were provided instructions. First, mothers and children were assigned to specific seats, with the child seated at the wide side of the table. Seating was specified in order to provide the child with more space to complete the tasks, and to obtain an optimal camera view of the participants' use of materials. The researcher or research assistant explained to the mother and child that they would be completing a series of interactive tasks (described below). Participants were informed that after a specified amount of time, the researcher or research assistant would stop the task, collect the materials, and introduce new materials for the subsequent task. It was also explained that instructions would be provided for each task upon presentation of the materials. The researcher or research assistant indicated that the interaction would be monitored from behind the one-way mirror but would not be interrupted except to change tasks or unless absolutely necessary (e.g., bathroom break).

The interactions consisted of three tasks. First, mother-child pairs were instructed to play for five minutes with the toy that had been provided. The purpose of this segment was to provide the participants' the opportunity to develop some level of comfort in the room and with the materials. This segment of the interaction was not coded or used in subsequent analyses. The remaining tasks lasted 10 minutes and their order was varied for the purposes of counterbalancing. The structured teaching task was adapted from the *Parent-Child Early Relational Assessment* (ERA; Clarke, Musick, Stott, Klehr, & Cohler, 1984). Mothers and their children were provided with a box of 96 coloured blocks, 16 each of 6 different colours. In addition, four cards depicting various block patterns were placed on a small easel and placed on the table. Mothers were instructed to help their

children build a tower of nine blocks and a bridge of three blocks, then assist their child in using the blocks to construct the patterns shown on the cards. The second task, an open-ended planning task adapted from Neitzel and Stright (2003), required mothers and their children to prepare a pretend birthday party for a stuffed animal. Participants were presented with the stuffed animal, blank paper and crayons. They were subsequently instructed to decide on the following: friends the stuffed animal would like to invite, a game the stuffed animal might like to play, a gift the stuffed animal would enjoy, and the kind of cake the stuffed animal would like. Mothers and children were encouraged to scribe or draw their plans on the paper provided. The third task was a free-play task in which mother-child pairs were provided with a bin consisting of a number of toys, and asked to play as though they normally would in the home environment. The entire interaction typically lasted for 45 minutes, following which a brief break was usually provided. For the purposes of the present study, only the structured teaching task was used to code for parental scaffolding. All coding was performed by research assistants trained in the use of an adapted version (Clark, 2005) of the *Parental Scaffolding Coding Manual* (Neitzel & Stright, 2003).

Testing. All additional tests and measures were completed by the mother and child separately. Mothers were asked to complete a series of questionnaires in the waiting area of the research lab. During this time, children completed a battery of tests with the researcher or research assistant. As noted above, these tests included a brief screening of cognitive ability, an assessment of language skills, and three measures not used in the present study, but which evaluated the child's emotion knowledge, self-concept, and social perspective taking, respectively. The purpose of screening cognitive abilities was simply to rule out potential development delays. As a result, the scores derived from this

assessment were not used in subsequent analyses. The Kaufman Brief Intellectual Test – Second Edition (*KBIT-2*; Kaufman & Kaufman, 2004) consists of three subtests (two verbal, one nonverbal), and required approximately 20 minutes to administer. The children's language skills were assessed using the *Clinical Evaluation of Language Fundamentals Preschool – Second Edition (CELF Preschool-2*; Wiig, Secord, & Semel, 2004). The CELF Preschool-2 consists of 6 subtests and required approximately 30 minutes to administer. The three remaining tests varied in administration time from 10 to 30 minutes.

Measures

Children were assessed using the Kaufman Brief Intelligence Test – Second Edition (*KBIT-2*; Kaufman & Kaufman, 2004) and the Clinical Evaluation of Language Fundamentals Preschool – Second Edition (*CELF Preschool 2*; Wiig, Secord, & Semel, 2004). Mothers were administered a questionnaire package consisting of measures for the present study, as well as a larger project. The measures for the present study included the following: (a) a background information questionnaire; (b) the age appropriate version of the Behavior Rating Inventory of Executive Functioning (*BRIEF*; Gioia, Isquith, Guy, & Kenworthy, 2000; *BRIEF-P*; Gioia, Espy, & Isquith, 2003); and (c) the Preschool Social Behavior Scale (*PSBS*; Crick, Casas, & Mosher, 1997). Finally, maternal scaffolding was evaluated by trained research assistants using the Parental Scaffolding Coding Manual (Neitzel & Stright, 2003).

Cognitive assessment. The Kaufman Brief Intelligence Test – Second Edition (*KBIT-2*; Kaufman & Kaufman, 2004) was used to ensure child participants possess adequate cognitive abilities. The *KBIT-2* is a standardized measure of intelligence for use with individuals aged 4 to 90 years. It consists of three subtests (e.g., Verbal

Knowledge, Riddles, and Matrices) that yield estimates of verbal and nonverbal cognitive functioning, as well as a general IQ composite. Children's raw scores are compared to a set of age-based norms in order to derive standard scores for each domain (e.g., verbal, nonverbal). Standard scores are then summed and compared to another set of age-based norms to determine the IQ composite. Both the standard scores and IQ composite have a mean of 100 and a standard deviation of 15. Administration of the KBIT-2 requires approximately 15 to 20 minutes.

The authors report adequate reliability and validity statistics. Internal-consistency reliability coefficients for individuals aged 4 to 18 years were .90 for the Verbal scale, .86 for the Nonverbal scale, and .92 for the IQ composite. Adjusted test-retest reliability coefficients over an average interval of four weeks were .88, .76, and .88 for the same scales. The KBIT-2 has been found to be strongly correlated with other frequently used measures of intelligence including the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV; Wechsler, 2003). Correlation coefficients were .79, .56, and .77 for the two tests' verbal, nonverbal, and total IQ composites.

Language. The CELF Preschool-2 (CELF Preschool-2; Wiig, Secord, & Semel, 2004) is an individually administered standardized test designed to assess the basic foundations of language use in children ages 3 years to 6 years, 11 months. It consists of 9 subtests that measure children's listening and auditory comprehension, expressive language, semantic development, and grasp of morphology and syntax. Three subtests (e.g., Word Structure, Sentence Structure, and Expressive Vocabulary) are needed to derive the Core Language Score (CLS), an estimate of general language ability. Administration of three additional subtests (e.g., Concepts and Following Directions, Recalling Sentences, and Basic Concepts or Word Classes) allows for the calculation of

four index scores: the Receptive Language Index (RLI), Expressive Language Index (ELI), Language Content Index (LCI), and Language Structure Index (LSI). The third subtest for calculation of both the RLI and LCI differs for 3- and 4-year-olds (e.g., Basic Concepts) from the one administered to 5- and 6-year-olds (e.g., Word Classes). The two supplementary tests were not used in the present study (i.e. Recalling Sentences in Context, Phonological Awareness). Children's raw scores are compared to a set of age-based norms, which in turn, yield scaled scores for each subtest. Subtest scaled scores have a mean of 10 and a standard deviation of 3. Subtest scaled scores are then summed and compared to additional age-based norms in order to determine the standard scores for all indices, as well as the CLS. Standard scores have a mean of 100 and standard deviation of 15.

The CELF Preschool-2 was standardized on a sample of 1,150 children who were judged to be representative of individuals aged 3 to 6 years in the United States (Wiig et al., 2004). The authors reported that while English was the primary language of all participants, approximately 10% of the standardization sample resided in a home in which a language other than English was spoken. An equal number of males and females were included in the standardization sample. The education level of the primary caregiver for children in the standardization sample was normally distributed, with categories ranging from 11th grade or less to a college or post-graduate degree. The CELF Preschool-2 possesses excellent reliability across time. Test-retest coefficients, based on an average interval of 9.3 days, ranged from .90 to .93 for the CLS and four indices. The internal consistency of the CELF Preschool-2 is also excellent as coefficient alphas for the aforementioned composites fall between .90 and .95, and split-half coefficients are all greater than .90.

With respect to construct validity, the results of a confirmatory factor analysis suggested that the two-tiered hierarchical model of the CELF Preschool-2 was an adequate fit for the standardization data. The CELF Preschool-2 was also reported to have adequate concurrent validity, with moderate to high correlations with its predecessor, the CELF Preschool (Wiig, Secord, & Semel, 1992), as well as other language measures, designed for both younger (e.g., Preschool Language Scale – 4th Edition; Zimmerman, Steiner, & Pond, 2002) and older students (e.g., Clinical Evaluation of Language Fundamentals – 4th Edition; Semel, Wiig, & Secord, 2003). Correlation coefficients measuring the relation between CELF Preschool-2 and CELF Preschool language domains ranged from .75 to .88. Similarly sized coefficients were reported for the relations between CELF Preschool-2 and CELF-4 language domains, as well as composites from the PLS-4 (e.g., $.69 > r < .84$). In the present study, internal consistency statistics for the five scales of the CELF Preschool-2 revealed adequate reliability, with specific results as follows (Cronbach's alpha in parentheses): CLS (.71), RLI (.74), ELI (.77), LCI (.76), LSI (.71).

Background information. Mothers completed a demographic questionnaire that included questions regarding their age, ethnicity, occupation, education, marital status, family structure, and household income. They also responded to questions pertaining to their children's age, education, and medical and psychological history.

Executive functioning/self-regulation. The Behavior Rating Inventory of Executive Function (BRIEF; Gioia, Isquith, Guy, & Kenworthy, 2000; BRIEF-P; Gioia, Espy, & Isquith, 2003) was used to estimate children's executive functioning (i.e., self-regulation) in the home environment. It has been suggested that BRIEF possesses more ecological validity than standardized neuropsychological tests of executive functioning

(Isquith, Crawford, Espy, & Gioia, 2005), which may assess more narrow, or specific, processes rather than real-world self-regulatory behaviour. Two versions of the BRIEF were used, the BRIEF-P for children ages 36 to 71 months, the BRIEF for children ages 72 to 83 months. Mothers rated their children's executive functioning using the BRIEF form that corresponded to their child's age. The BRIEF has been used extensively for both clinical and research purposes, and has been purported to possess sound psychometric properties.

The BRIEF-P was designed to assess executive functioning in children ages 2 years to 5 years, 11 months. It was standardized using a sample of 460 respondents that were selected to reflect the U.S. population across key demographic variables, including gender, ethnicity, age, and socioeconomic status (Gioia et al., 2003). The vast majority of respondents were mothers (88.7%); however, no significant differences were found between mother and father respondents in regards to level of scale scores. Low but significant correlations were found between parents' level of education and BRIEF-P scale scores. Nevertheless, the size of the correlation coefficients suggested that only a small amount of the variance in ratings (i.e., up to 5%) was accounted for by parents' education. With respect to child characteristics, the child's ethnicity was not found to have a significant effect on BRIEF scores. Although SES correlated significantly with the Inhibition, Working Memory, and Plan/Organize scales of the BRIEF-P, it was found to account for a very small portion of the variance (i.e., < 2%). The authors concluded that neither parents' level of education or SES should be considered a major factor in interpreting BRIEF-P scores (Gioia, Espy, & Isquith, 2003).

The BRIEF-P consists of 63 items based largely on the items devised for the BRIEF (Gioia et al., 2000). Items were adjusted to reflect the environments and

expectations of preschoolers. Additional items were developed on the basis of theory, clinical practice, and research literature. The authors suggest that a particular emphasis was placed on the emergence of executive functions in young children. Each item is rated on a four-point Likert scale ranging from 0 (*never*) to 3 (*very often*). Scores on these items combine to form five clinical scales (e.g., Inhibit, Shift, Emotional Control, Working Memory, Plan/Organize) and two validity scales (e.g., Negativity and Inconsistency). The five clinical scales are further combined to form three broader indices, the Inhibitory Self-Control Index (ISCI), the Flexibility Index (FI), and the Emergent Metacognition Index (EMI), as well as an overall estimate of executive functioning, the Global Executive Composite (GEC). Higher scores on the BRIEF-P indicate greater executive dysfunction.

The authors contend that the reliability and validity of the BRIEF-P are quite strong. Gioia et al. (2000) reported good internal consistency reliability across the five clinical scales, two composite indices, and overall GEC, with alpha coefficients ranging from .80 to .97. Modest inter-rater correlations were found between parent- and teacher-ratings, with the Inhibit, Shift, Emotional Control, and associated ISCI and FI showing stronger inter-rater agreement than the scales reflecting Working Memory, Plan/Organize, and EMI. The authors cited differences in the home and school environments of preschoolers as a likely explanation for the lower correlations. Test-retest reliability over an average period of 4.5 weeks revealed strong correlations for the five clinical scales ($M = .86$), and even stronger correlations for the three composite indices (Inhibitory Self-Control Index, $r = .90$; Flexibility Index, $r = .89$; Emergent Metacognition Index, $r = .87$) and GEC ($r = .90$). With respect to construct validity, BRIEF-P scales and index scores were found to correlate significantly with the behaviour scales from the ADHD Rating

Scale-IV, Preschool Version (*ADHD-IV-P*; McGoey et al., 2000). Variable but theoretically expected relations were found between the scales of the BRIEF-P and the scales of the Parent Rating Scale of the Behavior Assessment System for Children (*BASC-PRS*; Reynolds & Kamphaus, 1992).

The BRIEF predates the BRIEF-P and was designed to assess executive functioning in children ages 5 to 18 years. It was standardized using a sample of 1,419 respondents that were selected to reflect the estimated proportions for ethnicity and gender in the U.S. population (Gioia, et al., 2000). Although respondents were primarily mothers (83.2%), no significant differences were found between mother and father respondents in regards to level of scale scores. As with the BRIEF-P, parents' level of education was found to correlate, albeit mildly, with BRIEF scale scores. However, the size of the correlation suggested that only a small amount of the variance in ratings (e.g., < 5%) was accounted for by parents' education. With respect to child characteristics, the child's ethnicity was not found to have a significant effect on BRIEF scores. Socioeconomic status (SES), on the other hand, was significantly correlated with seven of eight BRIEF scale scores, but accounted for only a small portion (5%) of the variance in BRIEF scores. As with the BRIEF-P, the authors concluded that neither parents' level of education or SES should be considered a major factor in interpreting BRIEF scores (Gioia, et al., 2000).

The BRIEF consists of 86 items developed on the basis of theory, clinical practice, and research literature. The authors suggest that a particular emphasis was placed on the theory of executive function development in children. Like the BRIEF-P, each item is rated on a four-point Likert scale ranging from 0 (*never*) to 3 (*very often*). Scores on these items combine to form eight clinical scales (e.g., Inhibit, Shift, Emotional

Control, Initiate, Working Memory, Plan/Organize, Organization of Materials, and Monitor) and two validity scales (e.g., Negativity and Inconsistency). The eight clinical scales are further combined to form two broader indices, the Behavioral Regulation Index and the Metacognition Index, as well as an overall estimate of executive functioning, the Global Executive Composite (GEC). Higher scores on the BRIEF indicate greater executive dysfunction.

The authors reported that the reliability and validity of the BRIEF are quite strong. Gioia et al. (2000) noted good internal consistency reliability across the eight clinical scales, two composite indices, and overall GEC, with alpha coefficients ranging from .80 to .98. Test-retest reliability over a two-week period revealed strong correlations for the eight clinical scales ($M = .81$), and even stronger correlations for the two composite indices (Behavioural Regulation Index, $r = .84$; Metacognition Index, $r = .88$) and GEC ($r = .86$). With respect to construct validity, BRIEF scales and index scores were found to correlate significantly with the behaviour scales from the ADHD Rating Scale, 4th Edition (*ADHD-IV*; DuPaul, Power, Anastopoulos, & Reid, 1998), Behavior Assessment System for Children (*BASC-C*; Reynolds & Kamphaus, 1992), and Conners' Rating Scale (*CRS*; Conners, 1989), while weaker correlations were found with emotional scales from the same measures.

For the purposes of the present study, raw score composites were derived on the basis of the common items between the two versions of the BRIEF. This was done to ensure that the scores for the 6-year-olds in the study were based on the same items as those for the 3- to 5-year-old children. The items used to form the five clinical scales of the BRIEF-P were compared with items from the BRIEF. Identical or corresponding items were maintained and used to compute five raw score scales reflecting Inhibition

(11), Shift (6), Emotional Control (8), Working Memory (11), and Planning/Organization (7). The number of corresponding items between the BRIEF and BRIEF-P for each raw score composite is provided above in parentheses. The correspondence between BRIEF-P and BRIEF items is presented in Appendix B. These scales were then combined on the basis of their organization on the BRIEF-P to form the three BRIEF-P indices described above, namely the Inhibitory Self-Control Index (ISCI), Flexibility Index (FI), and Emergent Metacognition Index (EMI). Internal consistency statistics for the three executive functioning indices used in the present study suggested good reliability, with scores as follows (Cronbach's alpha in parentheses): ISCI (.93), FI (.87), EMI (.87). The factor structure of the BRIEF-P is depicted in Figure 1.

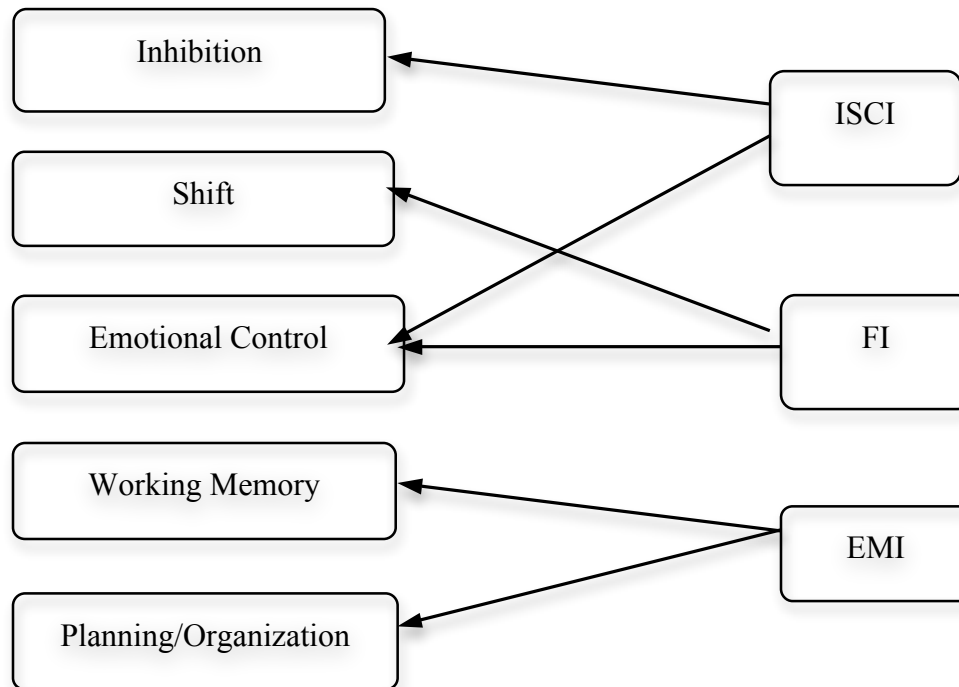


Figure 1. The factor structure for the Preschool Version of the Behavior Rating Inventory of Executive Function (BRIEF-P). Items on the BRIEF that correspond to items on the BRIEF-P were summed according to the structure depicted above so as to ensure uniform composites for all analyses.

Aggressive Behavior. The Preschool Social Behavior Scale (PSBS; Crick, Casas, & Mosher, 1997) is a 27-item questionnaire that is purported to measure aggression and social behaviour in preschoolers. Two versions were developed originally, a teacher-report and a peer-report version. The teacher-report version was adjusted and administered as a parent-report measure. Two items were added to the PSBS (i.e., “This child pokes peers” and “This child punches peers”; O’Neil, 2008). Scores on the 27 items yield 5 composites (i.e., Physical Aggression, Relational Aggression, Total Aggression, Prosocial Behavior, and Depressed Affect), of which only the Physical Aggression scale was used in the present study. Eight items were specific to physical aggression and reflected possible violent behaviours seen in preschool-aged children. Mothers rated the behaviours on a 5-point Likert scale, ranging from 1 (*never or almost never true of this child*) to 5 (*always or almost always true of this child*). As such, the Physical Aggression composite score has a possible range of 8 to 40. The PSBS was standardized on a sample of 129 preschool teachers. The children rated by the preschool teachers in the standardization sample reflected many of the various ethnic/cultural backgrounds in the United States. Crick et al. (1997) reported excellent internal consistency with Cronbach’s alpha for the Physical Aggression scale estimated at .94. Subsequent research by Crick, Casas, & Ku (1997) placed Cronbach’s alpha for the Physical Aggression scale at .87. Further support for the psychometric properties of the PSBS has been found in other studies (e.g., Bonica, Arnold, Fisher, Zeljo, & Yershova, 2003; Hart, Nelson, Robinson, Olsen, & McNeilly-Choque, 1998; Park, Essex, Zahn-Waxler, Armstrong, Klein, & Goldsmith, 2005).

Crick, Casas, and Mosher (1997) did not report test-retest reliability or inter-rater reliability coefficients; however, factor analytic results confirmed that the physical aggression scale was distinct from other scales, including relational aggression. Furthermore, strong correlations have been reported between teacher ratings and assistant teacher ratings of physical aggression using the PSBS (Ostrov & Keating, 2004). At the time of the present study, no known study had used the PSBS as a parent-report measure; however, given the dearth of reliable scales for measuring purely physical forms of aggression in preschool, it was decided that the teacher version of the PSBS, amended as a parent-report measure, would be administered to mothers in this research. In the present study, Cronbach's alpha for the physical aggression scale of the PSBS was .84.

Parental Scaffolding. An observational scale developed by Neitzel and Stright (2003), and adapted by Clark (2005), was utilized to code the interactive tasks for maternal scaffolding. Drawing on the work of Vygotsky (1962, 1978), Neitzel and Stright (2003) identified seven factors that they considered to reflect his notion of scaffolding: metacognitive information, regulation of task difficulty, review, emotional support, rejection, control, and encouragement of the child's active involvement. Three of these variables were purported to measure cognitive support (i.e., metacognitive information, regulation of task difficulty, review), two were considered to be reflective of emotional support (i.e., emotional support, rejection), and two were posited to capture autonomy support, or the transfer of task responsibility (i.e., control, encouragement of the child's active involvement). Although no reliability or validity statistics have been reported, The Parental Scaffolding Coding Manual has been used previously to measure maternal scaffolding and its influence on problem-solving skills and academic self-regulation in kindergarten (Neitzel & Stright, 2003, 2004), as well as classroom self-

regulation during middle childhood (Stright, Neitzel, Sears, & Hoke-Sinex, 2001). Using this coding system, raters scored the seven maternal scaffolding strategies on a five-point Likert scale, with 1 representing little or no indication of scaffolding and 5 indicating substantial or high quality scaffolding. Definitions and examples of the seven scaffolding strategies are provided in Appendix C. Two of the seven strategies, rejection and controlling, were reverse scored. That is, mothers who exhibit high levels of rejection or control are given a score of 1, and those who demonstrate little or no indication of such behaviours are assessed a score of 5.

All coding was conducted by two research assistants trained in the use of the adapted Parental Scaffolding Coding Manual (Neitzel & Stright, 2003). The coders were a recent doctoral graduate specializing in child development, and an experienced elementary school teacher. Training occurred in three steps. First, research assistants were provided background information regarding the construct of scaffolding and were asked to review the definitions of the seven scaffolding strategies. Detailed coding forms were supplied to the research assistants to assist with coding. These forms featured clear and concise definitions for the five coding alternatives per variable. In addition, the forms contained a section for the research assistants to note particular aspects of the interaction that served as the basis for their rating. Second, various scenarios were reviewed with each research assistant prior to viewing tapes. The purpose of this exercise was to help prepare the research assistants to identify the types of strategies they would be coding. Third, three videotapes were randomly selected for the research assistants in order to further orient them to the nature of the interaction and allow for practice with the application of the scaffolding scale. These tapes were not selected for calculation of inter-rater agreement and were re-coded by another research assistant for use in the

analyses. Prior to the calculation of inter-rater agreement, the primary researcher and the research assistants met to clear up any inconsistencies with respect to the application of the coding criteria. Raters were unaware of the participants' scores on other measures.

The use of a structured teaching task to elicit scaffolding or instruction for coding purposes is consistent with prior research investigating scaffolding. For instance, studies completed by the authors of the coding system have involved assessing scaffolding on the basis of various joint problem-solving tasks, including a block-building activity (Neitzel & Stright, 2003, 2004). Others, too, have used structured teaching or joint problem-solving tasks to evaluate maternal scaffolding and its effects on self-regulation and social competence in young children (e.g., Berk & Spuhl, 1995; Hoffman, Crnic, & Baker, 2006; Lengua, Honorado, & Bush, 2007; Pratt, Kerig, Cowan, & Cowan, 1988; Saltaris, Serbin, Stack, Karp, Schwartzman, & Ledingham, 2004; Wood & Middleton, 1975). As with these studies, the structured teaching task used in the present study was selected because it was believed to be within the children's zone of proximal development, or in other words, had elements that were too difficult for the children to complete on their own but which could be completed with the help of a caregiver or more skilled collaborator. Therefore, the structured teaching task used in the present study was considered to be well suited for use with the Parental Scaffolding Coding Manual.

Inter-Rater Agreement and internal consistency. Inter-rater reliability for the Parental Scaffolding Coding Manual was determined on the basis of 25 randomly selected videotaped mother-child structured teaching task interactions. As noted, coders were trained in the use of the coding system and had practiced coding three videotaped interactions prior to calculating inter-rater reliability. For each mother-child pair, the

coders were required to provide a rating ranging from 1 to 5 for each of the seven scaffolding variables.

The results of inter-rater analyses revealed relatively strong agreement between the two coders. Of the seven scaffolding variables rated using the coding system, the minimum rate of agreement following coding was 80% (i.e., *Regulation of Task Difficulty, Review*); however agreement reached as high as 100% for one variable (i.e. *Metacognitive Information*). To control for chance agreement, an inter-rater reliability analysis, using the Kappa statistic, was performed. Following the guidelines established by Landis and Koch (1977) and Byrt (1996), the results suggested substantial or good agreement for all seven variables. Scores for which the coders were not in agreement were discussed and reviewed until a rating was agreed upon. Inter-rater statistics and confidence intervals are provided in Table 2. Internal consistency reliability for the total scaffolding score (i.e., the sum of the seven variables) was .85.

Table 2

Inter-rater agreement statistics for coding of maternal scaffolding

Variable	Kappa	95% Confidence Interval
Metacognitive Information	1.00	1.00
Regulation of Task Difficulty	0.73	0.51 – 0.95
Review	0.72	0.51 – 0.92
Emotional Support	0.75	0.53 – 0.98
Rejection	0.70	0.45 – 0.94
Control	0.78	0.60 – 0.97
Encourage of Active Involvement	0.90	0.76 – 1.00

CHAPTER IV

Results

Planned Analyses

PASW Statistics 18.0 (Predictive Analytics SoftWare Statistics, 2009) was used for all statistical analyses, including data screening and preparation, correlations, regressions, and multiple mediation analyses. To assess the relation between language and aggression, separate standard multiple regressions were performed with Physical Aggression (PSBS) representing the dependent variable, and each of the language composites (i.e., CLS, RLI, ELI, LCI, and LSI) serving as independent variables. Following the steps for mediation outlined by Baron and Kenny (1986), similar procedures were conducted for the relations between executive functions (i.e., ISCI, FI, and EMI) and physical aggression, and language and executive functions. Once the conditions for mediation were established, a multiple regression procedure, devised by Preacher and Hayes (2008), which allows for the simultaneous evaluation of multiple mediators, was used to evaluate the indirect effect of executive functions on the relation between language and physical aggression. This procedure was undertaken to compare the relative influence of the various executive functions on the language-aggression association. For the third and final step, bivariate correlations were performed in order to determine possible relations between maternal scaffolding and the aforementioned study variables (i.e., language, executive functions, physical aggression). Subsequently, an exploratory procedure was used to assess for possible differences between the groups in terms of mediation effects. This procedure involved dividing the sample into high and low “scaffolders” on the basis of a median cutoff, then assessing potential mediation models at each level of scaffolding. To adjust for Type I error, the criterion for

significance was set at an alpha level of .01 for all direct-effects regression analyses. It was felt that this level of significance provided reasonable protection against false positives, while maintaining adequate power. For the mediation models, an alpha level of .05 was used in order to balance against the risks of Type I and Type II error.

Data Screening and Preparation

Prior to conducting both preliminary and main analyses, the data were screened for data entry errors and missing data. Following, the statistical assumptions of multiple regression were evaluated and steps were taken to address any apparent violations. Correlations were conducted between pertinent demographic variables and all study variables to detect possible confounds. Thorough consideration was given to the deletion of cases, replacement of missing values, and issues pertaining to univariate and multivariate normality.

Missing Data. Participants who completed 50% or less of the test battery were removed from the sample. This led to the deletion of 17 cases, and a reduction in sample size from 144 to 127. Fortunately, all of the remaining participants completed at least 80% of the items or tests on a given measure. As a result, missing values for these items were salvaged using the expectation maximization (EM) procedure provided by PASW Statistics 18.0 (Predictive Analytics SoftWare Statistics, 2009). EM is purported to avoid the risk of over-fitting and is suggested to provide realistic estimates of variance (Tabachnick & Fidell, 2001). Less than 10% of the scores for all study variables were derived using this method. One additional case was deleted in an attempt to meet the assumption of normality (see below), thus, reducing the total sample size to 126. Descriptive statistics (i.e., mean, standard deviation, minimum, maximum, range) were obtained for all demographic and study variables (see Table 3).

Table 3

Descriptive Statistics for Study Variables before Transformations (N = 126).

	Mean	SD	Minimum	Maximum	Range
CLS	101.87	11.50	73.00	127.00	54.00
RLI	104.42	12.06	63.00	127.00	64.00
ELI	101.71	10.86	75.00	134.00	59.00
LCI	104.69	11.16	72.00	131.00	59.00
LSI	101.55	11.79	65.00	133.00	68.00
ISCI	32.97	7.97	19.00	54.00	35.00
FI	23.37	5.76	14.00	39.00	25.00
EMI	28.41	6.78	18.00	51.00	33.00
PSBS	10.30	3.83	6.00	24.00	18.00
Scaffolding	24.75	6.00	9.00	35.00	26.00

Note. CLS = Core Language Scale; RLI = Receptive Language Index; ELI = Expressive Language Index; LCI = Language Content Index; LSI = Language Structure Index; ISCI = Inhibitory Self-Control; FI = Flexibility Index; EMI = Emergent Metacognition Index; PSBS = Physical Aggression; Scaffolding = Total Scaffolding Composite

Multivariate Normality. In order to assess for multivariate normality, all study variables were first assessed for significant skewness and/or kurtosis. Examination of univariate distributions revealed no obvious outliers for any of the study variables, with the exception of the LCI subscale for which two extreme outliers were found (i.e., z-scores > 3.29). Initial attempts to transform this variable (e.g., square root, log, reciprocal) were unsuccessful in reining in the outliers. In an effort to achieve normality, yet preserve sample size, the case with the most extreme outlier was deleted, while the other was replaced with value that estimated a z-score of 3, an approach recommended by Field (2005). As noted above, this step reduced the total sample size to 126. Bivariate scatterplots of all study variables were subsequently examined and suggested no violations of the assumptions of linearity and homoscedasticity (Tabachnick & Fidell, 2001).

After correcting for univariate outliers, skewness and kurtosis statistics were examined for all study variables. Values of skewness and/or kurtosis over 2 were considered significant. Certain variables were found to have non-normal distributions, including measures of language (i.e., RLI), executive functioning (i.e., ISCI, FI, EMI), and aggression (PSBS). The distributions for aggression (PSBS) and the executive functioning variables (i.e., ISCI, FI, EMI) were positively skewed, while the language variable (i.e., RLI) was negatively skewed. Only one variable (i.e., PSBS) was found to be leptokurtic. Square root transformations were then performed on both positively and negatively skewed (following reflection) variables. A review of the skewness and kurtosis statistics for the newly transformed variables revealed no violations of normality. Subsequent Shapiro-Wilk tests on the transformed variables confirmed normal distributions for many of the transformed variables (i.e., RLI_t , $ISCI_t$, FI_t , EMI_t) and

supported use of these newly transformed variables in all primary analyses; however, physical aggression (i.e., PSBS_t) remained slightly (positively) skewed, according to this test. Further attempts to transform (i.e., log, reciprocal) the aggression variable were conducted but failed to correct for normality. It was concluded that the distribution for physical aggression reflected what might be expected in the general population. Given a community sample, distributions suggesting smaller numbers of children with clinically significant levels of aggressive behaviour would be anticipated. Therefore, the still slightly (positively) skewed square root transformation of physical aggression was maintained for all primary analyses, as it provided the distribution that best approximated normality. Descriptive statistics for all variables that were subjected to transformations are presented in Table 4.

Table 4

Descriptive Statistics for Study Variables following Transformations (N = 126).

	Mean	SD	Minimum	Maximum	Range
RLI _t	4.38	1.30	1.00	8.06	7.06
ISCI _t	3.72	1.06	1.00	6.00	5.00
FI _t	3.08	0.93	1.00	5.10	4.10
EMI _t	3.21	1.04	1.00	5.83	4.83
PSBS _t	2.17	0.77	1.00	4.36	3.36

Note. RLI_t = Receptive Language Index Transformed; ISCI_t = Inhibitory Self-Control Transformed; FI_t =

Flexibility Index Transformed; EMI_t = Emergent Metacognition Index Transformed; PSBS_t = Physical

Aggression Transformed

Preliminary Analyses

Bivariate correlations were generated to evaluate the relation between study variables (CLS, RLI_t, ELI, LCI, LSI, ISCI_t, FI_t, EMI_t, PSBS_t, and Scaffolding) and demographic variables. A summary correlation table is presented in Table 5. Inspection of the correlations between demographic and study variables revealed that the variables “family structure” and “household income” correlated significantly with a number of study variables. As a result, these variables were included as covariates when they correlated with two of the study variables (i.e., IV, DV, or mediator) in a particular analysis. In addition, children’s IQ was found to correlate with all language domains, and thus, was controlled for in all analyses involving language variables. The inclusion of children’s IQ as a covariate allowed for specific conclusions about the effects of language on behaviour and other psychological processes irrespective of general cognitive functioning.

Table 5

Correlations between Study Variables and Demographic Variables (N = 126).

	Age	IQ	Maternal Education	FS	INC	SIBS
CLS	-.03	.64***	.10	.10	.25**	-.04
RLI _t	.04	.59***	.03	.11	.11	.01
ELI	-.07	.59***	.09	.12	.29**	.01
LCI	-.04	.61***	.11	.18*	.25**	-.03
LSI	.01	.63***	.03	.05	.22*	.04
ISCI _t	.03	-.14	-.18*	-.28**	.00	-.07
FI _t	.05	-.16	-.09	-.16*	-.05	-.10
EMI _t	.10	-.14	-.20*	-.22**	-.03	.03
PSBS _t	.06	-.04	-.28**	.41***	-.28**	.04

Note. CLS = Core Language Scale; RLI_t = Receptive Language Index; ELI = Expressive Language Index; LCI = Language Content Index; LSI = Language Structure Index; ISCI_t = Inhibitory Self-Control; FI_t = Flexibility Index; EMI_t = Emergent Metacognition Index; PSBS_t = Physical Aggression; Age = child's age; IQ = child's estimated intelligence, Maternal Education = Mother's highest level of education; FS = family structure; INC = household income; SIBS = Number of siblings

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

Main Analyses: Examination of the Direct Effects Models

Hypothesis #1: Correlations between language skills and physical aggression.

Bivariate correlations were performed to determine the general relations between all study variables, including language and aggression. Correlations between study variables, prior to and following transformations, are presented in Tables 6 and 7, respectively. The relation between language and aggression was assessed across all language indices yielded by the CELF Preschool-2. Tests of significance were one-tailed given the hypothesized direction of effects (i.e., inverse) between language and aggression. The relation between core language and physical aggression (PSBS_t) failed to reach statistical significance at the Type I error corrected level, $r(126) = -.15, p = .05$. However, significant negative correlations were found between aggression (PSBS_t) and three language domains, namely receptive language (RLI_t), $r(126) = -.20, p = .01$, expressive language, $r(126) = -.25, p < .01$, and semantic language, $r(126) = -.33, p < .001$. The association between syntactical language and physical aggression (PSBS_t) was not statistically significant, $r(126) = -.13, p = .07$. These findings suggested fairly strong relations between language and physical aggression but do not account for potentially confounding demographic variables.

Hypothesis #2: Receptive language - physical aggression. In order to determine the extent to which various language functions predict physical aggression, separate standard multiple regressions were performed for each language domain. Demographic variables found to correlate with language and/or physical aggression were controlled for in all regression analyses. After partialling out the effects of children's IQ, receptive language (RLI_t) was still found to predict physical aggression (PSBS_t) significantly in the

Table 6

Correlations between Study Variables before Transformations (n = 126).

	CLS	RLI	ELI	LCI	LSI	ISCI	FI	EMI	PSBS	Scaffolding
CLS	—	.84***	.86***	.81***	.93***	-.13	-.08	-.18*	-.14	.27**
RLI		—	.67***	.88***	.82***	-.24**	-.16	-.28**	-.23**	.27**
ELI			—	.79***	.89***	.20*	-.20*	-.21*	-.25**	.12
LCI				—	.73***	-.21*	-.18	-.28**	-.34***	.31***
LSI					—	.20*	-.16	-.21*	-.13	.14
ISCI						—	.73***	.62***	.49***	-.06
FI							—	.42***	.36***	.09
EMI								—	.36***	-.05
PSBS									—	.00
Scaffolding										—

Note. CLS = Core Language Scale; RLI = Receptive Language Index; ELI = Expressive Language Index; LCI = Language Content Index; LSI = Language

Structure Index; ISCI = Inhibitory Self-Control; FI = Flexibility Index; EMI = Emergent Metacognition Index; PSBS = Physical Aggression; Scaffolding = Total

Scaffolding Composite

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 7

Correlations between Study Variables following Transformations (n = 126).

	CLS	RLI _t	ELI	LCI	LSI	ISCI _t	FI _t	EMI _t	PSBS _t	Scaffolding
CLS	—	.82***	.86***	.81***	.93***	-.15	-.10	-.20*	-.15	.27***
RLI _t		—	.65***	.84***	.81***	-.25**	-.18*	-.29**	-.20*	.24**
ELI			—	.79***	.89**	-.22*	-.21*	-.23**	-.25**	.12
LCI				—	.73***	-.22*	-.17	-.28**	-.33***	.31***
LSI					—	-.22*	-.18*	-.23**	-.13	.14
ISCI _t						—	.75***	.62***	.49***	-.07
FI _t							—	.43***	.34***	.08
EMI _t								—	.35***	-.04
PSBS _t									—	-.02
Scaffolding										—

Note. CLS = Core Language Scale; RLI_t = Transformed Receptive Language Index; ELI = Expressive Language Index; LCI = Language Content Index; LSI = Language Structure Index; ISCI_t = Transformed Inhibitory Self-Control; FI_t = Transformed Flexibility Index; EMI_t = Transformed Emergent Metacognition Index; PSBS_t = Transformed Physical Aggression; Scaffolding = Total Scaffolding Composite

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

inverse direction, $\beta = -0.27$, $t(123) = -2.47$, $p < .01$. Table 8 displays the results of this standard multiple regression. The overall regression model was shown to be significant, $F(2, 123) = 3.16$, $p < .05$. In general, 5% of the variability in preschoolers' physical aggression (PSBS_t) was predicted by the dependent variables.

Hypothesis #2: Expressive language - physical aggression. A second standard multiple regression was performed to determine whether expressive language predicted preschoolers' physical aggression. Children's IQ and household income were controlled for by entering these variables in the regression model, along with expressive language. Table 8 displays the results of a standard multiple regression for the prediction of physical aggression (PSBS_t) on the basis of expressive language. The overall regression model was shown to be significant, $F(3, 122) = 5.61$, $p < .01$. Using a one-tailed test of significance, expressive language was found to significantly (negatively) predict physical aggression (PSBS_t), $\beta = -0.28$, $t(122) = -2.49$, $p < .01$. In general, 12% of the variability in preschoolers' physical aggression (PSBS_t) was predicted by the three independent variables. The results suggest a significant inverse relation between preschoolers' expressive language abilities and their physical aggressive behaviour.

Hypothesis #2: Semantic language – physical aggression. A third standard multiple regression was performed to determine whether semantic language predicted preschoolers' physical aggression. After partialling out the effects of family structure, children's IQ, and household income, semantic language was also found to significantly predict preschoolers' physical aggression (PSBS_t) in the inverse direction. Table 8 displays the results of a standard multiple regression for the prediction of physical aggression (PSBS_t) on the basis of semantic language. The overall regression model was

Table 8

Summary of the Standard Multiple Regression Analyses for the Prediction of Physical Aggression - Transformed from Language Domains (N = 126)

Variable	B	SE B	β	sr_i^2	r_s
RLI _t - PSBS _t					
Children's IQ	.01	.01	.12	.01	.18
Receptive Language (RLI _t)	-.16** ^a	.06	-.27	.05	.90
ELI - PSBS _t					
Children's IQ	.01	.01	.14	.01	.11
Household Income	-.14* ^b	.06	-.21	.04	.79
Expressive Language (ELI)	-.02** ^a	.01	-.28	.04	.73
LCI – PSBS _t					
Children's IQ	.01* ^b	.01	.21	.03	.07
Family Structure	-.63*** ^b	.16	-.32	.09	.79
Household Income	-.05	.06	-.07	.00	.53
Semantic Language (LCI)	-.03*** ^a	.01	-.38	.08	.64

Note. RLI_t = Receptive Language – Transformed; PSBS_t = Physical Aggression

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

^a One-tailed test

^b Two-tailed test

shown to be significant, $F(4, 121) = 11.30, p < .001$. Semantic language was found to significantly predict physical aggression (PSBS_t), $\beta = -0.38, t(121) = -3.74, p < .001$, although family structure accounted for an approximately equal proportion of the variance. In general, 27% of the variability in preschoolers' physical aggression (PSBS_t) was predicted by the four independent variables. These findings are consistent with those noted above and indicate that semantic language is inversely related to physical aggression.

Main Analyses: Examination of the Mediation Model

The relation between language domains and executive functioning. The results from the first step of analyses revealed evidence for the direct effects model, with three language domains predicting preschoolers' physical aggression. In order to assess for the possible mediating effect of executive functioning on these relations, additional bivariate correlations were performed to determine possible mediators. Following the steps outlined by Baron and Kenny (1986), the executive function composites (i.e., ISCI_t, FI_t, EMI_t) were required to correlate with both the dependent variable (i.e., language domains) and independent variable (i.e., PSBS_t). The correlations between language domains and executive function composites were presented in Table 7.

The correlations revealed that language and executive functioning were highly related. In fact, nearly all of the correlations between the language domains and executive function composites were significant at the .05 significance level. Assuming a one-tailed test of significance (to account for directional hypotheses), significant relations were found between most language scales and inhibitory self-control (ISCI_t), including receptive language (RLI_t), $r(126) = -.25, p < .01$, expressive language, $r(126) = -.22, p < .01$, semantic language, $r(126) = -.22, p < .01$, and syntactical language, $r(126) = -.22, p <$

.01. Similarly strong relations were found between the language scales and emergent metacognition (EMI_t), as only the correlation between the core language scale and emergent metacognition (EMI_t) failed to reach significance at the .01 level, $r(126) = -.20$, $p = .012$. The relations between the language scales and cognitive flexibility (FI_t) were not quite as strong; however, expressive language was found to correlate significantly with cognitive flexibility (FI_t), $r(126) = -.21$, $p < .01$. These findings provided preliminary evidence for the a-path specified by Baron and Kenny (1986), which specifies that a significant correlation must exist between the independent and mediating variables. In order to assess whether preschoolers' language abilities predicted their executive functioning, separate standard multiple regressions were performed for each language domain. Tests of significance were one-tailed given the hypothesized direction of effects (i.e., inverse) between language and executive dysfunction. Demographic variables found to correlate with language and/or executive functioning were controlled for in all regression analyses.

Hypothesis #3: Receptive language - executive functioning. After partialling out the effects of children's IQ, receptive language (RLI_t) was found to predict inhibitory self-control ($ISCI_t$), $\beta = -0.26$, $t(123) = -2.42$, $p < .01$, and emergent metacognition (EMI_t), $\beta = -0.32$, $t(123) = -3.03$, $p < .01$, but not cognitive flexibility (FI_t), $\beta = -0.13$, $t(123) = -1.16$, $p = .25$. The direction of the beta weights indicated that the relations were inverse in nature, such that weaker language skills were associated with greater executive functioning difficulties. For the prediction of inhibitory self-control ($ISCI_t$), the overall regression model was shown to be significant, $F(2, 123) = 4.18$, $p < .01$. A total of 6% of the variability in preschoolers' inhibitory self-control ($ISCI_t$) was accounted for by the

dependent variables. The overall regression model for the prediction of emergent metacognition (EMI_t) was also shown to be significant, $F(2, 123) = 5.96, p < .01$. For this model, 9% of the variability in preschoolers' emergent metacognition (EMI_t) was predicted by the three dependent variables. Taken together, these results confirm the inverse relation between receptive language abilities (RLI_t) and executive functions in a preschool sample, albeit only for specific executive functions (i.e., $ISCI_t, EMI_t$). Table 9 summarizes the results of the regression analyses involving receptive language and executive functioning.

Hypothesis #3: *Expressive language - executive functioning*. A second set of standard multiple regressions were performed to determine whether expressive language predicted preschoolers' executive functioning. Children's IQ was the only demographic variable controlled for in these analyses. Standard multiple regressions revealed that preschoolers' expressive language abilities failed to predict any of the three executive functions at the Type I error corrected level. Specifically, expressive language fell short of significance when predicting inhibitory self-control ($ISCI_t$), $\beta = -0.22, t(123) = -2.00, p < .03$, cognitive flexibility (FI_t), $\beta = -0.18, t(123) = -1.68, p < .05$, and emergent metacognition (EMI_t), $\beta = -0.23, t(123) = -2.07, p < .03$. For inhibitory self-control ($ISCI_t$), the overall regression model was not significant, $F(2, 123) = 3.24, p < .05$, with 5% of the variability in preschoolers' inhibitory self-control predicted by the dependent variables. Similar results were found for the models predicting emergent metacognition (EMI_t), $F(2, 123) = 3.44, p < .05$, and cognitive flexibility (FI_t), $F(2, 123) = 3.03, p = .05$,

Table 9

Summary of the Standard Multiple Regression Analyses for the Prediction of Executive Functioning from Receptive Language - Transformed (N = 126)

Variable	B	SE B	β	sr_i^2	r_s
RLI _t – ISCI _t					
Children's IQ	.00	.01	.02	.00	.55
Receptive Language (RLI _t)	-.21** ^a	.09	-.26	.04	1.00
RLI _t - FI _t					
Children's IQ	-.01	.01	-.08	.00	.84
Receptive Language (RLI _t)	-.09	.08	-.13	.01	.93
RLI _t – EMI _t					
Children's IQ	.00	.01	.05	.00	.47
Receptive Language (RLI _t)	-.26*** ^a	.09	-.32	.07	.99

Note. RLI_t = Receptive Language – Transformed; ISCI_t = Inhibitory Self-Control Index – Transformed; FI_t = Flexibility Index – Transformed; EMI_t = Emergent Metacognition Index - Transformed

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

^a One-tailed test

with the dependent variables accounting for 8% and 5% of the variance in these models, respectively. Squared semi-partial correlation coefficients and structure coefficients for the dependent variables are shown in Table 10. These results demonstrate a modest inverse relation between preschoolers' expressive language and their executive functioning.

Hypothesis #3: Semantic language - executive functioning. A third set of standard multiple regressions were performed to determine whether semantic language predicted preschoolers' executive functioning. For these analyses, the effects of children's IQ and family structure were accounted for the prediction of executive functions by entering these variables along with semantic language. The results indicated that preschoolers' semantic language significant (negatively) predicted their emergent metacognition (EMI_t), $\beta = -0.27$, $t(122) = -2.41$, $p < .01$, but not their inhibitory self-control (ISCI_t), $\beta = -0.02$, $t(122) = -1.39$, $p = .08$, or cognitive flexibility (FI_t), $\beta = -0.09$, $t(122) = -0.76$, $p = .23$. The overall regression model for the prediction of emergent metacognition (EMI_t) was significant, $F(3, 122) = 4.95$, $p < .01$. Model summary statistics indicated that 11% of the variability in preschoolers' emergent metacognition (EMI_t) was predicted by the three dependent variables. The results of this series of regressions, including semi-partial correlations and structure coefficients, are summarized in Table 11. Taken together, these findings support the existence of a significant inverse path between semantic language and emergent metacognition.

Table 10

Summary of the Standard Multiple Regression Analyses for the Prediction of Executive Functioning from Expressive Language (N = 126)

Variable	B	SE B	β	sr_1^2	r_s
ELI – ISCI _t					
Children's IQ	.00	.01	-.01	.00	.61
Expressive Language (ELI)	-.02* ^a	.01	-.22	.03	1.00
ELI – FI _t					
Children's IQ	.00	.01	-.05	.00	.73
Expressive Language (ELI)	-.02* ^a	.01	-.18	.02	.98
ELI – EMI _t					
Children's IQ	.00	.01	-.01	.00	.61
Expressive Language (ELI)	-.02* ^a	.01	-.23	.03	1.00

Note. ISCI_t = Inhibitory Self-Control Index – Transformed; FI_t = Flexibility Index – Transformed; EMI_t =

Emergent Metacognition Index - Transformed

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

^a One-tailed test

Table 11

Summary of the Standard Multiple Regression Analyses for the Prediction of Executive Functioning from Semantic Language (N = 126)

Variable	B	SE B	β	sr_1^2	r_s
LCI – ISCI _t					
Children's IQ	.00	.01	-.04	.00	1.27
Family Structure	-.68** ^b	.24	-.25	.06	2.57
Semantic Language (LCI)	-.02	.01	-.15	.01	2.04
LCI – FI _t					
Children's IQ	-.01	.01	-.10	.01	.68
Family Structure	-.34	.21	-.14	.02	.70
Semantic Language (LCI)	-.01	.01	-.09	.00	.74
LCI – EMI _t					
Children's IQ	.00	.01	.03	.03	.67
Family Structure	-.45	.23	-.17	.00	.43
Semantic Language (LCI)	-.03** ^a	.01	-.27	.04	.85

Note. ISCI_t = Inhibitory Self-Control Index – Transformed; FI_t = Flexibility Index – Transformed; EMI_t =

Emergent Metacognition Index - Transformed

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

^a One-tailed test

^b Two-tailed test

Hypothesis #3: Syntactical language - executive functioning. A fourth set of standard multiple regressions were performed with syntactical language as the independent variable of interest in the prediction of preschoolers' executive functioning. Children's IQ was controlled in these analyses by entering it in the regression model, along with syntactical language. Separate regression models showed that preschoolers' syntactical language failed to significantly predict their inhibitory self-control (ISCI_t), $\beta = -0.22$, $t(123) = -1.95$, $p < .03$, cognitive flexibility (FI_t), $\beta = -0.14$, $t(123) = -1.19$, $p = .12$, or emergent metacognition (EMI_t), $\beta = -0.24$, $t(123) = -2.12$, $p < .02$, at the .01 significance level. Syntactical language and children's IQ accounted for 5% of the variance when predicting inhibitory self control (ISCI_t), 4% for cognitive flexibility (FI_t), and 6% for emergent metacognition (EMI_t). Table 12 displays the results of these regression analyses. Overall, the findings suggest a modest, yet statistically insignificant, negative relation between syntactical language and executive functioning.

Table 12

Summary of the Standard Multiple Regression Analyses for the Prediction of Executive Functioning from Syntactical Language (N = 126)

Variable	B	SE B	β	sr_i^2	r_s
LSI – ISCI _t					
Children's IQ	.00	.01	.00	.00	.63
Syntactical Language (LSI)	-.02* ^a	.01	-.22	.03	1.00
LSI – FI _t					
Children's IQ	-.01	.01	-.07	.00	.83
Syntactical Language (LSI)	-.01	.01	-.14	.01	.95
LSI – EMI _t					
Children's IQ	.00	.01	.01	.00	.60
Syntactical Language (LSI)	-.02* ^a	.01	-.24	.03	1.00

Note. ISCI_t = Inhibitory Self-Control Index – Transformed; FI_t = Flexibility Index – Transformed; EMI_t =

Emergent Metacognition Index - Transformed

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

^a One-tailed test

The relation between executive functioning and physical aggression. To assess the relation between preschoolers' executive functioning and their physical aggression, bivariate correlations were calculated first, followed by standard multiple regressions. To show evidence of mediation, the proposed mediating variables (i.e., the executive functioning composites) must correlate with the dependent variable (i.e., physical aggression), while accounting for the effects of the independent variable (Baron & Kenny, 1986). As a preliminary step, the correlation patterns between preschoolers' executive functioning and physical aggression were examined to identify possible significant relations. These correlations are presented above in Table 7.

The correlations revealed that executive functioning and physical aggression are highly related. Each of the three executive functioning composites was found to correlate significantly with physical aggression (PSBS_t), in a positive direction, suggesting that greater executive dysfunction is associated with higher levels of physical aggression. These findings provided partial evidence for the b-path specified by Baron and Kenny (1986), or in other words, the path from the mediating to dependent variables. Correlational analyses, however, do not account for potentially confounding variables. In order to assess further the effects of preschoolers' executive functioning on their physical aggression (PSBS_t), three separate standard multiple regressions were performed for each executive functioning composite. Demographic variables found to correlate with executive functioning and/or physical aggression (PSBS_t) were controlled for in all regression analyses.

Hypothesis #3: Executive functioning - physical aggression. After partialling out the effects of family structure and maternal education, all three executive functioning composites were still found to relate significantly, and in a positive direction, with

physical aggression. This suggests that higher levels of physical aggression are associated with more executive functioning problems. Inhibitory self-control (ISCI_t) predicted physical aggression (PSBS_t) over and above the effects of family structure, $\beta = 0.39$, $t(122) = -5.08$, $p < .001$. The overall regression model was found to be significant, $F(3,122) = 19.97$, $p < .001$, with 32% of the variance explained by the dependent variables. Similarly, preschoolers' cognitive flexibility (FI_t) was found to significantly predict their physical aggression (PSBS_t) over and above the effects of family structure, $\beta = 0.28$, $t(123) = 3.51$, $p < .01$. Results suggested that the overall model was significant, $F(2,122) = 20.18$, $p < .001$, and accounted for 25% of the variance in predicting physical aggression (PSBS_t). Finally, analyses revealed that preschoolers' emergent metacognition (EMI_t) significantly predicted their physical aggression (PSBS_t), $\beta = 0.26$, $t(122) = 3.22$, $p < .01$. The overall model was found to be significant, $F(3,122) = 13.63$, $p < .001$, and accounted for 23% of the variance in predicting physical aggression (PSBS_t). The results of these regression analyses are summarized in Table 13, including semi-partial correlations and structure coefficients. Collectively, these findings indicated strong relations between preschoolers' executive (dys)functioning and their aggressive behaviour.

Table 13

Summary of the Standard Multiple Regression Analyses for the Prediction of Physical Aggression - Transformed from Executive Functioning (N = 126)

Variable	B	SE B	β	sr_i^2	r_s
ISCI _t - PSBS _t					
Family Structure	-.52*** ^b	.16	-.26	.06	.71
Maternal Education	-.12	.08	-.12	.01	.49
ISCI _t	.29*** ^a	.06	.39	.14	.84
FI _t - PSBS _t					
Family Structure	-.72*** ^b	.15	-.37	.13	.83
FI _t	.23*** ^a	.07	.28	.08	.68
EMI _t - PSBS _t					
Family Structure	-.60*** ^b	.17	-.31	.08	.81
Maternal Education	-.12	.08	-.13	.01	.56
EMI _t	.19*** ^a	.06	.26	.06	.71

Note. ISCI_t = Inhibitory Self-Control Index – Transformed; FI_t = Flexibility Index – Transformed; EMI_t =

Emergent Metacognition Index – Transformed; PSBS_t = Physical Aggression - Transformed

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

^a One-tailed test

^b Two-tailed test

Investigating the mediating effect of executive functioning on the relation between language and physical aggression. The results of the preceding regression analyses suggested two possible mediation models involving language, executive functioning, and physical aggression. A third mediation model involving expressive language was implied but only at an alpha level of .05. Following the four-step process for mediation outlined by Baron and Kenny (1986), evidence must be shown for significant relations between (1) the independent and dependent variables (i.e., c-path); (2) the independent and mediating variable(s) (i.e., a-path); (3) the mediating variable(s) and the dependent variable, while accounting for the effects of the first step (i.e., b-path); and (4) the effect found in step 1 must be reduced to zero (or non-significance) when the mediating variable(s) are introduced to the model (i.e., c'-path). Satisfaction of the first three steps constitutes partial mediation, while satisfaction of all four steps suggests complete mediation. The analyses presented thus far provide at least partial evidence for mediation models driven by receptive language (RLI) and semantic language (LCI). The model driven by expressive language was also examined given the pattern of results suggesting significant relations at the .05 level. In two of these three proposed models, multiple executive functions were implicated as mediators. Thus, in order to assess the relative importance of the mediators in these models, the procedure for multiple mediation analysis developed by Preacher and Hayes (2008) was employed.

The method for testing multiple mediation, written by Preacher and Hayes (2008), and designed for use with PASW 18.0, relies on bootstrapping methods. Bootstrapping refers to the statistical procedure of mimicking the sampling distribution of a statistic through repeated re-sampling (Preacher & Hayes, 2008). Observations used in the re-sampling process are replaced prior to successive observations. As a result, a single case

can be selected as part of a bootstrap sample either a single time or multiple times, or may not be selected whatsoever (Preacher & Hayes, 2008). This procedure is repeated time and again (i.e., preferably at least 1000 times), with the result being an empirical distribution consisting of bootstrapped samples that approximates a distribution derived from numerous samples. The procedure developed by Preacher and Hayes (2008) also allows for the inclusion of covariates, an option deemed necessary for the current study given the presence of possible demographic confounds. The following mediation analyses are based on 1000 bootstrap re-samples.

Hypothesis #4: Receptive language – executive functioning – physical aggression.

The first model assessed the possible mediating effects of inhibitory self-control and emergent metacognition on the relation between preschoolers' receptive language and physical aggression. Children's IQ, family structure, household income, and maternal education were included in the analysis as covariates. The results are reported according to the four steps described above. Step one replicated the results reported above with respect to the prediction of physical aggression ($PSBS_t$) by receptive language (RLI_t), $b = -0.12$, $t(117) = -2.09$, $p = .02$, albeit this time with the inclusion of household income as a covariate.¹ Step two indicated that when the two mediator variables (i.e., $ISCI_t$ and EMI_t) were regressed on receptive language (RLI_t), significant relations were found for both inhibitory self-control ($ISCI_t$), $b = -0.19$, $t(117) = -2.23$, $p < .02$, and emergent metacognition (EMI_t), $b = -0.25$, $t(117) = -2.93$, $p < .01$. For step three, physical aggression was regressed on both the predictor (i.e., RLI_t) and the proposed mediators

¹ When physical aggression was regressed on the executive functioning composites, household income was not included as a covariate, as it was found to correlate only with physical aggression. Household income was, however, found to correlate with language and physical aggression, and thus, has been included in the test for mediation.

(i.e., ISCI_t and EMI_t), with a significant effect found only for inhibitory self-control (ISCI_t), $b = 0.28$, $t(117) = 3.98$, $p < .001$. The fourth step assessed for the significance of the mediated effect, or in other words, the presence of a significant decrease in beta weight for the c-path (i.e., predictor-outcome) following the inclusion of the mediator variables (c'-path). The results of this final step revealed evidence for complete mediation, as the relation between receptive language (RLI_t) and physical aggression (PSBS_t) was no longer significant after including the executive functioning composites, $b = -0.06$, $t(117) = -1.15$, $p = .25$. The mediation model is depicted in Figure 2. Bias corrected and accelerated confidence intervals confirm a mediation effect. These results are shown in Table 14.

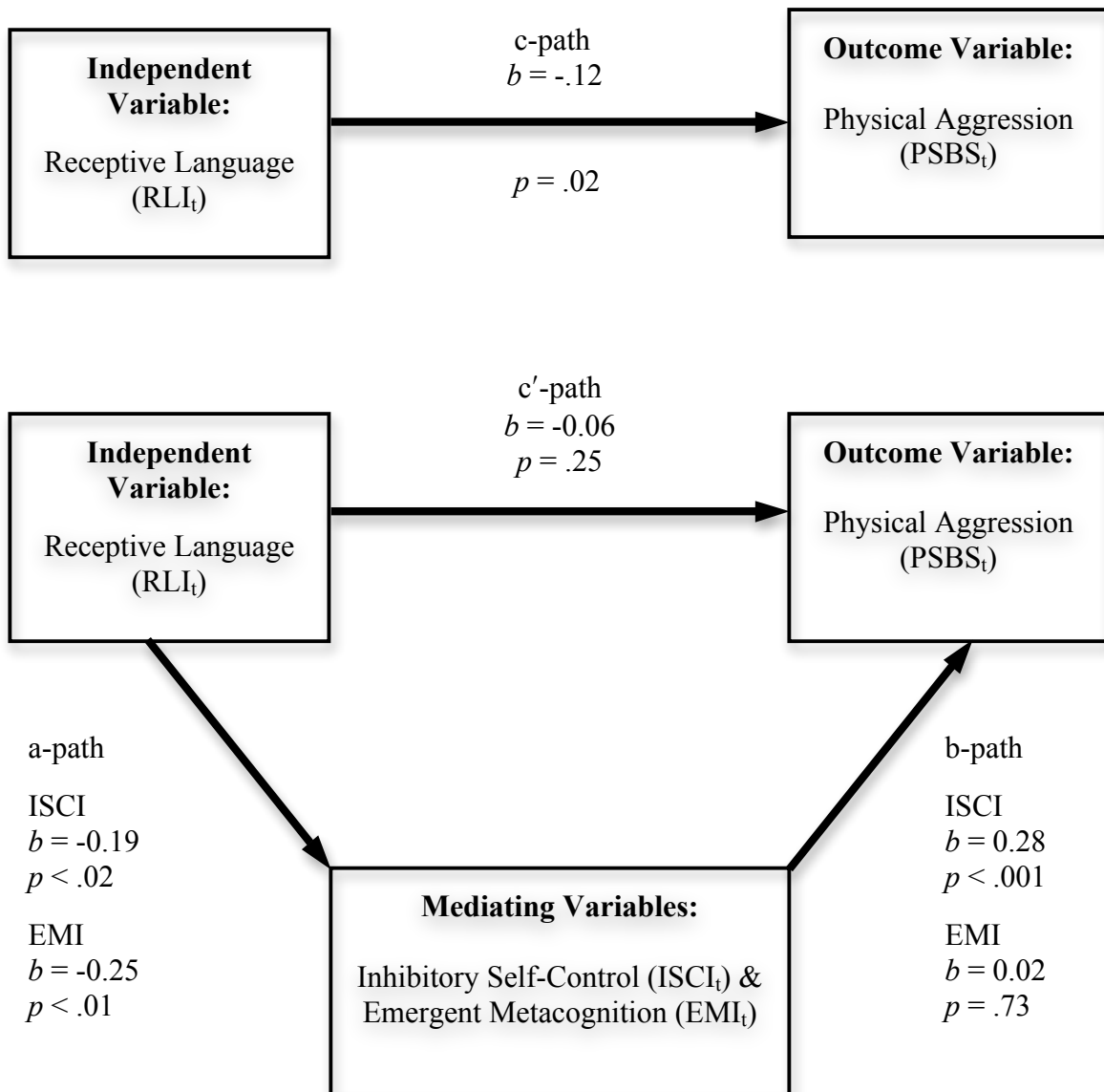


Figure 2. Complete Mediation Effect of Inhibitory Self-Control - Transformed on the Relation between Receptive Language – Transformed and Physical Aggression - Transformed.

Table 14

Bias Corrected and Accelerated Confidence Intervals for the Mediation Effect of Inhibitory Self-Control - Transformed on the Relation between Receptive Language - Transformed and Physical Aggression - Transformed (N = 126)

Mediating Variable	Lower	Upper
Total	-.115	-.005
ISCI _t	-.13	-.01
EMI _t	-.05	.03

Note. ISCI_t = Inhibitory Self-Control Index – Transformed; EMI_t = Emergent Metacognition Index – Transformed

Hypothesis #4: Expressive language – executive functioning – physical

aggression. This process was repeated for the second proposed mediation model, which specified all three executive functioning composites (i.e., ISCI_t, EMI_t) as mediators in the relation between expressive language and physical aggression. Although the relations between expressive language and the executive function composites fell short of the Type I error adjusted level of significance, the model was nevertheless evaluated given the pattern of results suggesting significance at the .05 level. Covariates for this analysis included family structure, children's IQ, household income, and maternal education. Evidence for step one (i.e., c-path) was obtained from prior analyses but was replicated in the present procedure. Expressive language was found to predict physical aggression (PSBS_t) significantly, $b = -0.02$, $t(116) = -2.58$, $p < .01$. For step two (i.e., a-path), results revealed a significant relation between expressive language and both inhibitory self-control (ISCI_t), $b = -0.02$, $t(116) = -2.14$, $p < .02$, and emergent metacognition (EMI_t), $b = -0.02$, $t(116) = -2.18$, $p < .02$, but not cognitive flexibility (FI_t), $b = -0.01$, $t(116) = -1.50$, $p = .07$. For step three, physical aggression was regressed on both expressive language and the proposed mediators (i.e., ISCI_t, FI_t, and EMI_t), with a significant effect found only for inhibitory self-control (ISCI_t), $b = 0.30$, $t(116) = 3.15$, $p = .001$. Finally, evidence for partial mediation was achieved when the results revealed that the beta weight for the c'-path was reduced, although the relations between expressive language and physical aggression (PSBS_t) remained significant at the .05 significance level. The mediation model is depicted in Figure 3. Confidence intervals for the mediating effect of the executive functions on the expressive language-aggression relation are shown in Table 15.

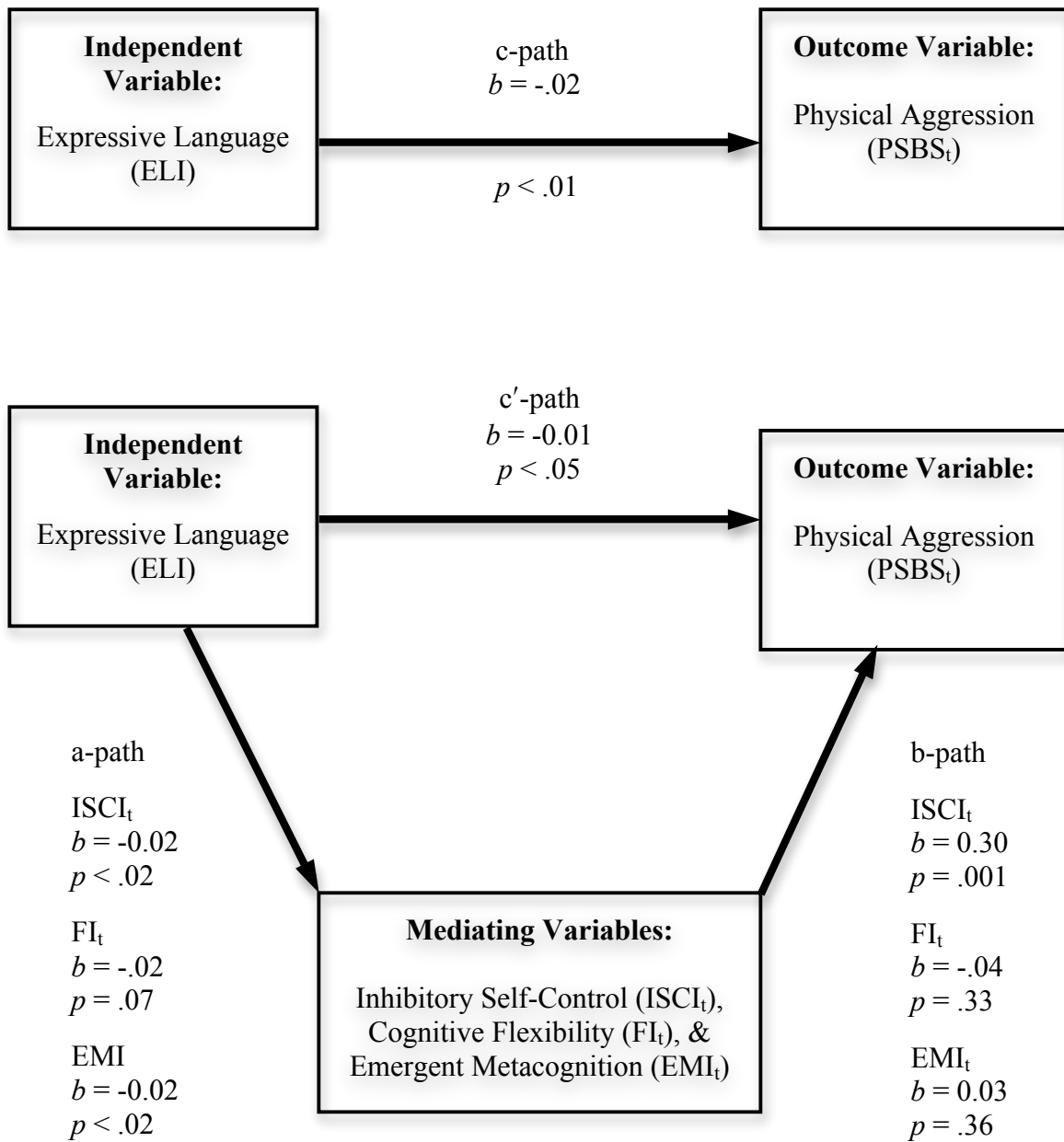


Figure 3. Partial Mediation Effect of Inhibitory Self-Control - Transformed on the Relation between Expressive Language and Physical Aggression - Transformed.

Table 15

Bias Corrected and Accelerated Confidence Intervals for the Mediation Effect of Inhibitory Self-Control on the Relation between Expressive Language and Physical Aggression - Transformed (N = 126)

Mediating Variable	Lower	Upper
Total	-.014	-.001
ISCI _t	-.017	-.002
FI _t	-.002	.005
EMI _t	-.005	.002

Note. ISCI_t = Inhibitory Self-Control Index – Transformed; FI_t = Flexibility Index - Transformed; EMI_t =

Emergent Metacognition Index – Transformed

Hypothesis #4; Semantic language – executive functioning – physical aggression.

The third possible mediation model assessed the effects of emergent metacognition on the relation between preschoolers' semantic language and physical aggression. Because only one significant relation was found between semantic language and the executive functioning composites, this model constituted a test of simple mediation, rather than multiple mediation. Nevertheless, the procedure developed by Preacher and Hayes (2008) was still used given the ability to conduct one procedure with all variables, including covariates. For this test, children's IQ, family structure, household income, and maternal education were again represented as covariates. Step one (c-path) replicated the results reported above with respect to the prediction of physical aggression (PSBS_t) by semantic language, $b = -0.03$, $t(118) = -3.76$, $p < .001$. Step two (a-path) indicated that when emergent metacognition (EMI_t) was regressed on semantic language, a significant relation was found $b = -0.03$, $t(118) = -2.66$, $p < .01$. For step three (b-path), the results indicated that emergent metacognition (EMI_t) predicted physical aggression, while accounting for the effects of semantic language, $b = 0.16$, $t(118) = 2.66$, $p < .01$. During the final step, the association between physical aggression (PSBS_t) and semantic language was reduced following the inclusion of the emergent metacognition (EMI_t); however, this relation remained significant, $b = -0.02$, $t(118) = -3.11$, $p < .01$, suggesting a partial mediation effect. The partial mediation model is depicted in Figure 4. Bias corrected and accelerated confidence intervals (Lower = -.011, Upper = -.001) were consistent with a mediation effect for emergent metacognition (EMI_t).

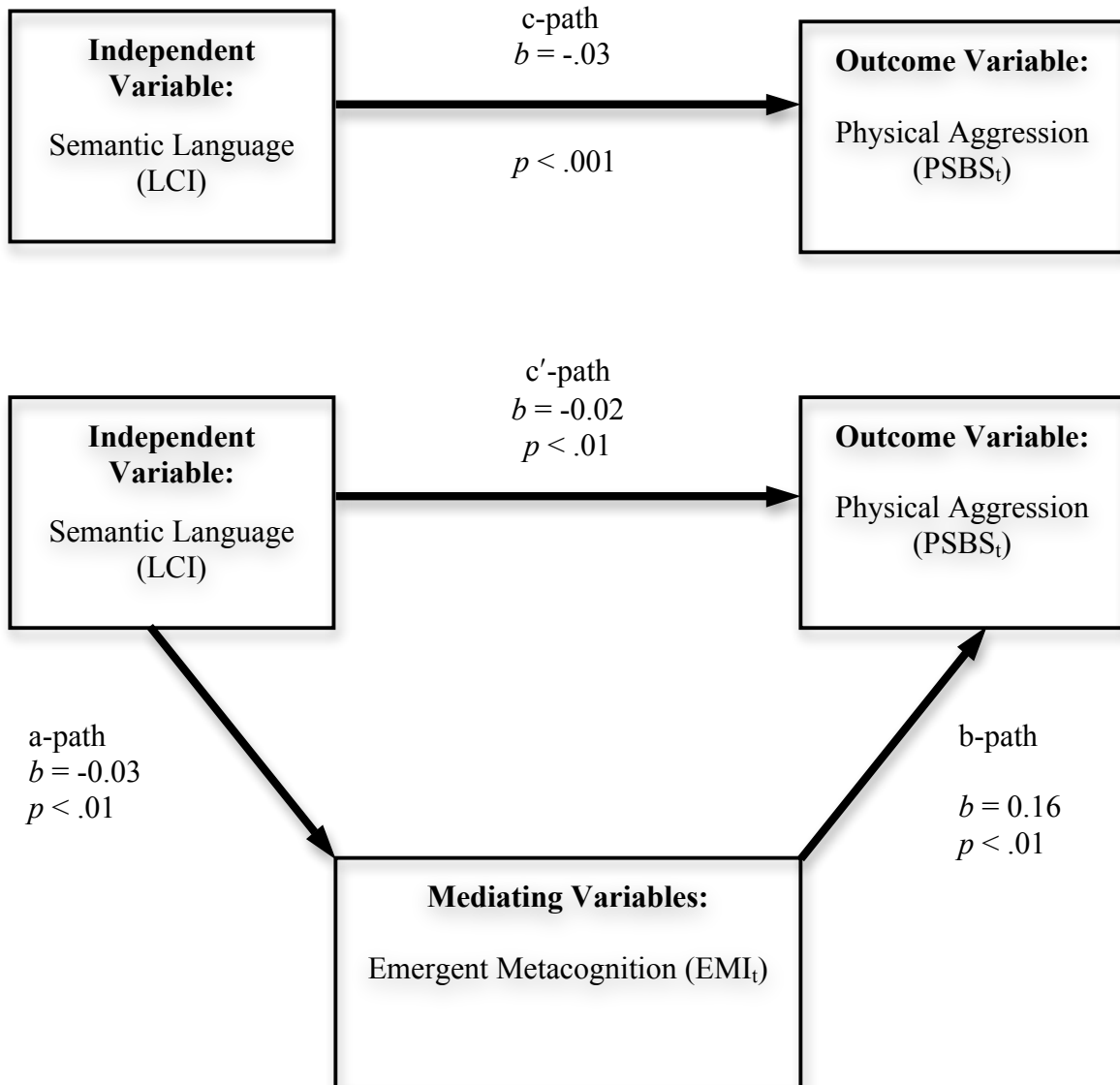


Figure 4. Partial Mediation Effect of Emergent Metacognition - Transformed on the Relation between Semantic Language and Physical Aggression - Transformed.

Main Analyses: The Effects of Scaffolding on the Mediation Model

Having established that the relation between language and aggression among preschoolers is largely mediated through their executive functioning, most notably their inhibitory self-control, separate analyses were performed to determine the influence of maternal scaffolding on these triangular relations. First, bivariate correlations and standard multiple regressions were conducted to ascertain the study variables with which maternal scaffolding was most closely associated. Following, the sample was divided into two groups on the basis of a median cut-off score for maternal scaffolding. The groups were considered to represent children of high and low scaffolding mothers, respectively. Next, bivariate correlations were performed for both groups to determine the pattern of relations among the study variables. Tests for mediation were then conducted, in each group, for the purposes of examining possible differences between the groups in terms of mediation effects.

Hypothesis #5: The relations between scaffolding and both language and executive functioning. The correlations between maternal scaffolding and the three sets of study variables (i.e., language, executive functioning, physical aggression) revealed only a few significant relations. Specifically, maternal scaffolding was found to correlate significantly with preschoolers' core language abilities, due primarily to its association with their receptive language (RLI_r) and semantic language (LCI) skills. These findings are presented in Table 7. No significant correlations were found between maternal scaffolding and either preschoolers' executive functioning or their physical aggression. Based on the pattern of significant correlations, standard multiple regressions were performed to control for confounding variables.

Hypothesis #5: The relation between scaffolding and language ability. Two separate standard multiple regression models were performed for each of the language domains shown to correlate significantly with maternal scaffolding. For interpretive purposes, the alpha level was adjusted to .01 to correct for Type I error. The first of these analyses involved regressing preschoolers' receptive language (RLI_r) on maternal scaffolding, while controlling for preschooler's IQ. The results indicated that after partialling out the effects of IQ, the relation between maternal scaffolding and preschoolers' receptive language (RLI_r) fell short of significance, $\beta = 0.11$, $t(123) = 1.51$, $p = .07$. In contrast, when preschoolers' semantic language was regressed on maternal scaffolding, while controlling for preschoolers' IQ, a significant relation was found for maternal scaffolding, $\beta = 0.18$, $t(123) = 2.54$, $p < .01$. The overall regression model was significant, $F(2,122) = 41.52$, $p < .001$, with the dependent variables accounting for 40% of the variance. Table 16 summarizes the standard multiple regressions involving preschoolers' language skills and maternal scaffolding. Based on these results, it was determined that of all the study variables examined, maternal scaffolding had the strongest association with preschoolers' semantic language abilities, over and above the effects of children's IQ.

Table 16

Summary of the Standard Multiple Regression Analyses for the Prediction of Preschoolers' Language Abilities from Maternal Scaffolding (N = 126)

Variable	B	SE B	β	sr_i^2	r_s
Scaffolding – RLI _t					
Children's IQ	.06***	.01	.57	.30	0.99
Maternal Scaffolding	.02	.02	.11	.01	0.40
Scaffolding – LCI					
Children's IQ	.54***	.07	.57	.31	1.51
Maternal Scaffolding	.34*** ^a	.13	.18	.03	0.78

Note. RLI_t = Receptive Language Index – Transformed

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

^a One-tailed test

In order to assess whether the quality of maternal scaffolding influences the relations among the study variables, two groups were formed on the basis of the median score for maternal scaffolding. Examination of the frequency distribution for maternal scaffolding revealed that the median score for maternal scaffolding ($Mdn = 25.00$) divided the sample into two equal groups ($n = 63$). As indicated above, children with mothers who scored above the median cut-off were considered to be in the high scaffolding group, whereas children with mothers who scored below the cut-off were in the low scaffolding group. Bivariate correlations performed for each group revealed unique patterns of relations between the study variables for each group.

Hypothesis #6: High scaffolding mother-child dyads. Among the high scaffolding mother-child pairs, the pattern of significant correlations was generally consistent with the pattern found for the entire sample, albeit with a few notable differences. Preschoolers' language abilities were found to have a strong inverse relation with their physical aggression. Core language, as well as three individual language scales (i.e., RLI_t , ELI , LCI) correlated significantly with physical aggression ($PSBS_t$) at the .01 alpha level, while syntactical language (LSI) was significantly related at the .05 level. Similarly, the results indicated that preschoolers' executive functioning was highly correlated with their physical aggression. Of note, however, was the pattern of correlations between their language abilities and executive functioning, with significant relations found only for cognitive flexibility. As shown in Table 17, semantic language correlated significantly with cognitive flexibility (FI_t), $r(63) = -.31, p < .01$, with strong relations also found for receptive language (RLI_t), expressive language, and syntactical language. This pattern was in slight contrast to the pattern found for the total sample,

Table 17

Correlations between Study Variables for High Scaffolding Group (n = 63)

	CLS	RLI _t	ELI	LCI	LSI	ISCI _t	FI _t	EMI _t	PSBS _t
CLS	—	.78***	.86***	.81***	.90***	-.01	-.16	-.08	-.31**
RLI _t		—	.58***	.78***	.78***	-.16	-.27*	-.23*	-.30**
ELI			—	.80***	.86**	-.13	-.24*	-.13	-.38**
LCI				—	.70***	-.13	-.31**	-.14	-.46***
LSI					—	-.12	-.23*	-.20	-.24*
ISCI _t						—	.84***	.56***	.48***
FI _t							—	.55***	.48***
EMI _t								—	.27*
PSBS _t									—

Note. CLS = Core Language Scale; RLI_t = Receptive Language Index - Transformed; ELI = Expressive Language Index; LCI = Language Content Index; LSI = Language Structure Index; ISCI_t = Inhibitory Self-Control - Transformed; FI_t = Flexibility Index - Transformed; EMI_t = Emergent Metacognition Index - Transformed; PSBS_t = Physical Aggression - Transformed

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

which suggested the strongest relations were between language and both inhibitory self-control (ISCI_t) and emergent metacognition (EMI_t).

The pattern of significant correlations suggested only one possible mediation effect at the .01 level of significance. In the mediation model suggested, preschoolers' semantic language represented the independent variable in predicting their physical aggression (PSBS_t) by way of their cognitive flexibility (FI_t). Demographic variables (i.e., preschoolers' IQ, household income) found to correlate with the study variables of interest were included as covariates. The test for mediation was conducted using the aforementioned procedure devised by Preacher and Hayes (2008) and was based on 1000 bootstrap re-samples. The results for path-c showed that when preschoolers' physical aggression (PSBS_t) was regressed on their semantic language, a significant relation was established, $b = -.05$, $t(58) = -3.92$, $p < .001$. Step two, or the regression analysis for path-a, was found to be significant at the .05 significance level, with preschoolers' semantic language predicting their cognitive flexibility (FI_t), $b = -.03$, $t(58) = -2.16$, $p < .02$. The regression for step three, or path-b, involved regressing preschoolers' physical aggression (PSBS_t) on both their semantic language and their cognitive flexibility (FI_t). The results suggested a significant relation, $b = .34$, $t(58) = 3.54$, $p < .001$. The fourth step assessed for the significance of the mediated effect, or as noted above, the presence of a significant decrease in beta weight for the c-path following the inclusion of the mediator variable (c'-path). The results of this final step revealed that the relation between semantic language and physical aggression (PSBS_t) was reduced but remained significant after including cognitive flexibility (FI_t) in the regression analysis, $b = -0.04$, $t(58) = -3.17$, $p < .01$. Examination of the bias corrected and accelerated confidence

intervals (Lower = -.024, Upper = -.002) confirmed the presence of a mediation effect. The mediation model is depicted in Figure 5.

Hypothesis #7: Low scaffolding mother-child dyads. The pattern of significant correlations found among low scaffolding mother-child pairs differed from what was found for the high scaffolding group. Specifically, when compared to the high scaffolding group, the language abilities of preschoolers in the low scaffolding group did not correlate as strongly with physical aggression (PSBS_t), with only semantic language, $r(63) = -.26, p < .03$, reaching any level of statistical significance. Also different was the pattern of relations between preschoolers' language abilities and executive functioning. Significant associations were found for nearly all language domains and both inhibitory self-control (ISCI_t) and emergent metacognition (EMI_t), but no significant relations were found with cognitive flexibility (FI_t). Inhibitory self-control (ISCI_t) and emergent metacognition (EMI_t) were also found to correlate strongly with preschoolers' physical aggression (PSBS_t), although the relation with cognitive flexibility (FI_t) fell short of statistical significance, $r(63) = .17, p = .09$. The correlations between study variables among low scaffolding mother-child dyads are shown in Table 18.

The pattern of correlations in the low scaffolding group suggested a possible mediation model driven by preschoolers' semantic language. Prior to assessing the model, standard multiple regressions were conducted to control for possible confounding demographic variables. The results of these regressions are summarized in Table 19. Preschoolers' semantic language was found to significantly predict their physical aggression (PSBS_t), $\beta = -0.40, t(60) = -2.56, p < .01$. Similarly, preschoolers' semantic

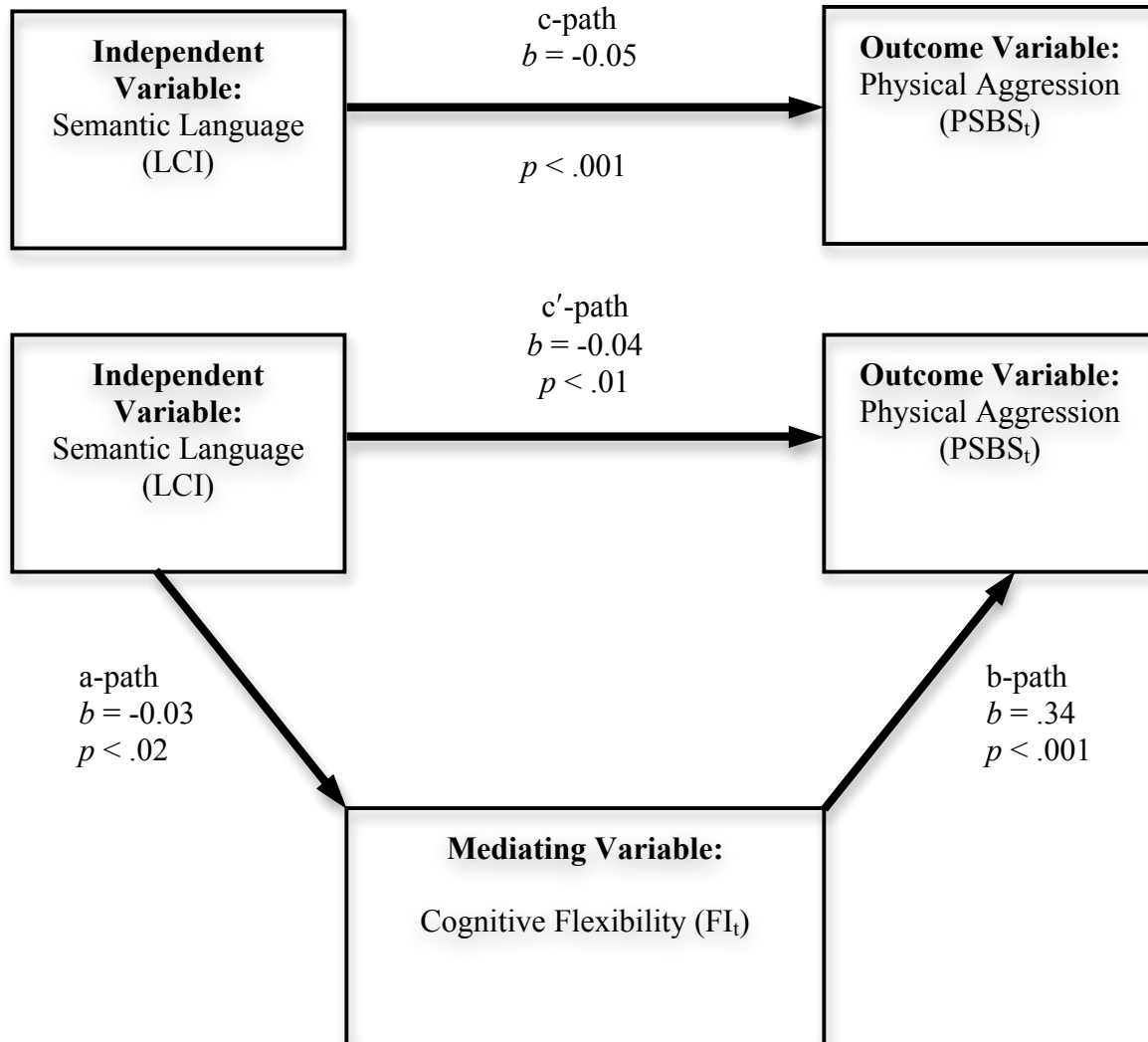


Figure 5. Partial Mediation Effect of Cognitive Flexibility on the Relation between Semantic Language and Physical Aggression - Transformed among Preschoolers of High Scaffolding Mothers.

Table 18

Correlations between Study Variables for Low Scaffolding Group (n = 63)

	CLS	RLI _t	ELI	LCI	LSI	ISCI _t	FI _t	EMI _t	PSBS _t
CLS	—	.83***	.89***	.80***	.95***	-.23*	-.09	-.28*	-.04
RLI _t		—	.72***	.88***	.84***	-.31**	-.15	-.34**	-.14
ELI			—	.82***	.92***	-.31**	-.19	-.31**	-.12
LCI				—	.78***	-.28*	-.11	-.39**	-.26*
LSI					—	-.29*	-.16	-.26*	-.05
ISCI _t						—	.71***	.66***	.52***
FI _t							—	.35**	.17
EMI _t								—	.46***
PSBS _t									—

Note. CLS = Core Language Scale; RLI_t = Receptive Language Index - Transformed; ELI = Expressive Language Index; LCI = Language Content Index; LSI = Language Structure Index; ISCI_t = Inhibitory Self-Control - Transformed; FI_t = Flexibility Index - Transformed; EMI_t = Emergent Metacognition Index - Transformed; PSBS_t = Physical Aggression - Transformed

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

Table 19

Summary of Standard Multiple Regression Analyses for Low Scaffolding Mother-Child Pairs (N = 63)

Variable	B	SE B	β	sr_i^2	r_s
LCI - PSBS _t					
Children's IQ	.01	.01	.23	.03	0.04
Semantic Language (LCI)	-.02*** ^a	.01	-.40	.10	0.82
LCI - EMI _t					
Children's IQ	.01	.01	.09	.01	0.45
Semantic Language (LCI)	-.04*** ^a	.01	-.44	.12	0.98
LCI - ISCI _t					
Children's IQ	.01	.02	-.14	.01	0.86
Semantic Language (LCI)	-.02	.02	-.20	.02	0.93
EMI _t - PSBS _t					
Children's IQ	-.43* ^b	.19	-.26	.06	0.74
EMI _t	.24*** ^a	.07	.37	.12	0.88

Note. ISCI_t = Inhibitory Self-Control Index – Transformed; EMI_t = Emergent Metacognition Index – Transformed; PSBS_t = Physical Aggression - Transformed

* $p < .05$, ** $p < .01$, *** $p < .001$

^a One-tailed test

^b Two-tailed test

language continued to predict their emergent metacognition (EMI_t), $\beta = -0.44$, $t(60) = -2.96$, $p < .01$, over and above the effects of children's IQ. However, when the second possible mediator, preschoolers' inhibitory self-control ($ISCI_t$), was regressed on their semantic language skills (while controlling for the effects of children's IQ) the relation between the two variables was no longer significant, $\beta = -0.20$, $t(60) = -1.28$, $p = .10$. This finding precluded the inclusion of inhibitory self-control in the mediation model for preschoolers of low scaffolding mothers, as it represent a violation of the second condition according to Baron and Kenny (1986). The final regression analysis featured preschoolers' emergent metacognition (EMI_t) as an independent variable in a regression model predicting their physical aggression ($PSBS_t$). The results showed the relation to be quite strong, $\beta = 0.37$, $t(60) = 3.17$, $p = .001$. The results of these regression analyses implicated preschoolers' emergent metacognition (EMI_t) as a possible mediating variable in the relation between semantic language and physical aggression ($PSBS_t$) among preschoolers of low scaffolding mothers.

In the low scaffolding group, the mediation model examined featured preschoolers' semantic language as the independent variable in predicting physical aggression ($PSBS_t$), with emergent metacognition (EMI_t) as the mediating variable. Preschoolers' IQ and family structure were included in the model as covariates given their association with the study variables. The results for path-c showed that when physical aggression ($PSBS_t$) in preschoolers of low scaffolding mothers was regressed on their semantic language, a significant relation was established, $b = -.02$, $t(58) = -2.13$, $p < .02$. For path-a, or the relation between semantic language and emergent metacognition (EMI_t), a significant relation was found, $b = -.04$, $t(58) = -2.58$, $p < .01$. The regression

for step three, or path-b, involved regressing preschoolers' physical aggression (PSBS_t) on both their semantic language and their emergent metacognition (EMI_t). The results suggested a significant relation, $b = .21$, $t(58) = 2.66$, $p < .01$. The fourth step assessed for the significance of the effect of mediation (c'-path). The results revealed evidence for complete mediation, as the relation between semantic language and physical aggression (PSBS_t) was reduced to non-significance after including emergent metacognition (EMI_t) in the regression analysis, $b = -0.01$, $t(58) = -1.27$, $p = .10$. The mediation model is depicted in Figure 6. An examination of the bias corrected and accelerated confidence intervals confirmed the mediation effect (Lower = -.016, Upper = -.002).

Summary

The results of the present study provided support for a number of the proposed hypotheses. Step one of the analyses revealed evidence for a strong inverse relation between language and physical aggression among preschoolers. Specifically, the language-aggression association was found to hold across all language domains, with the exception of syntactical language. Specific unique effects were still obtained for each language domain, despite the inclusion of correlated demographic variables.

Step two of the analyses yielded support for the mediation model. The results suggested that for each language domain found to predict physical aggression, the relation was at least partially, if not completely, mediated through preschoolers' executive functioning. Preschoolers' inhibitory self-control emerged as the self-regulatory function most responsible for the indirect effects. However, for semantic language, emergent metacognition, was found to significantly influence the relation between language and physical aggression, rather than inhibitory self-control.

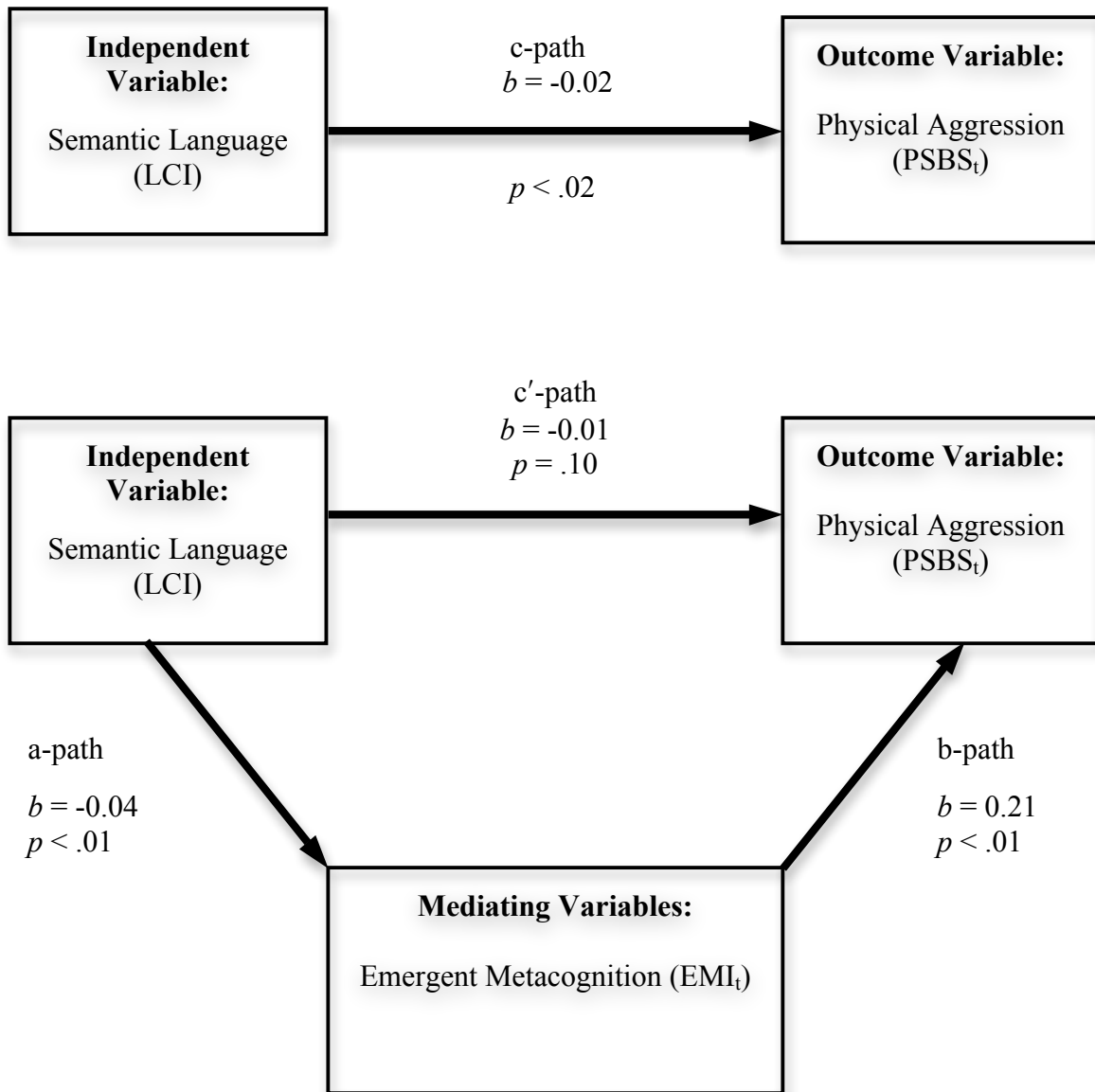


Figure 6. Complete Mediation Effect of Emergent Metacognition - Transformed on the Relation between Semantic Language and Physical Aggression - Transformed among Preschoolers of Low Scaffolding Mothers.

The third set of analyses demonstrated that maternal scaffolding is most closely associated with preschoolers' semantic language abilities. This relation persisted when the sample was divided into two groups based on the quality of scaffolding. The results indicated that when higher quality scaffolding was provided, the semantic language-aggression relation is mediated by preschooler's cognitive flexibility; whereas among preschoolers of mothers who provided lower quality scaffolding, the relation between semantic language and physical aggression was mediated by emergent metacognition. These findings intimate that parenting approaches have a unique effect on preschoolers' self-regulation of physical aggression.

CHAPTER V

Discussion

The aims of the present study were threefold. First, an attempt was made to establish that an inverse relation might exist between language and physical aggression among preschoolers. This step included the goal of determining which, if any, of the language functions were responsible for this association. Second, this study sought to examine whether preschoolers' executive functioning represented the mechanism by which their language and physical aggression were related. In doing so, an attempt was made to determine which of the executive functions measured accounted for the possible mediation effect. Third, this study aimed to identify the effects that parental scaffolding may have on the triangular relations between preschoolers' language, executive functioning, and physical aggression. This required assessing the influence of preschoolers' executive functions on the relation between their language and physical aggression, at two levels of parental scaffolding.

Step One: The Language-Aggression Hypothesis

The results of the first step of analyses provided support for the language-aggression hypothesis across several language domains, albeit not for preschoolers' overall language abilities. While the association between the core language scale and physical aggression fell short of the Type I error corrected level of significance (hypothesis #1), various language domains were found to predict physical aggression, including preschoolers' receptive, expressive, and semantic language (hypothesis #2). This pattern of results would at first glance seem contradictory; however, it is likely a function of the relations between the individual language subscales (upon which the indices are based) and physical aggression. That is, the CLS yields a general estimate of

preschoolers' language processing based on three subscales reflecting aspects of each of the subordinate indices. In contrast, scores on the individual indices reflect a more narrow and uniform set of language abilities, and thus, are a more thorough estimate of specific language skills. Notwithstanding the risks of Type I error, these results may actually suggest a more broad-spectrum association between language and physical aggression than has been reported in prior studies (e.g., Dionne et al., 2003; Ortiz et al., 2001).

This pattern of results might provide some explanation for the inconsistencies found in the literature with respect to the language-aggression relation. Although research has generally shown this association to be quite strong, those studies that report significant relations between language and aggression tend to focus on specific language functions (e.g., Dionne et al., 2003; Estrem, 2005; Ortiz et al., 2001). In contrast, those that report null findings have utilized more global estimates of verbal or language functioning (e.g., Aguilar et al., 2000; Plomin et al., 2002), which, as the results of the current study demonstrate, may not be sufficiently sensitive to detect the specific linguistic factors involved in the prediction of aggression. Those language functions that were found to predict physical aggression support findings from past research in demonstrating significant inverse relations between physical aggression and receptive (e.g., Dionne, 2003; Ortiz et al., 2001), expressive (Estrem, 2005; Ortiz et al., 2001; Seguin et al., 2009), and semantic language (e.g., Silva et al., 1987, Mack & Warr-Leeper, 1992; Piel, 1990). These results would seem to suggest that among preschoolers, physical aggression is related more to an understanding of language meaning, and how that understanding is used to both interpret and communicate, rather than knowledge of

language structure, per se. The micro-social and social cognition pathways help explain how delays in these language domains might predispose children to aggressive behaviour.

As outlined by Dionne (2005), weaknesses in language comprehension and expression lead to problems with how children perceive and partake in social interactions. Difficulties understanding language (i.e., receptive and semantic), and using language to express oneself (i.e., expressive), are critical for conflict resolution insofar as they permit cooperation, negotiation, and compromise. Not surprisingly, children with deficits in these areas of language processing have considerable trouble with these more nuanced social skills (e.g., Campbell, 1994; Keane & Calkins, 2004). Devoid of the language abilities necessary to manage conflicts nonviolently, it is likely that such children are susceptible to aggressive behaviour as a means for solving problems. An early history characterized by such negative social interactions may eventually lead to social isolation and/or the formation of maladaptive social perspective taking skills, including a hostile attribution bias and the belief that aggression is an effective way to solve problems. All told, deficits in receptive and expressive language may result in fewer opportunities for children to participate in the social interactions that would allow them to observe and practice prosocial ways of mediating conflict (Dodge et al., 2003).

Interestingly, however, the pattern of results found for most language domains did not extend to syntactical language, despite evidence from prior studies suggesting a significant correlation exists (e.g., Camarata et al., 1988; Cole, 2001; Miniutti, 1991). It is possible that the lack of a significant inverse relation between language syntax and physical aggression is a reflection of the age of children in the present study. Despite ongoing debate as to the origins of language, some in the field of psycholinguistics argue that syntactical language abilities are slower to develop than other language functions

(e.g., Brown, 1973; Bruner, 1983). More specifically, children are able to comprehend and convey communicative intent before they develop the capacity to organize words according to morphological and grammatical rules. Even during normative development, it is not until the end of the preschool years that grammar begins to take on more advanced qualities (Paul, 2007). At this stage of development, then, language syntax may be less critical to social interactions than other language functions, as the intent, or meaning, of preschoolers' communicative attempts is still conveyed and interpreted. This holds with the socio-cultural view of Vygotsky (1962, 1987), who emphasized the importance of meaning, as opposed to language structure in language and self-regulatory development. The relation between children's knowledge of syntax and physical aggression may be evident later in development when more sophisticated language use is required to mediate conflict.

Step Two: The Mediation Model

The second set of analyses provided some support for the self-regulation pathway. As a preliminary step, hypothesis three was reasonably substantiated, with significant relations found between the three sets of study variables. Specifically, after accounting for the effects of possible confounding demographic variables, receptive and semantic language significantly predicted emergent metacognition, while strong relations (e.g., $p < .05$) were also found between the other language domains (i.e., ELI, LSI) and emergent metacognition. The relations between the language domains and inhibitory self-control were not quite as robust, with receptive language representing the only language domain to reach significance as a predictor, although both expressive and syntactical language predicted inhibitory self-control at a less conservative level of significance. Consistent with prior research (Cole, Dennis, Smith-Simon, & Cohen, 2009; Hughes & Ensor, 2008;

Hughes, Turkstra, & Wulfeck, 2009; Joseph, McGrath, & Tager-Flusberg, 2005; Marton, 2008), relations were in the inverse direction, suggesting that weaker language skills were associated with more executive dysfunction. No significant relations were found between language domains and preschoolers' cognitive flexibility at the .01 alpha level; however, expressive language was found to predict cognitive flexibility at the .05 level of significance. With respect to the association between preschoolers' executive functioning and their physical aggression, all three executive function composites were, as hypothesized, found to predict physical aggression significantly. As has been shown previously (Giancola et al., 1998; Raaijmakers et al., 2009; Seguin et al., 2002; Seguin et al., 1999; Seguin et al., 1995), executive dysfunction (i.e., problems with inhibitory self-control, cognitive flexibility, and emergent metacognition) was found to be linked with higher levels of physical aggression, irrespective of family structure. Although these relations were noteworthy, more specific evidence for the self-regulation pathway was sought through investigation of possible mediation effects. These findings provided support for two pathways, whereby language delays may lead to physical aggression: one via inhibitory self-control, and another through emergent metacognition. Taken together, these results are believed to represent the first evidence for the self-regulation pathway at any age.

Inhibitory self-control emerged as the executive function most responsible for the relation between language and physical aggression among preschoolers. It served to completely mediate the relation between receptive language and physical aggression, and was implicated in the mediation model driven by expressive language, albeit at a less conservative level of significance. These findings fit with both historical and contemporary models of self-regulation. For instance, Luria (1961) argued that until

approximately 36 to 42 months of age, language has a stronger excitatory than inhibitory effect on action, such that prior to this age, children are better at initiating actions (i.e., “go”), as opposed to resisting impulses or stopping their behavior when appropriate (i.e., “no go”). According to Luria (1961), it is only when the words “start” and “stop” take on meaning that the inhibitory function improves and children become better able to resist impulses and/or halt their behaviour appropriately. From this standpoint, the results of the current study intimate that children with delays in language processing lag behind their more linguistically developed peers when it comes to stopping and interrupting behaviours and/or emotions because their language deficits perhaps render the inhibitory function of language underdeveloped. In effect, children who persist with chronic aggressive behaviour beyond the early preschool years might be, from a psycholinguistic perspective, at an earlier stage of development. These children could be expected to have trouble acquiring and implementing higher psychological functions because they will have not developed a means for inhibiting a prepotent response, or as Tremblay and Nagin (2005) might suggest, a mechanism for how not to aggress.

The integral role of inhibitory self-control also attests to the superior position of behavioural inhibition in Barkley’s (1997/2005) neuropsychological model of self-regulation. As he has hypothesized, the other executive functions cannot operate unless provided an interval or window within which to function. Thus, it is not surprising that when other executive function composites were compared as mediators in the models driven by receptive and expressive language, respectively, inhibitory self-control was responsible for the vast majority of the indirect effects. From a developmental perspective, the pathway via inhibitory self-control might reflect delays in the transition from more sensorimotor regulation to self-regulation based on internal representation, as

described by Piaget (1952). In other words, delays in language development might render some children unable to regulate themselves symbolically (or at a more preoperational level), and thus, leave such children reliant on instinctive motor responses (e.g., hitting, kicking) to cope with challenges in their environment. This holds particular implications for intervention approaches as it suggests, first, that promoting language development is critical for helping children to inhibit responses through symbolic means; and second, that the development of more advanced self-regulatory skills will depend upon the child completing this transition successfully. Although Barkley (1997/2005) argues against the role of socialization in the development of behavioural inhibition, and in fact, all executive functions, Greenspan's work (Greenspan, 2007; Greenspan & Shanker, 2004) makes a cogent case for the process by which emotional exchanges during parent-child interactions make possible the inhibitory function. His views are particularly relevant here given that the measure of inhibitory self-control used in the present study is a combination of behavioural inhibition and emotional self-control.

According to Greenspan and Shanker (2004), emotions represent an early preverbal form of communication. They are, in a sense, a language that the parent and child co-construct through repeated and progressively more drawn out interactions beginning in infancy (Beeghly & Tronick, 1994; Tronick, 1989). As discussed previously, the key development from Greenspan's (Greenspan, 2007; Greenspan & Shanker, 2004) point of view is when children learn that their emotions can represent signals, first to others and later to themselves. He explained further that once emotions are used as signals, they take on symbolic form, thereby enabling fixed action patterns (i.e., uninhibited behaviours) to be gradually separated from the perceptions that trigger them. Greenspan (Greenspan, 2007; Greenspan & Shanker, 2004) theorized that the

separation of perception from action introduces a pause or delay in children's responding, which is effectively synonymous with Barkley's (1997/2005) hypothesis for the role of behavioural inhibition. In this way, language functions, expressed first through emotional signaling and later through words, may be instrumental in the emergence of inhibitory self-control, and in turn, the reduction in aggressive behaviour typically observed during preschool (Alink et al., 2006; Broidy et al., 2003; Nagin & Tremblay, 1999; Tremblay et al. 2004). In contrast, disruptions in early emotional signaling, due either to constitutional deficits or limited opportunities for co-regulated exchanges, might be expected to put children at risk for difficulties characterized by poor inhibition, such as aggression. Given the problems associated with chronically aggressive trajectories, intervention efforts during the preschool years will perhaps need to focus on promoting behavioural inhibition and emotional self-control by facilitating the child's use of emotions as signals to meet regulatory needs.

The pathway through emergent metacognition is more consistent with a truly Vygotskian perspective. The fact that emergent metacognition, as opposed to the other executive functions, served to mediate the model driven by semantic language is suggestive of the relation between meaning and subvocal inner dialogue. Of the three executive functioning composites measured, emergent metacognition is the most closely associated with Vygotsky's (1962, 1978) notion of internalized speech (i.e., language). This is due to the fact that it is comprised of items reflecting working memory and planning and organization, both of which are higher self-regulatory functions that Kopp (1982) and Barkley (1997/2005) attribute to the internalization of language. Therefore, in demonstrating a pathway from semantic language to physical aggression via emergent metacognition, the results correspond to Vygotsky's (1962, 1978) assertion that language

becomes internalized when it assumes meaningful properties. More importantly, for the purposes of offsetting aggressive impulses, the emergence of metacognition may permit children the capacity for two critical attributes, namely hindsight and forethought.

Research has shown consistently that children who exhibit externalizing behaviour problems are limited in their capacity for rule governed behaviour, reflection, and anticipatory set (Bartels, Hudziak, van den Oord, van Beijsterveldt, Retiveltdt, & Boomsma, 2003; Brady & Denckla, 1994; Pennington, Grossier, & Welch, 1993; van der Meere, Vreeling, & Sergeant, 1992). They are compromised when it comes to encoding verbal messages as rules, whether received directly or vicariously. The emergent metacognition pathway, as illustrated in the present study, implies that deficits in semantic language may make it difficult for aggressive children to make sense of past experiences in order to plan future methods of problem solving. Given their difficulties with respect to comprehending language meaning, it is perhaps quite challenging for such children to (a) convert past problem solving or cause-effect experiences into verbal rules, and (b) internalize those rules for future use. The result might be that when such children are confronted with novel situations, they are predisposed to aggressive responses given their limited repertoire of regulatory strategies from which to draw upon.

One way to interpret the specific patterns of relations between language processing, executive functioning, and physical aggression is that their trajectories intersect at different points in development. Given perhaps the more pervasive role inhibitory self-control plays in mediating the relation between language and aggression, it is possible that language (or communicative efforts) and inhibitory self-control overlap quite early in development but truly consolidate during the preschool years. The notion that behavioural inhibition and emotional self-control emerge prior to other self-

regulatory functions is consistent with views from both developmental psychology (Greenspan, 2007; Kopp 1982, 1989) and neuropsychology (Barkley, 1997/2005; Mischel & Ayduk, 2004; Zelazo et al., 1996). Children likely grasp excitatory/inhibitory language (e.g., yes/no, go/stop) quite early in development; however, it is not until this capacity overlaps with the internalization of language that the rapid decline in physical aggression, observed during preschool, occurs. Unlike inhibitory self-control, emergent metacognition had less of an impact on the language-aggression relation; nevertheless, its effect was still strong enough to partially mediate this association during preschool. Perhaps this reflects the fact that internalized language is still a relatively new development at this stage, with a trajectory that will continue to develop across childhood (Berk & Diaz, 1992). When paired with inhibitory self-control, preschoolers have greater ability pause, reflect, and evaluate their actions according to rules they are just beginning to meaningfully comprehend and internalize. As such, there may be some variability at this stage in the rate at which children combine these functions. The lack of a significant association between the language functions and cognitive flexibility may indicate either that the point at which these processes intersect is some time later in development, or that additional factors are involved in its development (see below). In support of the developmental progression interpretation, Barkley (1997/2005) has argued that cognitive flexibility is a developmentally more advanced skill insofar as it involves and incorporates other executive functions. An aptitude for shifting one's mental set during problem solving presupposes a number of capacities, including the ability to prevent a fixed response (behavioural inhibition), modulate emotion and generate sufficient drive (emotional control), reflect on past problem solving strategies (working memory), consider these strategies in relation to current or future problems (planning), and

reevaluate strategy use based on contingencies in the immediate environment (self-monitor). At the preschool stage, perseveration during problem solving is certainly apparent (Luciana & Nelson, 1998; Stahl & Pry, 2005; Zelazo & Frye, 1998); however, it just might be more universal at this age, and thus, fails to distinguish aggressive from non-aggressive children.

This developmental perspective holds particular implications for treatment approaches. Considering that the effects of the inhibitory self-control and emergent metacognition pathways may be specific or additive at this stage, it may be difficult to detect the full range of processes underlying disruptive behaviours. As the results demonstrate, weaknesses in both receptive and expressive language interfere with the emergence of inhibitory self-control, which in turn, limits children's ability to discontinue fixed patterns of response. On the other hand, problems with semantic language may hamper the development of working memory and planning functions, therefore rendering it quite difficult for children to internalize, plan, and implement regulatory strategies accordingly. Attention to one pathway at the expense of the other may result in poor treatment response. Although additional research is required to explicate the influence of language development on the growth trajectory of self-regulation during early childhood, these pathways nevertheless highlight the necessity for the use of comprehensive assessment procedures (i.e., cognitive, linguistic, emotional, and behavioural) capable of detecting specific targets for intervention (Beeghly, 2006), as well as early and integrative forms of treatment that can facilitate maturation in multiple domains.

Step Three: The Self-Regulation Pathway as a Function of Maternal Scaffolding

The third and final step of the current study involved an exploratory procedure to examine how socialization factors, namely maternal scaffolding, influence the self-regulation pathway. Based on the work of Vygotsky (1962/1978), and others (Baumrind, 1971; Greenspan, 2007; Hoffman, 1994; Kopp, 1982, 1989; Maccoby & Martin, 1983), it was believed that maternal scaffolding would correlate positively with preschoolers' language abilities, but inversely with their executive dysfunction and physical aggression. Overall, the results provided very little support for these hypotheses. Contrary to expectations, maternal scaffolding was found to correlate quite poorly with the executive functioning composites and physical aggression; however, it was found to predict semantic language significantly, even after accounting for the effects of children's IQ. This lone significant relation is nevertheless quite noteworthy from a Vygotskian perspective, as it suggests that higher quality maternal meaning-making is associated with children's semantic knowledge.

Broadly defined, semantic language refers to the understanding of meaning in linguistic form. In this sense, it involves knowledge about the associations between symbols and the properties they represent. At the preschool level, semantic language is reflected in how children grasp labels for people and objects, as well as, and perhaps more importantly, actions and concepts. According to Vygotsky (1962, 1978) and Greenspan (Greenspan & Shanker, 2004), the labels for these phenomena become symbolic when caregivers infuse them with meaning. Therefore, of all the language functions to be predicted by maternal scaffolding, semantic language makes the most sense theoretically. Empirical research, as well, has demonstrated that scaffolding, whether assessed in parent-child or teacher-student interactions, is associated with

children's verbal and nonverbal cognitive development, including concept formation and reading comprehension (e.g., Many, 2002; Neuman, 1996; Plumert & Nichols-Whitehead, 1996; Smith, Landry, & Swank, 2000).

On the other hand, the lack of any significant correlations between maternal scaffolding and both preschoolers' executive functioning and physical aggression is somewhat surprising but not entirely uncommon (e.g., Hughes & Ensor, 2005). It is possible that these null findings reflect the developmental variability among preschoolers. That is, during the preschool years children may be still learning the labels for various external, and internal, processes but some have yet to fully internalize this knowledge in order to act on themselves, or self-regulate. In this sense, the association between caregiver scaffolding and executive functioning may be more apparent later in development, when there is greater onus on children to self-regulate during problem solving. This was the exact finding of Landry and colleagues who demonstrated that maternal scaffolding when children were 3 years of age predicted children's executive functioning at age 6 by way of their language skills at age 4 (Landry, Miller-Loncar, Smith, & Swank, 2002). Given the considerable variability in development during preschool, the relation between scaffolding and semantic language may simply reflect the one self-regulatory milestone that most children at this age have met. Future studies adopting a longitudinal design are needed to explicate this process further.

Despite few obvious relations with scaffolding, the results still showed some evidence for the effect scaffolding may have on emerging self-regulation skills. In fact, more compelling findings were obtained when the sample was split into two groups based on the quality of maternal scaffolding. While the relations between executive functioning and physical aggression were significant irrespective of the level of scaffolding, distinct

correlation patterns were noted between the groups with respect to the language-executive functioning association. Specifically, among low scaffolding mother-child pairs, each of the four language domains (i.e., RLI_t, ELI, LCI, and LSI) were found to be significantly correlated with both inhibitory self-control and emergent metacognition (at the .05 level of significance), but not cognitive flexibility. Interestingly, nearly the exact opposite pattern was obtained among high scaffolding mother-child pairs (at the .05 level of significance). In this group, significant correlations were obtained between preschoolers' language skills (i.e., RLI_t, ELI, LCI, LSI) and their cognitive flexibility; however, no language domains was found to correlate with inhibitory self-control, and only one (RLI_t) was related significantly to emergent metacognition. While Type I error must be considered when interpreting these results, the pattern of significant correlations is nevertheless noteworthy.

This distinctive pattern may allude to the fact that different developmental processes are occurring at each level of scaffolding. Specifically, children in the low scaffolding group may be at a stage in development when they are still mastering the use of language for less sophisticated self-regulatory processes, namely inhibitory self-control and emergent metacognition. The lack of significant relations between these variables among high scaffolding mother-child pairs may suggest that the children in this group have progressed beyond this stage and now using language in an attempt to master the developmentally more advanced self-regulatory process of cognitive flexibility. Mediation analyses at each level of scaffolding provided some support for this explanation.

Within the low scaffolding group, the results failed to support hypothesis #7, which specified that the direct-effects model would emerge rather than the mediation

model. The evidence did, however, point to the mediating effect of emergent metacognition on the relation between preschoolers' semantic language and their physical aggression among low scaffolding mothers. As discussed in the preceding section, this finding is consistent with the Vygotskian view of internalized speech in regards to self-regulation, insofar as language, once meaningful, becomes covert sub-vocal language, which then guides and organizes action in the pursuit of goals. The fact that emergent metacognition emerged as the most significant mediator among low scaffolding mother-child pairs hints that difficulties in meaning-making are perhaps contributing to self-regulatory challenges, and as a consequence, physical aggression. In other words, the mothers of these children may be less skilled when it comes to providing the meaning necessary to facilitate the internalization of language.

This is not to suggest, however, that socialization experiences are the sole reason for self-regulatory development. On the contrary, it is likely that for many children, extensive scaffolding during early parent-child interactions is unnecessary, owing to their constitutionally strong language abilities and/or temperament. Nevertheless, the scaffolding construct, as measured in the present study, reflects mothers' sensitivity to their children's level of development, and their ability to respond accordingly. Some children may need only a modicum of input from their parents to derive meaning from their interactions, whereas others might require more explicit intervention to progress to the same point developmentally. Among the low scaffolding group, then, the language abilities and semantic knowledge of some children may be strong enough to overcome limitations in maternal scaffolding, allowing for appropriate self-regulatory development, and the expected reduction in aggression during the preschool years. On the other hand, for their more psycholinguistically challenged peers, poorer quality scaffolding may

contribute to delays in internalized language (i.e., emergent metacognition), and consequently, persistent aggressive behaviour. It follows that this particularly susceptible group of children may be those identified repeatedly as on the chronic and stable aggression trajectory (e.g., Alink et al., 2006; Broidy et al., 2003; Nagin & Tremblay, 1999; Tremblay et al., 2004), and whom are at risk future psychiatric diagnoses and/or deleterious outcomes in adolescence and adulthood (e.g., Broidy et al., 2003; Farrington & Loeber, 2000; Kokko, Tremblay, Lacourse, Nagin, & Vitaro, 2006; Moffitt, Caspi, Harrington, & Milne, 2002).

Unlike the findings found for low scaffolding mother-child pairs, some support was found for hypothesis #6. Specifically, the language-aggression link for the high scaffolding group was partially mediated by preschoolers' cognitive flexibility. The cognitive flexibility function is, in many respects, synonymous with Barkley's (1997/2005) description of reconstitution in that it involves the ability to modulate behavioural and emotional reactions by devising novel approaches to meet changes in response contingences and environmental demands. As noted previously, theory (Barkley, 1997/2005) and empirical research (Frye, Zelazo, Brooks, & Samuels, 1996; Zelazo et al., 1996; Zelazo, Helwig, & Lau, 1996; Wellman, Cross, & Watson, 2001) suggest that it develops after other self-regulatory skills because its function presupposes the use of these skills when activated. The results, then, intimate that a history of meaningful interactions between mothers and children in the high scaffolding group may have fostered the adequate development of subordinate self-regulatory functions, such as inhibitory self-control and emergent metacognition (i.e., internalized language). In keeping with a Vygotskian interpretation, it follows that the inner language that these children are afforded has a coordinating effect on basic psychological functions, thereby

enabling the development of the sort of higher-order problem solving associated with cognitive flexibility. Ongoing positive parent-child interactions continue to facilitate this process by making children's evolving strategy use more meaningful. In this way, these children are more capable than their less developed peers when it comes to interpreting cues in their environment, generating responses, selecting adaptive strategies, and reflecting on the effectiveness of these strategies (e.g., Crick & Dodge, 1994; Lemerise & Arsenio, 2000). It must be noted, however, these higher-order processes are likely still relatively underdeveloped at this stage, and thus, even typically developing preschoolers may be prone to physical aggression from time to time, as these skills become increasingly consolidated.

Clinical Implications

The results of the present study hold a number of important implications for intervention efforts aimed at promoting early self-regulation and reducing physical aggression. First, the findings reported herein are consistent with research in the areas of physical aggression (Campbell et al., 2006; Shaw, Lacourse, & Nagin, 2005; Tremblay et al., 2004) and self-regulation (Greenspan, 2007; Kopp, 1982; Tronick & Beeghly, 2011; Webster-Stratton, 2003) insofar as they highlight the value of early intervention. As the work of Tremblay (Nagin & Tremblay, 1999; Tremblay et al., 2004) and others Alink et al., 2006; Broidy et al., 2003) has shown, the preschool years represent the point of divergence between aggressive and non-aggressive developmental trajectories. As such, greater emphasis needs to be placed on the toddler and preschool years in designing treatment approaches, before the ramifications for aggressive behaviour become more significant. Delaying intervention for aggressive tendencies carries with it a number of risks, including the possibility that such behaviour becomes more entrenched, children's

self-concepts are affected adversely, and/or their moral development is compromised. At a societal level, early intervention may be even more important given the extensive costs associated with antisocial behaviour and its consequences.

As part of these early intervention efforts, broad-based assessment techniques may be required. Such assessment techniques should target not only the child's functioning but the quality of the parent-child relationship as well. Cohen's work (Cohen et al., 1993) illustrates that children are often referred for treatment based on their most obvious problems, with little consideration for underlying causal or contributory factors. In this way, assessment techniques that incorporate measures of children's language, cognitive, emotional, and behavioural functioning, provide an opportunity to gauge the developmental trajectories of these factors in relation to each other rather than in isolation. When considered along with environmental risks (e.g., maladaptive parent-child relationship), the data derived from these assessments allow for the identification of children who are at risk for more severe emotional/behavioural disorders, as well as specific targets or barriers to intervention that otherwise might not have been apparent on the basis of referral information alone.

An additional aim of the present study was to elucidate the developmental processes underlying the maturation of self-regulation. To this end, the results provided some evidence for the process by which meaningful parent-child interactions facilitate the development of executive functions. When these findings are interpreted with reference to the major theorists in the area (e.g., Greenspan, 2007; Kopp, 1982, 1989) what they suggest is that in responding to the intent of their children's speech acts (or communicative efforts), caregivers promote their knowledge and use of symbols; or in other words, their understanding of meaning. This may signify the first step in a chain of

developments, each facilitated by positive parent-child interactions, which later leads to behavioural inhibition, internalized language, and cognitive flexibility. That is to say, the development of self-regulation may pass through stages, with each stage representing a sensitive developmental period characterized by maturational challenges. Treatment approaches designed for this age group must therefore consider the importance of the parent-child relationship in self-regulatory development and help caregivers adopt strategies that are tailored to their children's stage in development. For instance, play-based therapies may be best suited for parents and children struggling with the initial meaning-making process and the development of behavioural inhibition. This type of interaction provides opportunities for parents to respond to their children's intentions, while also promoting their use of symbolism during play. Alternatively, training in the use of scaffolding, or the types of strategies coded in the present study, might be more effective for children who are experiencing difficulties at the level of internalized language. Such an approach might emphasize joint problem solving activities as means for facilitating rule-governed behaviour, while at the same time, provide opportunities for honing planning functions like hindsight and forethought. At the next level, children who are having trouble with cognitive flexibility, or more advanced problem solving, may be ready for social skills training (e.g., McGinnis & Goldstein, 1997) or problem solving skills training (e.g., Spivack, Platt, & Shure, 1976) provided their other executive functions are reasonably well developed. These approaches center on the acquisition of skills that can later be combined in the service of social interaction and more sophisticated goal-directed behaviour. This tiered approach to treatment is not only developmentally sensitive, but it might also help improve treatment response insofar as it emphasizes the bidirectional nature of self-regulatory development. Those interventions

that do focus on parent-child interactions (e.g., Eyberg & Boggs, 1989; Hembree-Kigin & McNeil, 1995; Webster-Stratton, 2003) have incorporated some of these ideas and have been shown to be quite effective in the treatment of disruptive behavior disorders (Reid et al., 2004; Webster-Stratton & Reid, 1999; Reid & Hammond, 2004).

Limitations of the Present Study

A few methodological limitations must be acknowledged when considering the conclusions drawn from the present study. First and foremost, while the sample size was adequate for basic mediation analyses, it was too small for larger scale path or structural equation modeling. Given a larger sample size, these statistical methods would have allowed for the investigation of larger scale models that might better control for Type I error, while assessing the relations between the four sets of variables (i.e., language, executive functioning, physical aggression, and scaffolding) in question. Future studies that combine path modeling with longitudinal designs may be particularly useful in clarifying the interactions between psychological functions and socialization processes during early development.

The inclusion of six-year-olds in the sample raised challenges that might also be regarded as limitations. For one, the variability in development between 3-year-olds and 6-year-olds can be considerable. In responding to questionnaires, parents are likely to gauge the frequency of their children's behaviours according to their age-related expectations, which likely differ for children three and six years of age, respectively. In addition, the inclusion of 6-year-olds required combining the common items between separate versions of the BRIEF in order to derive executive functioning composites that were uniform. Although the executive functioning composites were in fact found to be internally consistent, raw scores could not be compared to normative data, rendering it

difficult to ascertain the level of executive dysfunction within the sample. After much consideration, however, 6-year-olds were included in the sample because it was felt that they provided a broader sampling of emerging self-regulatory abilities during the early years. This, in turn, allowed for comparisons between the roles played by different executive functions. Limiting the sample to younger children may have restricted findings to the role of inhibitory self-control, as has been demonstrated in prior research (e.g., Raaijmakers et al., 2008), albeit to the expense of the roles played by emergent metacognition and cognitive flexibility.

The use of parent-report questionnaires as measures of preschoolers' executive functioning and physical aggression raises possible statistical confounds. Specifically, the use of one measurement method for two sets of study variables introduces the possibility of common method variance, which might artificially inflate correlations. Although the two variables in question, namely executive functioning and physical aggression, have been shown in previous research to be highly related (Giancola et al., 1998; Raaijmakers et al., 2008; Seguin et al., 2002) it is reasonable to speculate that the specific pattern of relations found in the present study may have been somewhat different had standardized assessment instruments or observational techniques been employed. It must be noted, however, that the decision to use the BRIEF as a measure of self-regulation was based on its purported aim, that is, "to provide a window into everyday behaviors associated with specific domains of executive functioning" in young children (Gioia et al., 2003, p. 6). Considering the general purpose of the present study, the BRIEF was thus felt to be an optimal measure of preschooler executive functioning, particularly given that other assessment procedures (e.g., CELF Preschool-2), and observational tasks (e.g., structured teaching task), were completed by the children.

Future studies investigating the self-regulation pathway will need to consider the use of measures designed specifically for preschoolers, such as play-based tasks like “Simon Says” (Gerardi-Caulton, 2000; Murray & Kochanska, 2002) or frustration tasks (Keenan & Wakschlag, 2000).

The sample collected for the present study does not entirely reflect the diversity seen in families referred for treatment. As a community sample, there were a limited number of children who might be considered as clinically aggressive or language impaired. Second, the vast majority of mother-child pairs in the sample were from nuclear families. Although the effects of family structure were often controlled, it is likely that single-parenthood would influence the quality of scaffolding during the early years. Given the predominance of participants from two-parent homes, it follows that the history of parent-child interactions of members of the current sample may not be completely representative of the greater population. Thirdly, the educational level of mothers in the present study was relatively high. Past research has shown maternal education to be correlated significantly with the quality of parent-child interactions and childhood aggression (Benzies, Keown, Magill-Evans, 2009; Cote et al., 2007). Therefore, it is possible that the quality of scaffolding observed in the present study is stronger than might be seen if a higher number of less educated mothers had participated. Fourthly, there was a dearth of participants from ethnic minorities in the sample, with most mother-child pairs identifying themselves as Caucasian. This has important implications for the coding of scaffolding strategies given variations in the relative importance of parenting practices and problem solving approaches between cultures. As Vygotsky (1962) has suggested, language, and by extension, scaffolding, are largely processes of cultural transmission. Future studies that incorporate the scaffolding

paradigm will need to explore the influence of cultural factors and how they influence the specific practices parents employ to promote their children's problem solving. Finally, the present study focused solely on the scaffolding practices of mothers, without consideration of the role played by fathers in their children's self-regulatory development. The influence of paternal scaffolding on children's self-regulation represents an intriguing avenue for future research, as are any studies into the possible differences between mothers and fathers when it comes to scaffolding.

Future Directions

Although the goals of the present study were largely met, the conclusions presented herein raise a number of questions for future research in the areas of language, aggression, self-regulation, and parent-child interaction. Perhaps the most pressing need is for longitudinal and/or cross-sectional study designs capable of identifying developmental changes in these psychological processes. Potentially, such designs could provide more detailed information on the intersection of emerging self-regulatory processes with both language and physical aggression. Along these lines, the group-based approach to trajectory modeling used extensively by Tremblay and colleagues (Nagin & Tremblay, 1999; Nagin & Tremblay, 2005; Tremblay et al., 2004) would be useful in terms of mapping the developmental courses of various self-regulatory processes like the executive functions examined in the current study. From there, additional studies will need to investigate how parent-child interaction histories influence these processes across early development. As Landry and colleagues (2002) demonstrated, the relations between parenting factors and specific child characteristics may not be apparent when measured concurrently; rather, they become evident when measured over time.

Another focus for future research may be in the use of the scaffolding paradigm for the study of parent-child interactions. A review of recent literature reveals that scaffolding has progressed from a construct studied largely in educational research to one that is used to assess parent-child interactions (e.g., Gelman, Goetz, Sarnecka, & Flukes, 2008; Lengua, Honorado, & Bush, 2007; Williams, Mastergeorge, & Onati, 2010). When caregivers respond to the intent of their children's actions, a process Greenspan and Shanker (2004) identify as critical for early self-regulatory development, they are in essence, working within the zone of proximal development (Vygotsky, 1978). In this way, scaffolding is tailor made for studying the meaning-making process between parents and their children because it represents the strategies caregivers employ when working within the ZPD. In short, it provides an operational construct for the practices caregivers use to transform their children's previously rudimentary acts into meaningful symbolic functions. Therefore, its use in future studies examining the development of self-regulation might yield important findings in regards to the use of specific parenting practices. Most notably, it will be important for future studies to identify the specific scaffolding practices (i.e., metacognitive information, manner of instruction, emotional support, transfer of responsibility) that are most influential for child development. The identification of these practices, in combination with information regarding the developmental courses of various psychological processes, will be of great utility for treatment models aimed at early intervention for disruptive behaviour problems.

In addition to these research prospects, continued investigation of the self-regulation pathway is recommended. In the present study, the role of internalized language for self-regulatory functioning was conjectured based on the relation between semantic language and emergent metacognition. It was not, however, observed,

measured, or assessed explicitly. While empirical study of internalized language has proven to be quite difficult, recent designs have adopted well-formulated coding systems to rate its frequency and quality during both shared and independent problem solving (e.g., Winsler, 1998; Winsler et al., 1999; Winsler, Diaz, & Montero, 1997). The results of these studies have been largely consistent with Vygotsky's (1962, 1978) views in showing that children with delays in the internalization of language are more likely to have deficits in executive functioning and externalizing behaviour problems (Winsler, 1999). Further research is needed to determine the relations, if any, between language functions, internalized language, and the quality of parent-child interactions.

Finally, forthcoming studies will need to adopt a broader focus when investigating the self-regulation pathway. Specifically, various genetic and environmental factors are likely to influence the developmental trajectories of children's language, aggression, and executive functioning, as well as the quality of early parent-child relationships. For instance, given differences in the rate of language development between boys and girls, studies should seek to explicate how these differences might influence executive abilities and/or the strategies parents use to facilitate self-regulation. Along these lines, similar studies are needed to explore the differences, if any, between mothers and fathers in terms of their scaffolding practices and their respective influence on the self-regulation pathway. Other avenues of study include the exploration of factors that might influence parents' ability to scaffold problem-solving skills for their children, including parental depression, marital conflict, or parents' subjective experience of parenting.

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Appendix A



CONSENT TO PARTICIPATE IN RESEARCH

Correlates and Predictors of Preschool Children's Social Behaviour: Parent/Guardian Consent Form

You are asked to participate in a research study conducted by Dr. Rosanne Menna, Robert Clark, Sara O'Neil, Holly Ambrose, and Adam Kayfitz from the Psychology Department at the University of Windsor. This study is part of a Ph. D. dissertation by Robert Clark, Sara O'Neil, Adam Kayfitz, and Holly Ambrose. If you have any questions or concerns about the research, please feel to contact Dr. Rosanne Menna at 519-253-3000 extension 2230.

PURPOSE OF THE STUDY

The purpose of this study is to learn about how children's behaviour in situations with other children is related to their thinking style, their language skills, their knowledge about emotions, their relationships with their parents and their parents' marital interactions. Furthermore, this study is intended to further understanding in regards to the ways parents teach their children when spending time with them in one-to-one interactions.

PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

- Give permission for your child's teacher to fill out questionnaires about your child. These questionnaires will ask about your child's behaviour at school.
- Visit the university with your child. During this time, you and your child will be asked to engage in a series of interactive tasks while being videotaped. The tasks are intended to approximate the types of interactions you have with your child at home. Also, we would like to obtain measures of your child's cognitive functioning and language skills. This assessment is expected to take about 60 minutes. While we are assessing your child's cognitive functioning and language skills, we would like you to fill out a few questionnaires about your child's behaviour and about your own experience as a parent. In total, this visit is expected to require 1 to 1.5 hours of your time.
- Give permission for your child to work one-on-one with a researcher for approximately 20 minutes to 30 minutes. During this time your child will listen to several brief stories accompanied by pictures and will be asked questions about the stories. In addition, your child will be read some statements about activities that some children are good at and will be asked to decide whether or not he or she is good at those activities.

POTENTIAL RISKS AND DISCOMFORTS

When you visit the university, you will be asked to engage in two interactive tasks with your child, which he/she may find mildly frustrating. If at any time, you believe that your child is too frustrated, we will end the task immediately.

When filling out questionnaires about your child's behaviour, you may find that you are reminded of some negative behaviours your child may exhibit. This may cause you to feel somewhat uncomfortable. You may also experience some negative feelings when filling out a questionnaire on your marital interactions. If this is the case, please feel free to discontinue the questionnaire and return to it later, or not at all. Also, please feel free to talk to us about your discomfort. We have included the telephone numbers of local resources should you feel the need to discuss with someone your concerns in regards to your child's behaviour:

Parent Help Line	519-257-5437
Children First	519-250-1850
Windsor Regional Children's Centre	519-257-5215

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

By participating in this study, you may become more aware of your child's behaviour, as well as his/her strengths and weaknesses. In addition, you may receive feedback on your child's language skills and social skills. Your child is expected to enjoy the tasks as they are designed to be developmentally appropriate and feature stories, puppets, toys, and stickers. In addition, by participating in this study you will be contributing to science by increasing our understanding of the links between children's thoughts and behaviour. The information obtained from this study may help with the development of special programs intended to help children and their families.

PAYMENT FOR PARTICIPATION

As a token of our appreciation for your help with this study, you will be given a \$5 gift certificate to Tim Horton's when you complete the questionnaires. You will also be provided \$10 in cash when you come to the University of Windsor to complete the additional tasks.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission to the people who are working on this particular project. The information will be kept in a locked cabinet and will be destroyed after 5 years. Group results may be published in a professional journal and/or at professional conferences, but no identifiable information will be included. In addition, you will have permission to review videotapes if you would like to do so.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS

Group results will be presented here:

<http://web4.uwindsor.ca/units/researchEthicsBoard/studyresultforms.nsf/VisitorView?OpenForm>

Preliminary results are expected to be available by September 2010. Further results will be available by September 2011.

SUBSEQUENT USE OF DATA

Do you give consent for the subsequent use of the data from this study? Yes No

May we contact you for future studies similar to this one? Yes No

If yes, please provide phone number: _____

If yes, please also provide mailing address

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study "Correlates and Predictors of Preschool Children's Social Behaviour" Parent/Guardian Consent Form as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

Name of Child

Name of Parent or Guardian

Signature of Parent or Guardian

Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

Signature of Investigator

Date



Letter of Information for Parents and Guardians

Correlates and Predictors of Preschool Children's Social Behaviour

You are asked to participate in a research study conducted by Dr. Rosanne Menna, Robert Clark, Sara O'Neil, Holly Ambrose, and Adam Kayfitz from the Psychology Department at the University of Windsor. This study is part of a Ph. D. dissertation by Robert Clark, Sara O'Neil, Holly Ambrose, and Adam Kayfitz. If you have any questions or concerns about the research, please feel to contact Dr. Rosanne Menna at 519-253-3000 extension 2230.

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PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

- Give permission for your child's teacher to fill out questionnaires about your child and your family. These questionnaires will ask about your child's behaviour at school.
- Visit the university with your child. During this time, you and your child will be asked to engage in a series of interactive tasks while being videotaped. The tasks are intended to approximate the types of interactions you have with your child at home. Also, we would like to obtain measures of your child's cognitive functioning and language skills. This assessment is expected to take about 60 minutes. While we are assessing your child's cognitive functioning and language skills, we would like you to fill out a few questionnaires about your child's behaviour and about your own experience as a parent. In total, this visit is expected to require 1 to 1.5 hours of your time.
- Give permission for your child to work one-on-one with a researcher for approximately 20 minutes to 30 minutes. During this time your child will listen to several brief stories accompanied by pictures and will be asked questions about the stories. In addition, your child will be read some statements about activities that some children are good at and will be asked to decide whether or not he or she is good at those activities.

POTENTIAL RISKS AND DISCOMFORTS

When you visit the university, you will be asked to engage in two interactive tasks with your child, which he/she may find mildly frustrating. If at any time, you believe that your child is too frustrated, we will end the task immediately.

When filling out questionnaires about your child's behaviour, you may find that you are reminded of some negative behaviours your child may exhibit. This may cause you to feel somewhat uncomfortable. If this is the case, please feel free to discontinue the questionnaire and return to it later, or not at all. Also, please feel free to talk to us about your discomfort. We have included the telephone numbers of local resources should you feel the need to discuss with someone your concerns in regards to your child's behaviour:

Parent Help Line	519-257-5437
Children First	519-250-1850
Windsor Regional Children's Centre	519-257-5215

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

By participating in this study, you may become more aware of your child's behaviour, as well as his/her strengths and weaknesses. In addition, you may receive feedback on your child's language skills and cognitive functioning. Your child is expected to enjoy the tasks as they are designed to be developmentally appropriate and feature stories, puppets, toys, and stickers. In addition, by participating in this study you will be contributing to science by increasing our understanding of the links between children's thoughts and behaviour. The information obtained from this study may help with the development of special programs intended to help children and their families.

PAYMENT FOR PARTICIPATION

As a token of our appreciation for your help with this study, you will be given a \$5 gift certificate to Tim Horton's when you complete the questionnaires. You will also be provided \$10 in cash when you come to the University of Windsor to complete the additional tasks.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission to the people who are working on this particular project. The information will be kept in a locked cabinet and will be destroyed after 5 years. Group results may be published in a professional journal and/or at professional conferences, but no identifiable information will be included. In addition, you will have permission to review videotapes if you would like to do so.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS

Group results will be presented here:

<http://web4.uwindsor.ca/units/researchEthicsBoard/studyresultforms.nsf/VisitorView?OpenForm>

Preliminary results are expected to be available by September 2010. Further results will be available by September 2011.

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca



CONSENT FOR VIDEO TAPING

Child's Name:

Parent's Name:

Title of the Project: **Correlates and Predictors of Preschool Children's Social Behaviour**

I consent to the video-taping of procedures of myself and my child.

I understand these are voluntary procedures and that I am free to withdraw at any time by requesting that the viewing be discontinued. I also understand that my name or (my child's name) will not be revealed to anyone and that viewing will be kept confidential. Tapes are filed by number only and store in a locked cabinet.

I understand that confidentiality will be respected and the viewing of materials will be for professional use only.

(Signature of Parent or Guardian)

(Date)

I also give permission for these tapes to be viewed for teaching purposes in psychology graduate level courses.

(Signature of Parent or Guardian)

(Date)

Appendix B

Demographics Questionnaire

The Canadian Psychological Association recommends that researchers report the major demographic characteristics of research participants. To assist us in collecting this information, please complete this brief questionnaire (use the back if needed). All data are confidential and will not be used in any way that identifies you or your child. If you have any questions concerning any of the items, please do not hesitate to ask them.

Child's Name _____

Today's Date _____

Child's birth date (please include day, month, and year) _____

Child's current grade _____

Child's gender _____

Your relationship to child (e.g., mother, father) _____

Parents' Marital Status

- Married
- Divorced
- Separated
- Living together
- Remarried
- None of the above (Please Specify: _____)

Who does the child live with most of the time?

- Mother
- Father
- Step-father
- Step-mother
- Other (Please Specify: _____)

Father's education

- Less than 7 years
- Junior high school (Grade 9)
- Some high school (Grade 10 or 11)
- Graduated from high school or equivalent high school diploma
- Some college or university (at least one year)
- Graduated from college or university
- Graduate/professional school (e.g., Master's, Ph.D.)
- Other _____

Mother's education

- Less than 7 years
 - Junior high school (Grade 9)
 - Some high school (Grade 10 or 11)
 - Graduated from high school or equivalent high school diploma
 - Some college or university (at least one year)
 - Graduated from college or university
 - Graduate/professional school (e.g., Master's, Ph.D.)
 - Other _____
-

Please describe stepparents' education if applicable:

Stepmother:

- Less than 7 years
- Junior high school (Grade 9)
- Some high school (Grade 10 or 11)
- Graduated from high school or equivalent high school diploma
- Some college or university (at least one year)
- Graduated from college or university
- Graduate/professional school (e.g., Master's, Ph.D.)
- Other _____

Stepfather:

- Less than 7 years
- Junior high school (Grade 9)
- Some high school (Grade 10 or 11)
- Graduated from high school or equivalent high school diploma
- Some college or university (at least one year)

- Graduated from college or university
- Graduate/professional school (e.g., Master's, Ph.D.)
- Other _____

Mother's occupation _____

Father's occupation _____

Please describe stepparents' occupations if applicable: _____

Mother's ethnicity: (please choose the one that fits best)

- South Asian
- East Asian
- Caucasian
- African Canadian
- Caribbean
- Hispanic
- Native Canadian
- Biracial - Please Specify _____
- Multi-racial - Please Specify _____
- Other – Please Specify _____

Father's ethnicity (please choose the one that fits best):

- South Asian
- East Asian
- Caucasian
- African Canadian
- Caribbean
- Hispanic
- Native Canadian
- Biracial - Please Specify _____
- Multi-racial - Please Specify _____
- Other – Please Specify _____

If applicable: Stepfather's ethnicity

- South Asian
- East Asian
- Caucasian
- African Canadian
- Caribbean
- Hispanic
- Native Canadian
- Biracial - Please Specify _____
- Multi-racial - Please Specify _____
- Other – Please Specify _____

If applicable: Stepmother's ethnicity

- South Asian
- East Asian
- Caucasian
- African Canadian
- Caribbean
- Hispanic
- Native Canadian
- Biracial - Please Specify _____
- Multi-racial - Please Specify _____
- Other – Please Specify _____

Has your child been diagnosed with a disability or a psychological disorder? _____

If so, please specify _____

Has your child been suspected of having a learning disorder?

If so, please specify _____

Do you think your child has a disorder of any kind? _____

If so, what do you think the child has? _____

Is your child receiving any psychological services? _____

If so, please describe: _____

Does your child have a serious illness? _____

If so, please specify _____

Is your child currently taking any medications? _____

If so, please specify _____

Approximate total annual income of parent(s) who live with the child _____

Does your child have any siblings? If so, please indicate gender and date of birth for each child.

How would you describe your child as an infant? (e.g., easy, difficult, slow-to-warm up)

Imagine that your child came to you and told you that another child hit your child while they were playing on the playground. What would you tell your child to do?

Imagine that your child came to you and told you that another child was telling other children not to be friends with your child. What would you tell your child to do?

Please tell us anything else that you think we should know:

Corresponding Items between BRIEF-P and BRIEF

Index	BRIEF-P	BRIEF
Inhibition		
	3	34
	13	78
	18	38
	23	81
	28	82
	33	42
	38	63
	43	44
	52	54
	54	55
	60	59
Shift		
	5	6
	15	12
	20	30
	25	19
	35	80
	45	23
Emotional Control		
	1	1
	6	7
	11	70
	16	25
	21	26
	26	64
	31	62
	36	45
Working Memory		
	2	2
	12	17
	22	21
	27	24
	32	27
	37	32
	42	37
	47	83
	51	47
	59	57
	61	9

Corresponding Items between BRIEF-P and BRIEF

Index	BRIEF-P	BRIEF
Plan/Organize	9	10
	14	33
	19	75
	29	8
	34	69
	39	28
	44	67

Preschool Social Behavior Scale – Parent Form

The following measure is adapted from that described in:

Crick, N.R., Casas, J.F., & Mosher, M. (1997). Relational and overt aggression in Preschool. *Developmental Psychology*, 33, 579-588.

The measure is based on a similar measure developed for use with children in middle childhood (e.g., Crick, 1996). The PSBS-T contains a total of 25 items and assesses the following:

Subscales:

Relational Aggression: Items # 4, 8, 11, 13¹, 15, 19¹, 21, 22

Overt/Physical Aggression: Items # 2, 5, 7, 12, 14, 17¹, 20¹, 23

Prosocial Behavior: Items # 1, 3, 6, 10

Depressed Affect: Items # 9, 16, 18²,

Child's acceptance with same sex peers: Item # 24

Child's acceptance with opposite sex peer: Item # 25

¹ = items cross-loaded on the factor analysis and were dropped from further analyses.

² = item needs to be reverse-coded.

New Scales for Revised Parent Version:

Physical Aggression: 2, 5, 7, 12, 17, 23, 26, 27

Relational Aggression: 4, 8, 11, 13, 15, 19, 21, 22

Total Aggression: 2, 4, 5, 7, 8, 11, 12, 13, 14, 15, 17, 19, 20, 21, 22, 23, 26, 27

Prosocial Behavior: Items # 1, 3, 6, 10

Depressed Affect: Items # 9, 16, 18²,

Child's acceptance with same sex peers: Item # 24

Child's acceptance with opposite sex peer: Item # 25

Preschool Social Behavior Scale

Child's Name _____	Child's sex: Male or Female?
Parent's Name _____	Age _____

	Never/ Almost Never True	Not often	Some- times	Often	Always/ Almost Always True
1. This child is good at sharing and taking turns	1	2	3	4	5
2. This child kicks or hits others.	1	2	3	4	5
3. This child is helpful to peers.	1	2	3	4	5
4. This child tells a peer that he/she won't play with that peer or be that peer's friend unless he/she does what this child asks.	1	2	3	4	5
5. This child verbally threatens to hit or beat up other children.	1	2	3	4	5
6. This child is kind to peers.	1	2	3	4	5
7. This child pushes or shoves other children.	1	2	3	4	5
8. This child tells others not to play with or be a peer's friend.	1	2	3	4	5
9. This child doesn't have much fun.	1	2	3	4	5
10. This child says or does nice things for other kids.	1	2	3	4	5
11. When mad at a peer, this child keeps that peer from being in the play group.	1	2	3	4	5
12. This child verbally threatens to physically harm another peer in order to get what they want.	1	2	3	4	5
13. This child tries to embarrass peers by making fun of them in front of other children.	1	2	3	4	5
14. This child ruins other peer's things (e.g. art projects, toys) when he/she is upset.	1	2	3	4	5
15. This child tells a peer they won't be invited to their birthday party unless he/she does what the child wants.	1	2	3	4	5
16. This child looks sad.	1	2	3	4	5

	Never/ Almost Never True	Not Often	Some times	Often	Always/ Almost Always True
17. This child throws things at others when he/she doesn't get his/her own way.	1	2	3	4	5
18. This child smiles at other kids.	1	2	3	4	5
19. This child walks away or turns his/her back when he/she is mad at another peer.	1	2	3	4	5
20. This child verbally threatens to push a peer off a toy (e.g. tricycle, play horse) or ruin what the peer is working on (e.g. building blocks) unless that peer shares.	1	2	3	4	5
21. This child tries to get others to dislike a peer (e.g. by whispering mean things about the peer behind the peer's back).	1	2	3	4	5
22. This child verbally threatens to keep a peer out of the play group if the peer doesn't do what the child says.	1	2	3	4	5
23. This child hurts other children by pinching them.	1	2	3	4	5
24. This child is well liked by peers of the <u>same</u> sex.	1	2	3	4	5
25. This child is well liked by peers of the <u>opposite</u> sex.	1	2	3	4	5
26. This child punches peers.	1	2	3	4	5
27. This child pokes peers.	1	2	3	4	5

Appendix C

Definitions and Examples of Maternal Scaffolding Behaviours (Neitzel & Stright, 2003)

Scaffolding		
Strategy	Definition	Example
Metacognitive information	The degree to which the parent provides information makes salient the thinking behind the problem-solving process.	"That was a very complicated description, so try to imagine in your mind what it might look like before you try to make it."
Regulation of task difficulty	The degree to which the parent gives instructions in small, manageable steps to simplify or reduce the complexity of the task.	"Let's separate all the same coloured blocks. First..."
Review	The extent to which the parent reviews the steps of the task and discusses progress in relation to the overall goal of the task.	"Okay, you finished the tower; now, let's make the bridge. Remember, we have to have a tower and a bridge when we are all done."
Emotional support	The extent to which the parent provides comfort and support verbally (e.g., words of encouragement, positive comments) or nonverbally (e.g., smiles, tone of voice).	"Good job! It's really hard but I know you can do it."

Scaffolding		
Behaviour	Definition	Example
Rejection	Redirection that is done in a negative way including criticism, disapproval or disgust, dismissal of the child's efforts, or nonverbal gestures of nonsupport.	"I knew you wouldn't be able to do it because you never listen."
Controlling	The extent to which the parent presents instruction consistent with the child's developmental level including the recognition of the child's region of sensitivity and observation of contingency rules.	Instruction in the region between the child's highest level of demonstrated success and their first instance of failure. Also, when the child is successful the parent refrains from providing instruction; when the child struggles, instruction is increased.
Encouragement of Active Involvement	The degree to which the parent encourages the child's active involvement in the task through the use of prompts, questions, and hints rather than simply stating the answer, directing the child's actions, or doing the task.	"Now we have finished the tower. What should we do next?"

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