2005

# Prediction of childhood externalizing disorder outcome: A variable-oriented and person-oriented analysis of better beginnings, better futures data

Stephanie C. Cerutti
*Wilfrid Laurier University*

*Your file Votre référence*
*ISBN: 978-0-494-16736-6*
*Our file Notre référence*
*ISBN: 978-0-494-16736-6*

# PREDICTION OF CHILDHOOD EXTERNALIZING DISORDER OUTCOME: A VARIABLE-ORIENTED AND PERSON-ORIENTED ANALYSIS OF BETTER BEGINNINGS, BETTER FUTURES DATA

BY

Stephanie C. Cerutti

B. A. Hons. Psychology, Queen's University, 2004.

Advisor: Dr. Geoff Nelson

THESIS

Submitted to the Department of Psychology
in partial fulfilment of the requirements
for the Master of Arts degree
Wilfrid Laurier University
2006

## Abstract

The current study identified risk factors associated with childhood externalizing disorders. Intervention outcomes of children that took part in a community-based, early childhood prevention project, Better Beginnings Better Futures, were studied longitudinally from Grade 3 to Grade 6. Three intervention sites in Ontario (Cornwall, n = 108; Sudbury, n = 134; Highfield, n = 131) and two matched comparison sites in Ontario (Ottawa-Vanier, n = 116; Etobicoke, n = 87) were examined. Risk factors examined at multiple levels of analysis, including the individual, family, and community levels of analysis, were considered. It was expected that higher risk children would respond more to the intervention. Data were examined using both a variable-oriented analyses (multiple regression) and a person-oriented analysis (regression decision tree analytic strategy) with respect to parent and teacher-rated measures of childhood externalizing disorder. Neither of these two statistical approaches revealed the effectiveness of programs for high-risk subgroups. Regression decision tree analyses revealed that comparison sites had equivalent childhood externalizing disorder outcome scores as seen in intervention sites. This may have been due to intervention programming in these comparison communities thereby leading to a narrowing of differences between the intervention and comparison sites. Both approaches found a number of different risk factors for externalizing disorders.

Acknowledgements

I thank the Better Beginnings, Better Futures Research Coordination Unit for allowing me to conduct this research using their data.

My gratitude is extended to Dr. Geoff Nelson for acting as my thesis advisor. I would like to acknowledge all of the guidance, time, and assistance that he provided.

I also thank Dr. Mark Pancer and Dr. Pam Sadler for their advice, time, and assistance while acting as my thesis committee members.

My gratitude is also extended to Dr. Ray DeV. Peters for introducing me to community psychology and for acting as my undergraduate thesis advisor in which he allowed me to work with Better Beginnings. I also would like to extend much thanks to Andrew Currie, Kelly Petrunka, Shahriar Khan, Philomene Kocher, Dr. Will King, and Dr. Bob Arnold, for their ongoing assistance throughout the duration of my thesis study (while at Queen's and at Laurier).

I would like to thank my parents and sister for their love and support throughout my post-secondary education. Finally, I would like to thank Alex.

Table of Contents

List of Tables

List of Figures

List of Appendices

# Introduction

The Better Beginnings, Better Futures (Better Beginnings) project was created as a response to the need for research on the prevention of children's mental health problems in Ontario. This longitudinal prevention policy research demonstration project had the purpose of providing information on the effectiveness of a universal approach to prevention as a policy for children. This community-based primary prevention policy initiative in Ontario (funded by the Government of Ontario in 1990) was designed to prevent emotional and behavioural problems and promote positive development in young children, to improve family and neighbourhood characteristics, to link effectively with existing services, and to involve local residents in project development and implementation. This is the first study in Canada that focuses on long-term outcomes of a universal prevention program for children. The projects' findings will have important implications for the national children's agenda, a federal-provincial initiative to establish effective programs for early childhood development.

Eight disadvantaged communities in Ontario make up the Better Beginnings intervention sites. Five of the Better Beginnings communities (the younger child sites) focus on children from birth to age four with approximately 3,000 children and their families, and three of the Better Beginnings sites (the older child sites) focused on children from four to eight years old with a total of approximately 1,500 children and families (Peters et al., 2004). This study considers only the three older child sites which have two matched comparison sites for the purpose of examining the outcomes of the prevention program comparison. The three older child sites received

school-based programs and enriched child care programs as these programs were mandated by the government funders. Based on locally identified needs and available resources, additional programs for children and their families were provided. Therefore, substantial variation in programming and emphasis occurred at each site. Better Beginnings' universal approach to prevention involved all children in the age group in the disadvantaged neighbourhood, not just those identified as being at highest risk (Peters et al., 2004).

Several phases of project development/implementation have taken place. A *project development phase* (starting in 1991) in each of the eight intervention sites took two to three years. This project development phase focused on citizen engagement and planning. The next phase of the project, the *demonstration phase*, started in 1993-94 when children were in Junior Kindergarten. This demonstration phase covered the first five years in which programs were fully operational until 1997-98 when children were in Grade 3. This demonstration phase of the Better Beginnings intervention in the older child sites had short-term outcomes that were very positive, showing significantly lower rates of behavioural problems in Better Beginnings children compared with children in two comparison groups (Peters et al., 2004).

Presently follow-up research considering the impact of the intervention after demonstration phase, when programming is no longer provided for the longitudinal sample, is being conducted. A medium-term follow-up report was recently written that investigated progress since the short-term outcomes report which had considered child and family outcomes in the time period of Grade 1 to Grade 3. This recent

medium-term follow-up report considered the time period of Grade 3 to Grade 6 when programming was no longer provided (post demonstration phase).

The recent medium-term follow-up of the Better Beginnings intervention was completed to determine the effects of the Better Beginnings program on Grade 6 children and their families three years after the end of the program. Results from this medium-term follow-up indicated that there were no overall intervention effects seen for childhood externalizing disorders (Peters et al., 2005). However, significant effects of an intervention may be limited to certain sub-groups of individuals. The goals of the present archival study were to determine whether or not the Better Beginnings intervention had greater or lesser impact on high-risk groups, and if so, what the particular risk variables are that moderate program effectiveness. This study used longitudinal data collected for the Better Beginnings prevention project (Peters et al., 2000). Predictor variable (risk factors) effects on childhood externalizing disorder in Better Beginnings intervention and comparison sites were investigated.

## Literature Review

This literature review defines externalizing disorders and describes the concepts of prevention, ecological model, and differential effectiveness. A review of literature pertaining to risk factors associated with childhood externalizing disorders follows.

### *Externalizing Disorders*

The revised third edition of the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-III-R which was used to assess childhood externalizing disorders at the outset of Better Beginnings study)(American

Psychiatric Association [APA], 1987), identifies three specific behaviour disorders that constitute externalizing disorders or disruptive behaviour disorders. This triad includes attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD). Children with ADHD experience inattention, impulsivity, and overactivity to the degree that these symptoms are considered excessive in comparison with their peers. ODD is characterized by a pattern of defiant, negativistic, and noncompliant behaviour. Children with ODD lose their temper frequently, argue with adults, actively defy or refuse adult requests, place blame on others, deliberately annoy others, are often angry and resentful, swear, and are spiteful or vindictive. Such symptoms must be exhibited more frequently than same age peers and over a period of six months. CD is differentiated from other disorders primarily by the severity of symptoms, which usually result in the violation of another's rights (e.g., fighting, stealing) and/or the destruction of property (e.g., setting fires). ODD is contrasted with CD in that symptoms associated with ODD typically do not violate the rights of others. However, many children may receive dual diagnoses of these externalizing disorders.

### *Prevention of Externalizing Disorders*

Many young children in Canada suffer from behavioural problems (Boyle et al.,1987) which have been considered to have negative long-term outcomes (Harrington, Fudge, Rutter, Pickles & Hill, 1991; Klein & Mannuzza, 1991; Lahey, Loeber, Quay, Frick, & Grimm, 1997; Reid, Patterson & Snyder, 2002; Simeonsson, 1994). These negative outcomes, such as serious delinquency in adolescence and antisocial personality disorder and criminal behaviour in adulthood are common for

children with externalizing disorders as there is considerable stability of such serious behaviour problems over the lifespan (Barkley, Fischer, Edelbrock & Smallish, 1991; Herbert, 1987; Klein et al., 1991; Offord & Bennett, 1994; Patterson, Reid & Dishion, 1992). Also, these childhood disorders have proved resistant to a variety of treatments (Kazdin, 1995). This resistance may be particularly evident when interventions are not implemented until such behaviours as severe physical aggression or criminal behaviour occur (Fischer, Barkley, Fletcher & Smallish, 1993; Simeoensson, 1994).

Many experts have concluded that primary prevention interventions are the best approach to mitigating the negative effects of childhood externalizing disorders (Boyle & Offord, 1990; Offord et al., 1994). The goal of primary prevention of externalizing disorders is to lower the incidence or onset, rather than to treat occurring cases of the problem (secondary prevention) or its sequelae (tertiary prevention). Primary prevention strategies focus on both risk and protective factors that have been identified as having a strong relationship with the problem. Primary prevention interventions seek to modify these risk and protective factors. This is done by either increasing the factors that protect against externalizing disorders or by decreasing the risk factors. Three types of primary prevention have been proposed by the Institute of Medicine (Nelson & Prilleltensky, 2005). These three types of primary prevention are Universal, Selected, and Indicated. Universal primary prevention interventions are focused on the entire community. In contrast, selected primary prevention interventions focus on high-risk individuals or subgroups within a community. Finally, indicated primary prevention interventions are focused on high-

risk individuals in a community that are showing symptoms or biological markers for a disorder (Nelson & Prilleltensky, 2005).

Although primary prevention interventions may be costly, this approach is more likely to save money in the long run (Nelson & Prilleltensky, 2005), as externalizing disorders have been found to be costly to treat as well as having negative outcomes for children, schools, communities, and society (Simeonsson, 1994). Also, treatment costs associated with current prevalence rates of mental health problems are challenging to finance. A province-wide survey of mental health disorders in children aged four to 16 years, the Ontario Child Health Study, showed prevalence rates of externalizing disorder in males of 9.3% and in females of 2.6% (Government of Ontario, 1989). Furthermore, professional human resources are not able to meet such a high need for individual treatment of such externalizing disorders. In fact, the Ontario Child Health Study showed that only a small minority of children with a mental health problem had received social or mental health services in the previous six months. This children's mental health survey also emphasized the need for primary prevention of children's mental health problems due largely to the high prevalence of child mental health disorders found in the study and to the large proportion of children in Ontario who were not receiving necessary treatment. The Better Beginnings project was created as a response to the need for research on prevention of children's mental health problems in Ontario.

### *Ecological Model*

A developmental ecological model (Bronfenbrenner, 1979, 1988) has guided much of the work on child, family, parent, and community effects on child

development and children's mental disorders (Essau, 2003). This ecological metaphor has also been emphasized in the work of community psychologists who believe that this emphasis on people in the context of social systems is much more accurate than the traditional psychological viewpoint that focuses on the individual. The ecological metaphor has been defined as the interaction between individuals and the multiple social systems in which they are embedded (Nelson & Prilleltensky, 2005).

Simeonsson (1994) stated that primary prevention interventions for externalizing disorders that have an integrated approach address the personal, familial, school, and community variables and the interactions among them that are necessary to have significant preventive effect on these disorders. The Better Beginnings project implemented programs designed to impact the components of an ecological model of human development (Bronfenbrenner, 1979) that emphasize a comprehensive view of children's development (Figure 1) including parent, family, neighbourhood, school and cultural/societal factors that directly and indirectly influence children's development (Peters et al., 2003). This study also followed an ecological model and considered risk predictor variables at multiple levels of analysis including the individual, family, and community levels of analysis. An ecological framework of the predictor variables to be investigated in this study is found in Table 1. Finally, this study considered the prevention of child externalizing disorder at both home and school.

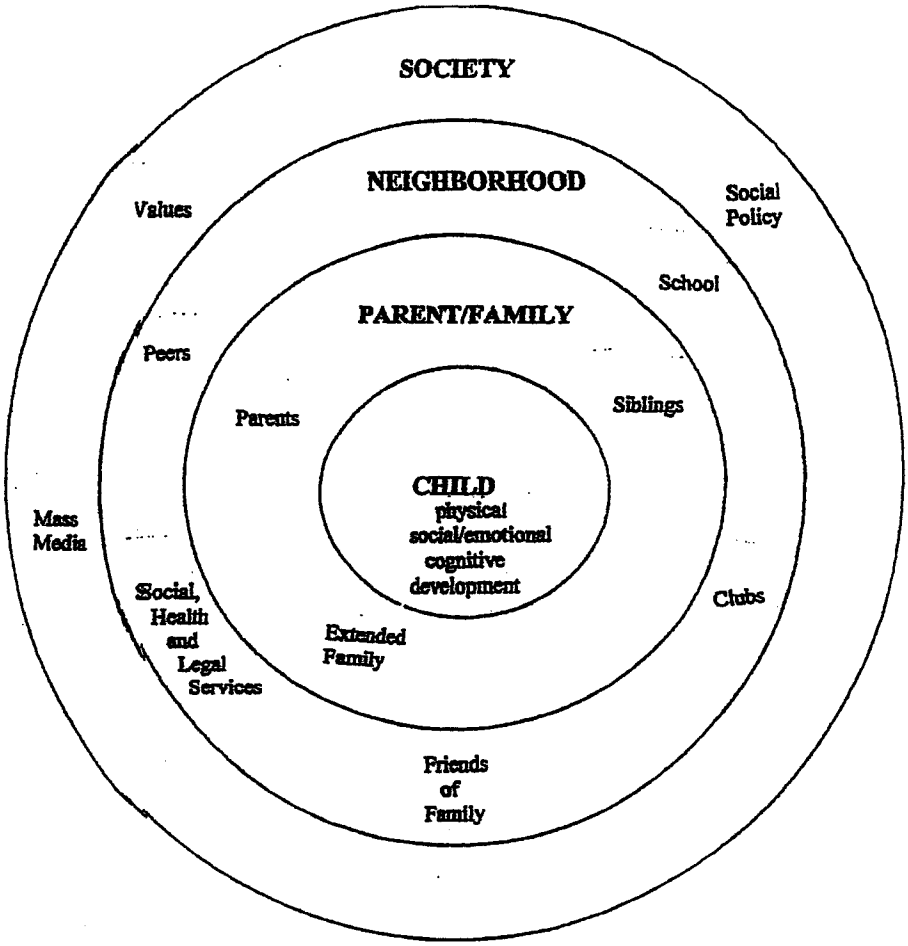


*Figure 1.* Better Beginnings Better Futures Ecological Model of Child Development (Peters et al., 2003).

Table 1

*Risk Predictor Variables Within An Ecological Framework*

| Level of Analysis | Factor Type | Predictor Variable |
|---|---|---|
| Child | Child Factors | Gender of Child<br>Social Skills |
| Parent/Family | Family and Parenting | Monthly Income<br>Unemployment Status<br>Maternal Education Level<br>Single Parent Status<br>Parenting<br>Family Functioning |
| | Parent Factors | Stressful Life Events<br>Social Support<br>Maternal Depression |
| | Immigration Factors | Main Home Language<br>Maternal Immigrant Status |
| Neighbourhood/ Community | School Factors | School Climate<br>Parent's Rating of Child's School<br>Parent's Rating of Relationship with Child's Teacher/Involvement in School |
| | Neighbourhood/ Community Factors | Neighbourhood Activities<br>Use of Programs<br>Sense of Community<br>Perceived Quality of Neighbourhood/Neighbourhood Satisfaction |

*Differential Effectiveness*

Due to the parent and local resident involvement in developing Better Beginnings programs to meet specific local needs, differences in programs offered and differences in intervention outcomes resulted at each Better Beginnings site (Peters et al., 2004). However, differences in intervention outcomes may also be due to the fact that effectiveness of intervention may be limited to certain subgroups. When examining the effects of intervention, some research has shown that comparing a control and an intervention group may not show significant differences. Instead, significant effects of an intervention may be limited to certain sub-groups of individuals. For example, the Elmira (New York) Nurse Home Visitation Program found that the intervention provided little short-term benefit to the entire sample of participants, but found benefits for the neediest of families, specifically low income and unmarried women (Olds, Henderson, Kitzman, Eckenrode, Cole & Tatelbaum, 1999). Another home-based parent training intervention, conducted by Field, Widmayer, Stringer, and Ignatoff (1980), was not equally effective with all participants (mothers and their preterm infants). This intervention proved to be most effective for preterm infants of teenage mothers, as compared to preterm infants of adult mothers. Findings from SAFE Children, a family focused prevention intervention targeting first grade children and their families living in inner-city neighborhoods in Chicago, indicated differential effects of the intervention as well. Intervention effects for family structure (which refers to the organization of the family, clear rules, boundaries between a family's generations, and defined roles) and

parent involvement in school were found to be stronger in families living in the most devastated inner-city communities (Gorman-Smith & Henry, 2002).

Furthermore, intervention effects of the Infant Health and Development Program were seen in children of mothers with high school education or less, whereas children of mothers who attended college did not benefit from the intervention (Brooks-Gunn, Gross, Kraemer, Spiker & Shapiro, 1992). Finally, a study concerning the moderating effects of neighborhood and family characteristics on the effectiveness of a prevention program targeting conduct problems, Fast Track, demonstrated variation in program impact. Effectiveness of the intervention was seen in children who lived in less poor and dangerous neighborhoods for measures of both child aggression and depression levels. However, for a measure of social competence, effectiveness of the intervention was seen in children who were African American and who lived in more dangerous neighbourhoods (Pinderhughes & Nix, 2002). In the Better Beginnings medium-term follow-up report (Peters et al., 2004), there were no overall intervention effects seen for childhood externalizing disorders in the older child group. Whether or not the Better Beginnings intervention has greater or lesser impact on high-risk groups, and if so, what are the particular risk variables that moderate effectiveness is therefore the main purpose of the present study. A new type of data analysis method was used in this thesis to assist identification of high-risk subgroups of participants. This new strategy, a type of recursive partitioning entitled regression decision tree analytic strategy, allowed for participants being investigated to be placed into subgroups based on similar scores across multiple variables.

## *Risk Factors*

Detecting subgroups with higher severity or presence of risk factors associated with the outcome of childhood externalizing disorder was the main goal of this study. Risk factors are considered to be factors or variables that precede a negative outcome of interest and increase the chances that the outcome will occur (Mash & Wolfe, 1999). Risk factors from multiple levels of analysis were considered in this study. These risk factors that followed an ecological model include the individual, family, and community levels of analysis. Both the home and the school environment were also considered.

### *Child Level of Analysis*

*Child factors.* Gender is considered to be an important risk factor for the onset of externalizing disorders. Many studies have shown that significantly more boys than girls have been diagnosed with an externalizing disorder during preadolescence (Lewinsohn, Hops, Roberts, Seeley & Andrews, 1993; Loeber, Keenan, Russo, Green, Lahey & Thomas, 1998; Robins & Price, 1991; Romano, Tremblay & Vitaro, 2001). From preschool age onward, young boys tend to engage in significantly more aggressive and nonaggressive antisocial behaviour than girls (Keenan & Shaw, 1997). Also, the prevalence of externalizing disorders in the Diagnostic and Statistical Manual of Mental Disorders (4$^{th}$ ed. [DSM-IV]; American Psychiatric Association, 1994) is greater for males than for females. For attention-deficit/hyperactivity disorder, prevalence of this disorder is estimated at 3% - 5% in school aged children and the male-to-female ratios ranging from 4:1 to 9:1, depending on the setting (i.e., clinic vs. general population). For conduct disorder,

prevalence for males under age 18 years ranges from 6% - 16% for males and from 2% to 9% in females. Finally, an examination of the frequency of behavioural disorder in the first cycle of the Canadian National Longitudinal Survey of Child and Youth (NLSCY) by Offord and Lipman (1996) compared the frequency of boys and girls 8 to 11 years of age for conduct problems and hyperactivity problems (Offord & Lipman, 1996). Boys were found to have a higher frequency than girls of conduct problems (11.3% vs. 8.2%). Likewise, boys were found to have a higher frequency than girls of hyperactivity (14% vs. 6.7%). Therefore, being male is considered a risk factor.

A child's social skills are also an important consideration in the development of externalizing disorder. Poorer social skills are considered a detriment or risk factor. Much research has considered the relationship between social skills and problem behaviours. For instance, McElwain, Olson and Volling (2002) considered how individual differences in children's management of conflict contribute to disruptive behaviour and peer rejection. Conflict management skills of 53 boys in Head Start classrooms were considered in this study at two points in time via videotaped interactive sessions with classmates. Conflicts were identified from transcripts as a situation when the focal child and his peers experienced mutual or unilateral opposition. A conflict turn was defined as all utterances of one child bounded by the utterances of another child. Nonverbal (e.g., aggression) behaviour that accompanied an utterance was also included as part of a given turn. Conflict was ended when a resolution was reached, one or both children left the situation, or two turns occurred that were not related to the conflict. Conflict strategies were then

coded. This was done following A. Eisenberg and Garveys's (1981) method of outlining conflict sequences. The following 10 behaviours were coded: simple negatives (e.g., "No.", "Don't touch my toy."), nonverbal negatives (e.g., "pulling a toy away, shaking head no), insistence (e.g., repeating or paraphrasing a previous opposition with an increase in demanding tone), mitigating (e.g., paraphrasing a previous opposition with a decrease in demanding tone), reasons (e.g., justification of an opposition, "I need that block because I'm building a tower."), countering (e.g., offer an alternate proposal "Do you want to play with the car?"), conditioned directives (e.g., promise followed by command, "I'll be your best friend if you give me the spaceship"), compromises (e.g., suggestion to share a toy), and requests for explanation of the other's opposition (e.g., "Why can't I play with the spaceship?"). Aggressive behaviour during conflict was coded and included physical aggression, verbal aggression, threats, object aggression, grabbing objects, and annoying behaviours. These six aggressive behaviours were summed to form an overall score of aggressive behaviour during conflicts. Avoidance behaviour during conflict included leaving the conflict situation, ignoring one's opponent, and engaging in nonverbal play or play talk. These four avoidance behaviours were summed to form an overall score of avoidance during conflict. Disruptive behaviour was also assessed via teacher and peer-rating. Teacher's completed the Conners Teacher Rating Scale (Goyette, Conners, & Ulrich, 1978) in which specific behaviour problems were rated on a tool consisting of conduct problem items and impulsive and hyperactive behaviour items. Peer nominations of disruptive behaviour used an aggressive behavioural descriptor. Finally, peer nominations of disliking were also collected at

two points in time. Boys who engaged in higher rates of conflict were found to exhibit greater aggression and avoidance during peer conflicts. Further, these boys also tended to be rejected by peers and were also perceived as being disruptive by teachers and peers. Therefore, children with lower conflict management social skills have been found to be more aggressive and also less cooperative, displaying more disruptive behaviour.

Another study considering the role of social skills and peer rejection of children was completed by Coie, Dodge, and Capottelli (1982). In this study, Coie and colleagues used positive and negative peer nomination scores to define different social status groups in 848 elementary school aged children. Rejected children's profile included greater fight initiation, greater disruptiveness and greater asking for help in school. Rejected children also were shown to be less cooperative and low on leadership skills. The opposite profile was seen for peer accepted (popular) children. The profiles defined in this study were found to hold for both genders and all age levels of Grade 3, Grade 5 and Grade 8. However, some gender differences were seen in what discriminated rejected or accepted boys and girls. In boys, aggressiveness and help seeking were found to be negatively viewed behaviours by peers. In girls, cooperativeness was found to be a positively viewed behaviour by peers. Therefore, social skills such as poor conflict management and poor cooperation play a role in peer rejection. Children who are aggressive and therefore peer rejected would also have lower assertiveness social skills as measured by the assertiveness social skills subscale in this thesis (e.g., assertiveness question: Makes friends easily) as they would have greater peer rejection.

Finally, aggressive children have been found to make inaccurate social judgments. In an examination of differences in aggressive and non-aggressive boys' self-perceptions, peer perceptions, and attributions of relative responsibility, Lochman (1987) found that aggressive boys' perceptual and attributional biases operate in actual social interactions. In comparison with non-aggressive boys, aggressive boys minimized their perceptions of their own aggressiveness and perceived their partners as more aggressive than they themselves were. The opposite pattern was found for non-aggressive boys studied. Therefore, inaccurate social judgments by aggressive children would most likely contribute to poorer conflict management social skills.

*Parent/Family Level of Analysis*

*Family and parenting factors.* Research has often uncovered the relationship between family socioeconomic status and childhood externalizing disorders. For instance, epidemiological research has often uncovered a relationship between socioeconomic status and conduct problems in childhood (Farrington, 1978, 1991; Patterson, Kupersmidt & Vaden, 1990). Low SES was also found by Loeber, Green, Keenan, and Lahey (1995) in almost 60% of families with children who suffer from externalizing disorders as opposed to 23.8% of families with children who do not suffer from any externalizing disorder. An examination of the relationship between socioeconomic status and later child externalizing behaviour problems was also conducted by Dodge, Pettit, and Bates (1994). A representative sample of 585 children from three geographic sites (urban and small town) was followed from preschool to grade three. Socioeconomic status assessed in preschool significantly

predicted teacher rated externalizing disorder in kindergarten and grades one, two, and three (Dodge, Pettit & Bates, 1994).

In a study considering economic disadvantage in Ontario children aged 4 to 16 years by Lipman, Offord, and Boyle (1994), it was found that children who are poor have significantly more externalizing disorders (CD and ADHD) than children who are not poor. Results from an examination of the frequency of behavioural disorder in the first cycle of the NLSCY also found similar results indicating that poverty is a risk factor for the development of childhood externalizing disorders. Offord and Lipman determined that frequencies of behavioural problems increased as income decreased (Offord & Lipman, 1996).

Research has often also uncovered the relationship between family socioeconomic status through presence of unemployment and childhood externalizing disorders. A study by Wang, Zhang, and Leung (2005) considered the influence of social skills and unemployed families on the prevalence of behaviour problems in 1410 adolescents aged 12-18 years in Beijing. Using the Achenbach Youth Self-Report, 13.01% ($n$ = 79) of adolescents were considered to have a behaviour problem. A significant negative association was found between adolescent social abilities and prevalence of behaviour problems. Furthermore, social skills subscales of concentration, withdrawal, and social problems were each significantly negatively associated with prevalence of adolescent behaviour problems. A higher prevalence of behaviour problems (24.32%) was also found in unemployed families. Therefore, adolescents' social skills and having an unemployed family affected prevalence of behaviour problems.

Another study using a large national sample ($N = 4480$) of Dutch children aged four to 15 years also considered the role of parental unemployment as a risk factor for child behaviour problems. Experience of parental unemployment was strongly associated with children's risk for behavioural problems as measured by parent-rating using the Child Behaviour Checklist. As compared to children who had experienced parental unemployment in the more distant past, risks for behaviour problems were higher for children who had experienced recent parental unemployment. The odds of a child who experienced recent (< the past 12 months) parental unemployment having a behavioural problem was 1.75 times the odds of a child who experienced more distant (> the past 12 months) parental unemployment having a behavioural problem ($OR = 1.75$ vs. $OR = 1.38$). Therefore, children with recent experience of parental unemployment are at a relatively higher risk for the development of behavioural problems (Harland, Reijneveld, Brugman, Verloove-Vanhorick, & Verhulst, 2002). Finally, Kohen, Brooks-Gunn, Leventhal and Hertzman (2002) found an association between unemployment and child behaviour problems. In an examination of the relationship between neighbourhood characteristics and behavioural competencies of a large sample of Canadian preschoolers, Kohen and colleagues uncovered higher parent-rated behaviour problem scores in children who lived in neighbourhoods with fewer affluent residents, low neighbourhood cohesion, and high unemployment rates. These higher behaviour problems scores were noted even after controlling for family socioeconomic factors.

Research has also considered the role of maternal education level in the development of childhood externalizing disorders. As part of the New York Longitudinal Study, Velez, Johnson, and Cohen (1989) conducted an eight-year longitudinal analysis of the risk factors associated with childhood externalizing disorders. Sociodemographic risk factors such as low SES, low income, and low maternal education level were found to be statistically significant risk factors for all childhood externalizing disorders (ADHD, ODD, CD). All of these sociodemographic risk factors contributed to at least a two-fold higher likelihood of childhood externalizing disorder as compared to participants without these risk factors (Valez, Johnson, & Cohen, 1989). Similarly, low parental education levels (< high school degree), poverty and single-parent family status were significantly related to parent reported childhood externalizing disorder in a study involving a representative sample of pediatric medical practices. Specifically, low parental education levels, poverty, and single-parent family status were associated with a 1.30, 1.08, and 1.26 fold increase, respectively, of childhood externalizing disorder as compared to the rate in the absence of such factors (Briggs-Gowan, Horwitz, Schwab-Stone, Leventhal, & Leaf, 2000).

In an effort to investigate the strength of single-parent family status as a marker for CD and ADHD in Ontario children aged six to 16, Munroe Blum, Boyle, and Offord (1988) also found that children from single-parent families are at increased risk for the development of childhood externalizing disorders. In fact, children with externalizing disorders were 2.2 times more likely to be from a single-parent family than a two-parent family and children with ADHD were 1.8 times more

likely to be from a single-parent family than a two-parent family (Munroe Blum, Boyle & Offord, 1988). Another comparison of single-parent families and two-parent families with respect to child psychopathology was conducted by Wadsworth, Burnell, Taylor, and Butler (1985) on a cohort of children born in the United Kingdom in one week. At five years of age the behaviour of children from single-parent families was found to be significantly more anti-social (exhibited disobedience, destructiveness, lying, aggression, irritability, and restlessness) than that of children from two-parent families (Wadsworth, Burnell, Taylor & Butler, 1985).

Finally, a study of children aged four to 11 done by Lipman, Offord, and Dooley (1996) reported that children from single-mother families had statistically significantly higher rates of behaviour problems than children from two-parent families (Lipman, Offord & Dooley, 1996). Furthermore, Lipman and colleagues found that children of single-mothers were at increased risk of behavior problems regardless of the family income. The odds of a child from a low-income, single-mother family having CD were 2.35 times that of a child from a low-income two-parent family. The odds of a child from a low-income, single-mother family having ADHD were 1.89 times that of a child from a low-income two-parent family. In contrast, the odds of a child from a non-low income single-mother family having CD was one and a half times that of a child from a non-low income two parent family. The odds of a child from a non-low income single-mother family having ADHD was almost two times that of a child from a non-low income two- parent family. Therefore, children from single-mother families may be at increased risk for

childhood behaviour disorders compared with children from two-parent families regardless of the level of family income.

The model of Patterson (1982) has been particularly influential in understanding the role of parenting practices in promoting aggression and antisocial activities in young children. In this model of coercive family process, parents shape and maintain overtly defiant and aggressive behaviour through harsh, punitive interchanges and subsequent backing down from prior demands, both modeling and negatively reinforcing the child's defiance and hostility. In fact, investigations reveal that parents (particularly mothers) of children suffering from ADHD display a more negative and controlling style with their children than do parents of comparison children (Barkley, 1985, 1990). Mother-child interactions of ADHD boys were also studied by Barkley, Karlsson, and Pollard (1985). Mothers of ADHD (ADD-H) boys were found to give more commands, be less positive toward compliance, and be more negative and controlling toward both compliance and off-task behaviour than mothers of children without ADHD (Barkley, Karlsson & Pollard, 1985). Child aggressive behaviours have also been associated with harsh and punitive parenting (Eron, Huesmann, & Zelli, 1991; Farrington, 1978; McCord, 1977). Dodge and colleagues (1994) also related harshness of discipline to childhood externalizing disorder. Harshness of discipline was highly significantly positively related to multiyear teacher-rated child externalizing disorder in this study (Dodge et al., 1994). Finally, lack of parental warmth has also been associated with child aggression (Olweus, 1980). This lack of parental warmth was also significantly positively correlated with teacher rated child externalizing problems in kindergarten, grade one, two, and three

in a large sample (Dodge et al., 1994). Therefore, greater amounts of hostile-ineffective and inconsistent parenting are considered risk factors for childhood externalizing disorder. Conversely, a greater amount of positive parenting is not considered a risk factor for childhood externalizing disorder.

The role of general family functioning in childhood externalizing disorders is also discussed in the literature. General family functioning is considered to be the overall health or pathology of a family with focus on family relationships and communication. Using the same family functioning scale as that employed in the present study, the Ontario Child Health Study found significant associations between family dysfunction and child externalizing disorders. Specifically, the odds of a child from a dysfunctional family suffering from CD was 7.2 times that of a child from a functional family. The odds of a child from a dysfunctional family suffering from ADHD was 4.5 times that of a child from a functional family. Similarly, teacher reports indicated that the odds of a child from a dysfunctional family suffering from CD was 2.9 times that of a child from a functional family. Teacher reports also indicated that the odds of a child from a dysfunctional family suffering from ADHD was 2.3 times that of a child from a functional family (Offord, Boyle & Racine, 1989). Similarly, in their study of psychiatric disorder in Ontario children aged 6 to 16, Munroe Blum and colleagues (1988) uncovered the outcome of child psychiatric disorder (CD, ADHD, and emotional disorder) as being more than three times as likely when a child is from dysfunctional family (Munroe Blum et al., 1988). Finally, the relative importance of family dysfunction in predicting child externalizing disorder (CD and ADHD) for children 4-16 years of age in Ontario was calculated by

Lipman and colleagues (1994). Family dysfunction was found to be significantly associated with a more than threefold risk of child externalizing disorder (relative odds = 3.65). Therefore, family dysfunction can be considered a risk factor for the development of childhood externalizing disorder.

*Parent factors.* The role of stressful life events in childhood externalizing disorders is also discussed in the literature. Either positive and negative potentially stressful events or transitions that occurred in a specific time period are considered as stressful life events. In one study involving a representative sample of pediatric medical practices, higher presence of stressful life events was significantly related to parent-reported childhood externalizing disorder. Specifically, higher presence of stressful life events was associated with a 1.59 fold increase of childhood externalizing disorder as compared to the rate in the absence of such factors (Briggs-Gowan et al., 2000). A highly significant positive correlation was also found between family stressful life events and teacher-rated multiyear child externalizing behaviour problems in a study by Dodge and colleagues (1994). Finally, as part of the New York Longitudinal Study, Velez and colleagues (1989) conducted a two-year longitudinal analysis of the risk factors associated with childhood externalizing disorder. An assessment of stressful life events was done retrospectively and indicated that stressful life events represented a risk factor for childhood externalizing disorder. Children with a high number of stressful life events were almost three times as likely as children reporting fewer events to have a diagnosis of CD and almost twice as likely to have either ADHD or ODD (Velez et al., 1989). Therefore, higher

presence of stressful life events is considered a risk factor for childhood externalizing disorder.

The literature has also found an association between social support and child externalizing disorder. For example, a significant negative correlation between maternal social support and teacher-rated child externalizing behaviour problems was found for four consecutive years in children from a large representative sample (Dodge et al., 1994). In addition, lower levels of social support were significantly related to parent-reported childhood externalizing disorder in a study involving a representative sample of pediatric medical practices. Specifically, lower levels of social support were associated with a 2.62 fold increase of childhood externalizing disorder as compared to the rate in the absence of low levels of social support (Briggs-Gowan et al., 2000).

Another parent factor that is discussed as a risk factor in the literature pertaining to childhood externalizing disorders is the presence of maternal depression. Parental depression was significantly related to parent reported childhood externalizing disorder in a study involving a representative sample of pediatric medical practices, for instance. Specifically, parental depression was associated with a 3.26 fold increase of childhood externalizing disorder as compared to the rate in the absence of parental depression (Briggs-Gowan et al., 2000). Maternal depression was also significantly associated with childhood externalizing disorders in a study by Fenton (1998), using data from the Yale Family Study. Finally, the rate of ADHD and CD in children (aged 6-23) of depressed (1+ parent) and nondepressed parents was compared in a study by Weissman, Warren, and Fendrich (1990). Children from

families with one or both depressed parents were found to suffer from more ADHD and CD than children with non-depressed parents (Weissman, Warren & Fendrich, 1990).

*Immigration factors.* Immigrant status is also considered an important factor in the development of behaviour disorders in children. Some studies suggest equal or lower risks for immigrant children compared to native born children. Other studies consider immigrant status as a risk factor for the development of child psychopathology. Harker (2001) examined the link between immigrant generation and adolescent psychological well-being using data from the United States National Longitudinal Study of Adolescent Health. It was found that first-generation immigrant adolescents (adolescents who were not born in the United States or as a Unites States citizen in a foreign country) had significantly greater positive well-being than native born adolescents. Second-generation immigrant adolescents (adolescents who were born in the United States or in a foreign country as a United States citizen, but who have at least one parent of foreign birth) were not found to differ significantly from native-born adolescents in their level of psychological well-being. Harker (2001) posited that a number of family influences such as higher parental supervision, lack of parent-child conflict, presence of religious practices, and greater social support serve as factors that promote positive psychological well-being in first-generation immigrant adolescents. Another study by Klimidis, Stuart, Minas and Ata (1994) compared the presence of adolescent psychopathology in native-born Australians, first and second-generation immigrants to Australia, and Vietnamese refugees. Results failed to show significant differences between the four groups on

self-reported adolescent psychopathology. Therefore, adolescent immigrants were considered to be at equal risk for psychopathology as compared to native born adolescents. Similarly, the mental well-being of children of Australian immigrants was examined in a study by Alati, Najman, Shuttlewood, Williams, and Bor (2003). Data used from a longitudinal survey of mothers and children in Brisbane, Australia, the Mater-University of Queensland Study of Pregnancy, were used in this archival study. More specifically, data on a large sample of women (N = 5000) who were interviewed at their first ante-natal clinic visit and followed up at three to five days, six months, five years and 14 years after their baby was born was used in this particular archival study. No significant differences in mental health were found between second-generation children and their Australian counterparts. A positive relationship between length of stay in Australia and increased childhood externalizing problems (aggression and delinquency) was found at the five year and the fourteen year follow up times. Therefore, children considered second-generation immigrants did not differ in their mental health from children with native born parents. Furthermore, children of immigrant parents had lower levels of aggression and delinquency in the first years after arrival in Australia. However, increased childhood aggression and delinquency were seen with increased time since arrival in Australia. Finally, Steinhausen, Edinsel, Fegert, Gobel, Reister, and Rentz (1990) compared psychiatric disorders among children of Turkish and Greek immigrant workers, French soldiers, and a German control group. Children of the Turkish and Greek immigrant workers and children of the French soldiers showed a higher prevalence of psychiatric disorder as compared to the German control group children. Therefore,

parental immigrant status can also be a risk factor for the development of childhood psychopathology.

*Neighbourhood/Community Level of Analysis*

*School factors.* An examination of the influence of school climate on psychopathology in a sample of children in New York was conducted by Kasen, Johnson and Cohen (1990). Only children who did not change schools over a two year period were included in this study. Attendance in a school with poor school climate was significantly related to increased behavioural problem symptoms over the two year period. Rutter (1979) also conducted a study considering the relationship between school atmosphere and child delinquency and behavioural problems. Using 12 inner-city secondary schools in London, England, Rutter found that positive school atmosphere predicted positive outcomes that were over and above the sociodemographic characteristics of the students. More specifically, positive outcomes were related to good care and condition of the school, encouragement of student responsibility and participation, low teacher turnover, and the number of experienced teachers in the school. Therefore, positive school atmosphere was associated with a decrease in students' rate of delinquency and behavioural problems. Bateman (1998) also found that students' psychological sense of community in the classroom was negatively associated with students' level of antisocial behaviour in the classroom. Therefore, a negative school environment and experience for a child is considered a risk factor for the development of child externalizing problems.

*Neighbourhood/community factors.* The community/neighbourhood where a family is raising a child also impacts child development and more specifically

development of child behaviour problems. Social disorganization theory, outlined by Shaw and McKay (1942), serves as a framework for understanding the problem behaviours of children who live in poor neighbourhoods. Structural characteristics of neighbourhoods like poverty, residential instability, single parenthood and ethnic heterogeneity hinder or support the formation of neighbourhood social organization which entails the presence of community norms, values and structure surrounding residents' behaviour (which together is referred to as collective efficacy; Sampson, Raudenbush & Earls, 1997). The level of collective efficacy impacts the extent of residents' behaviour monitoring and the degree of public order. If there are many risk factors in a neighbourhood's structural characteristics (as are present in high-risk communities), the level of collective efficacy is more likely to be low and this leads to problem behaviours in children. Researchers who have examined the social organizational characteristics of neighbourhoods have focused on youth behavioural outcomes and their studies report associations between low levels of social organization and youth problem behaviours (e.g., Elliott, Wilson, Huizinga, Sampson, Elliott & Rankin, 1996; Sampson, 1997; Sampson & Groves, 1989).

Other studies have also considered the role of neighbourhood/community factors as possible risk factors for the development of childhood externalizing disorders. For instance, a significant positive association was found between being from a disadvantaged neighbourhood and presence of child antisocial behaviour in a study by Dubow, Edwards, and Ippolito (1997), which examined the contribution of particular stresses and resources to inner-city children's psychological adjustment. Children from disadvantaged neighbourhoods reported that there was trash in many

local yards and alleys, that crime (stealing, property damamge, sale of illegal drugs) had occurred in their neighbourhoods, that their neighbourhoods were unsafe, and that there were many people in the neighbourhood who did not have sufficient funds to purchase food and other basic necessities (Dubow, Edwards & Ippolito, 1997). Likewise, an examination of the role of perceived neighourhood safety in the development externalizing problems in American twelve year olds was conducted by Pettit, Bates, Dodge, and Meece (1999). A significant negative relationship between maternal reported neighbourhood safety and externalizing problems was found. Another study considering neighbourhood factors as a possible risk or protector factor for the development of child externalizing disorders was done by O'Brien Caughy, O'Campo, and Muntaner (2003). This study examined the association between attachment to community and the presence of child behaviour problems. A significant negative association was found between child externalizing problems and sense of community (O'Brien Caughy, O'Campo & Muntaner, 2003). Therefore, a negative neighbourhood environment is considered a risk factor for the development of child externalizing problems.

## The Present Study

The effects of various risk variables on *Grade 6 outcome measures* of childhood externalizing disorder in Better Beginnings intervention and comparison sites were investigated in this archival study. In addition, the Grade 3 baseline externalizing disorder score was also added as a control variable. Finally, the variable of site (either intervention site or comparison site) was used to ascertain whether there was differential effectiveness of the Better Beginnings intervention for

childhood externalizing disorder. It was predicted that the higher the level of risk, the more likely participants would be to respond positively to the Better Beginnings intervention with a better Grade 6 outcome (low externalizing disorder score). This prediction was based on the findings of several previous studies described earlier (Brooks-Gunn et al., 1992; Field et al., 1980; Gorman-Smith & Henry, 2002; Olds et al., 1999) where the effect of an intervention was stronger for participants at highest risk. In addition, this study was designed to determine whether specific combinations of risk factors are associated with greater response to the Better Beginnings intervention with a better Grade 6 outcome. Again this prediction was based on the previous research (Brooks-Gunn et al., 1992; Field et al., 1980; Gorman-Smith & Henry, 2002; Olds et al., 1999) indicating that high-risk subgroups benefited more from a particular intervention than those at lower risk.

Both variable-oriented analyses and a person-oriented analysis were conducted. The variable-oriented analytic approach of multiple regression focused on relationships between the dependent variable and the independent variables. The person-oriented approach of regression decision tree analytic strategy allowed for participants being investigated to be placed into subgroups based on similar scores across multiple variables. An examination of the "value-added" by using the person-oriented approach of regression decision tree over the multiple regression analyses was also completed. This novel statistical analysis was applied due to its potential to determine effectiveness for high-risk subgroups when overall intervention effects are not present. Identifying subgroups most responsive to intervention effects may assist

the Better Beginnings project and other efforts to improve the behavioural health of young children in Ontario.

# Method

## *Participants*

Participants in this study were children and families from the three Better Beginnings intervention and comparison sites with the older children. This archival study used the database from the Better Beginnings longitudinal research project (Peters & Russell, 1996). Data for this study were collected from children for three years, starting in Grade 3 when children were eight years of age. A summary of socio-demographic characteristics of the older child group studied here include: 88% of parents participating in the research were female; 62% were born in Canada; 45% of parent respondents had some sort of post-secondary education; 24% of female parents were unemployed and 10% of male parents were unemployed; 30% of households were headed by a single-parent; the mean monthly income was $2, 784; and 63% of homes were below the Statistics Canada's low income cut-offs (Peters et al., 2000).

Families participating in the Better Beginnings research resided in one of five communities in Ontario: Cornwall, Sudbury, Vanier (Ottawa), Highfield (Toronto), and Etobicoke (Toronto). Cornwall, Sudbury, and Highfield each had a Better Beginnings program. Vanier served as a comparison site for both Cornwall and Sudbury, whereas Etobicoke served as a comparison site for Highfield. Each of the three intervention sites were chosen, in part, due to socio-economic disadvantage and the comparison sites were demographically similar to the intervention sites based on Statistics Canada data.

In Cornwall the Better Beginnings intervention is delivered in French in four Francophone primary schools. However, the Sudbury intervention site is considered to be bilingual in French and English, as the Better Beginnings intervention is delivered in a primarily English neighourhood (the Donovan) and a primarily French neighbourhood (the Flour Mill/Le Moulin à Fleur). Finally, the Highfield intervention site has a high level of ethnoracial diversity. In fact, the 1991 Canadian Census indicated that 54% of the population in Highfield was born outside of Canada. The following Canadian Census in 1996 indicated that 60% of the population in Highfield was born outside of Canada. Despite the great variety of ethnocultural groups that live in the neighbourhood of Highfield, a majority of residents are people from India or the Caribbean (Nelson, 2005).

All families in a Better Beginnings intervention site with a child between four and eight years had equal access to these programs, making it a universal intervention. Families were contacted through schools in their communities and parents were given information about the Better Beginnings program and provided with the opportunity to consent to participate in the longitudinal research project.

In 1997, research assistants in each community collected data from parents through an in-home interview when their children were in Grade 3 and in 2000 when their children were in Grade 6. Teacher measures were collected via a questionnaire that teachers completed for each child participating in the research for each grade mentioned above. From Grade 3 to Grade 6, the sample attrition rate was 21.0 %.

The sample size used in analysis was the number of available parent-rated or teacher-rated observations for each respective childhood externalizing disorder, either

ADHD, ODD, or CD found in the Better Beginnings archival database. Data from 571 parent ratings and 441 teacher ratings formed the parent-rated and teacher-rated childhood hyperactivity-inattention sample sizes, respectively. Data from 566 parent ratings and 354 teacher ratings formed the parent-rated and teacher-rated childhood delinquency sample sizes, respectively. Finally data from 557 parent ratings and 380 teacher ratings formed the parent-rated and teacher-rated childhood physical aggression sample sizes, respectively. The numbers of children in the research sample from each site are displayed in Table 2.

*Table 2*

*Number of Children Per Site*

| Site | Frequency |
|---|---|
| Cornwall | 108 |
| Sudbury | 134 |
| Highfield | 131 |
| Etobicoke | 87 |
| Ottawa-Vanier | 116 |
| Total | 576 |

*Program Descriptions for the Better Beginnings Intervention Sites*

In the older child group of the Better Beginnings project, three sites operate intervention programs. These programs stress strong local community involvement in order to plan and execute service delivery. Each program is tailored to suit the individual needs of the community by integrating existing and creating new services. A conceptual model of the Better Beginnings intervention in the older child sites is seen in Figure 2. This conceptual model describes the developmental phase of the project (from 1991 to 1993) where three local Better Beginnings projects were established. This phase involved the creation of project organization and management structure, program development, and integration of services. The conceptual model also describes the demonstration phase of the project (from 1993 to 1998) which involved implementing programs for 4 to 8 year old children, their families and neighbourhood. Three types of programs were implemented: child-focused programs, parent-focused programs, and family-neighbourhood programs. This conceptual model of the Better Beginnings project also links intervention programming to intervention objectives. A description of the Better Beginnings programming at each specific intervention site also follows and is further elaborated in a table in Appendix A.

*Cornwall.* In Cornwall, Better Beginnings programming was available in four Francophone primary schools. School facilitators provided classroom enrichment, toy libraries, containing resources and materials, were also instituted in the four primary schools. Activities for children and their families during holidays and school breaks were offered in addition to play groups for children, family visits, welcome

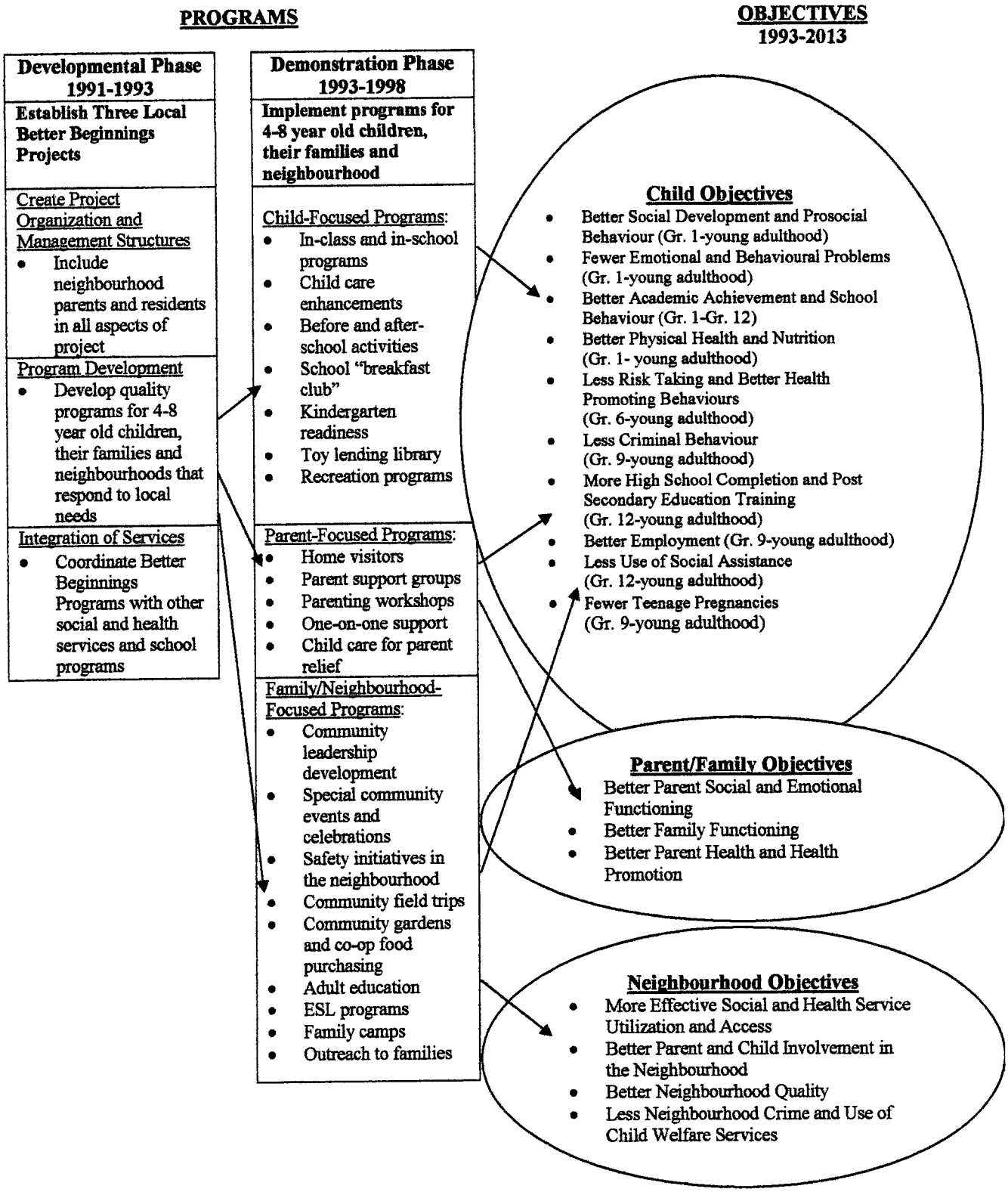


*Figure 2.* Conceptual Model of the Better Beginnings, Better Futures Project in the Older Child Sites (Nelson, Pancer, Peters, Hayward, Petrunka & Bernier, 2005).

baskets and home visits for new families. Finally, French activities for the community were provided.

*Sudbury.* This site is considered bilingual as it offered programs to four primary schools located in either a primarily anglophone neighbourhood or primarily francophone neighbourhood. In Sudbury almost 60% of the budget for prevention programming was devoted to before or after school and holiday programs. These programs consisted of games, craft activities, outings, and provision of nutritious snacks. The other focus of the intervention at this site was community development. Community kitchens, community gardens, environmental enhancement as well as other community initiatives were provided. School-based activities consisted of 8% of the budget available for prevention programming. Three programs, Peaceful Playground Program, Native Cultural Program, and Multicultural Program (in francophone schools), were provided as the prevention programs' school-based activities.

*Highfield.* This site is unique as it focused its resources on a large single school catchment neighbourhood. An important aspect of the Better Beginnings program in Highfield involved enrichment workers who provided in-class assistance to children and regular parent home visitation. This regular home visitor informed parents of their child's activities in school and of community resources available for use. Home visitors also encouraged parent involvement in their child's school. Summer enrichment programs were also offered each summer. In addition the Lion's Quest Skills for Growing Social Skills program was offered in classrooms by teachers. Health/Nutrition programs also were offered in the school via breakfast,

snack and hot lunch programs. Finally, programs for parents and children were offered to this neighbourhood in the form of child parent drop-in, a parent relief program, before and after school programs, toy library and programs during school breaks and summer holidays.

*Measures*

Parent and teacher ratings were obtained for children at Grade 3 and Grade 6 for the dependent variables (child hyperactivity-inattention, child delinquency, and child physical aggression). Parent ratings for several scales that identified independent variables were obtained when children were in Grade 3. Teacher ratings for social skills and school climate were also obtained when children were in Grade 3. The outcome variables or dependent variables, the specific childhood externalizing disorder [hyperactivity-inattention (ADHD), delinquency (ODD), physical aggression (as a marker of CD)] were measured using both parent and teacher ratings on the Behavioural Problems subscale of the Revised Ontario Child Health Study (OCHS) Scales (Boyle, Offord, Racine, Felming, Szatmari & Sanford, 1993) and the Behavioural Problems subscale of the National Longitudinal Survey of Children and Youth (NLSCY) Scales (Offord & Lipman, 1996). The Revised OCHS scales are based on the Child Behavior Checklist developed by Achenbach and Edelbroock (1983). The Behavioural Problems subscale of the OCHS Scales consists of six subscales of which one subscale for oppositional disorder was used by Better Beginnings to measure parent-rated delinquency. The Behavioural Problems subscale of the NLSCY Scales for hyperactivity and physical aggression were used by Better Beginnings to measure both parent and teacher-rated hyperactivity-inattention and

physical aggression. Both the parent-rated and teacher-rated aggression and hyperactivity-inattention scales were used in this study to measure parent and teacher-rated hyperactivity-inattention and physical aggression. The Behavioural Problems subscale of the NLSCY Scales for property offence was used by Better Beginnings to measure teacher-rated delinquency. This teacher-rated property offence measure was used in this study.

The Hyperactivity-Inattention subscale, on which parents and teachers rated the children's hyperactivity-inattention, had eight items for the parent report and seven items for the teacher report. Examples of items included: "fidgits", "is inattentive", "can't settle to anything for more than a few minutes", and "can't sit still, is restless, or hyperactive". Each item was rated as never (0), sometimes (1), or often (2). Responses were reversed scored for negatively worded questions. Total scores range from 0 to 16 for parents and 0 to 14 for teachers with higher scores indicating greater hyperactivity-inattention. The Cronbach alpha reliabilities for these scales in the Better Beginnings data were .85 in Grade 3 and .89 in Grade 6 for parents and .84 in Grade 3 and .77 in Grade 6 for teachers.

Parents and teachers completed the Delinquency subscale to assess a variety of delinquent behaviours for children. The parent scale consisted of eight items and the teacher scale consisted of three items. Examples of items include: "steals", "destroys things belonging to others", and "vandalism". Each item was answered never (0), sometimes (1), or often (2). Responses were reversed scored for questions having a negative loading. Scores range between 0 and 16 for the parent scale and 0 to 6 for the teacher scale, with higher scores indicating more frequent delinquent

behaviours. Cronbach alpha reliabilities in the Better Beginnings data were .85 in Grade 3 and .89 in Grade 6 for the parent scales and .84 in Grade 3 and .77 in Grade 6 for the teacher scales.

Finally, the Physical Aggression subscale that parents and teachers rated the children's physical aggression behaviours was a six-item scale using a three-point response scale (0 = never, 1 = sometimes, 2 = often). Responses were reversed scored for questions having a negative loading. The scale includes behaviours such as: "physically attacks people", "cruelty, bullying or meanness to others", and "kicks, bites, hits other children". Total scores range from 0 to 12, with higher scores reflecting more physically aggressive behaviour. The Cronbach's alpha reliabilities for the physical aggression scales in the Better Beginnings data were .85 in Grade 3 and in Grade 6 for parents and .92 in Grade 3 and Gr. 6 for teachers.

The presence of physical aggression within the symptomatology of ODD or CD suggests a more severe course of these disorders (Essau, 2003). Many studies have highlighted the importance of aggression in the development of CD (Coie & Dodge, 1998; Loeber & Farrington, 1998; Loeber & Stouthamer-Loeber, 1998; Vitiello & Stoff, 1997). In fact, Biederman, Mick, Faraone, and Burback (2001) found that the aggression subscale of the Child Behavior Checklist measured at baseline (prior to age 8) was a good predictor of whether a boy would persist or desist in CD through adolescence. Finally, the demonstration of proactive aggression (in contrast to reactive aggression) has been found to predict CD symptoms in boys (Vitaro, Gendreau, Tremblay, & Oligny, 1998). Thus, the use of the physical aggression NLSCY measure as a measure of CD in this study seemed reasonable.

Better Beginnings behavioural problems measures can be found in Appendix B. The same dependent variables are used for all levels of analysis.

*Child Level of Analysis*

*Child factors.* Gender of the child was measured through sociodemographic information obtained in the parent interviews (Arnold, 2000; see Appendix C) and the Social Skills Rating System (Gresham & Elliott, 1990; see Appendix D) was used to measure children's social skills by teacher and parent rating. The Social Skills Rating System provides an assessment of social behaviour, with items designed to measure subscales of conflict management, cooperation, and assertiveness. The conflict management subscale had 6 items on the teacher version and 11 items on the parent version of this measure and each item was measured on a three-point scale with "Never" (0), "Sometimes" (1), and "Very often" (2). Scores on this scale ranged from 0 to 12 for the teacher version and from 0 to 22 on the parent version. Higher scores on both the teacher and parent version denote higher conflict management social skills. Factor analyses of the Social Skills Rating System showed three clear factors in both parent and teacher ratings for the three subscales of conflict management, cooperation, and assertiveness. The Cronbach alpha reliability for conflict management by teacher rating was .88 and .83 for the parent rating.

The cooperation subscale had 9 items on the teacher version and 7 items on the parent version of this measure and each item was measured on a three-point scale with "Never" (0), "Sometimes" (1), and "Very often" (2). Scores on this scale ranged from 0 to 18 for the teacher version and from 0 to 14 on the parent version. Higher scores on both the teacher and parent version denote higher social skills in

cooperation. The Cronbach alpha reliability for cooperation by teacher rating was .92 and .77 for the parent rating. Finally, the assertiveness subscale had 8 items on the teacher version and 7 items on the parent version of this measure and each item was measured on a three-point scale with "Never" (0), "Sometimes" (1), and "Very often" (2). Scores on this scale ranged from 0 to 16 for the teacher version and from 0 to 14 on the parent version. Higher scores on both the teacher and parent version denote higher social skills of assertiveness. The Cronbach alpha reliability for assertiveness by teacher rating was .85 and .67 for the parent rating.

*Parent/Family Level of Analysis*

*Family and parenting factors.* Monthly income, mother and partner labour force status (unemployment), maternal level of schooling, and single-parent family status were measured through sociodemographic information obtained in the parent interviews (Arnold, 2000; see Appendix C).

Better Beginnings also assessed parenting practices. To do so they used a series of parenting scales from the National Longitudinal Survey of Children and Youth (NLSCY). These scales focused on positive interaction, hostile-ineffective parenting, and consistent parenting, were provided by Dr. M. Boyle at Chedoke-McMaster Hospital, based on work by Dodge and an adaptation of Strayhorn and Weidman's Parent Practices Scale. In the Better Beginnings data, each scale appeared to be unifactorial. Items are answered using a five-point Likert-type scale ranging from "Never" (1) to "Many times each day" (5). Responses were reversed-scored so that higher scores indicate greater positive interaction, greater hostile-ineffective parenting, and greater consistent parenting. Scores on this scale ranged

from 5 to 25 on the positive parenting subscale, from 5 to 35 on the hostile-ineffective parenting subscale, and from 5 to 25 on the consistent parenting subscale. For the 5-item positive parenting scale the Cronbach alpha reliability was .74 in the Better Beginnings data. For the 7-item hostile-ineffective measure, Cronbach alpha reliability was .78 in the Better Beginnings data. Finally, the consistency measure had a Cronbach alpha reliability of .36 in the Better Beginnings data (see Appendix E).

The Family Assessment Device, based on the McMaster Model of Family Functioning (FAD; Epstein, Baldwin, & Bishop, 1983; see Appendix F), was the measure used to assess family dysfunction. Specifically, only the General Functioning scale of this measure was used to assess the overall health/pathology of the family. This scale consists of 12 statements whose applicability to the family is rated by selecting from the four-point Likert-type scale ranging from "strongly agree" (1) to "strongly disagree" (4). Responses were reversed-scored so that higher scores indicate greater family functioning. Scores on this scale range from 12 to 48. In the Better Beginnings data this scale was consistently unifactorial. This scale had a Cronbach alpha reliability of .92 in Better Beginnings data.

*Parent factors.* Mothers were asked about potentially stressful events or transitions (both positive or negative) that occurred within the previous year. This 13 item stressful life events questionnaire used in the Better Beginnings data was taken from a larger pool of items used in the Social Change in Canada Study (Institute for Social Research, 1977; 1979; 1981; see Appendix G). Items were chosen due to high frequency of endorsement in the Change in Canada study. The scale score consists of

the number of items reported, therefore ranging from 0 to 13. Higher levels of life stress are denoted by a higher score on this scale. The Cronbach's alpha reliability was .57 for Better Beginnings Data.

Social support was measured using a shortened version of the Social Provisions Scale (Cutrona & Russell, 1989). The social support measure in this study measured the following supportive relationships: guidance, reliable alliances (the assurance that others can be counted upon for practical help) and attachment. This scale is aimed at determining the level of social support received from family, friends and others. This social support measure included six questions. Items were answered using a four-point Likert-type scale ranging from "strongly agree" (1) to "strongly disagree" (4). Responses were reversed-scored so that higher scores indicate greater social support. Scores on this scale range from 0 to 24. The Cronbach's alpha reliability was .80 for Better Beginnings data (see Appendix H).

Maternal depression was measured by use of the Center for Epidemiologic Studies Depression Scale (CES-D; Devins & Orme, 1985; see Appendix I). The CES is a self-report measure of depressive symptoms with 20 items that assess the frequency/duration of symptoms associated with depression in the preceding week. Cognitive, affective, behavioural and somatic symptoms associated with depression are assessed by sixteen items. Positive affect is assessed by four items. Items are answered using a four-point Likert-type scale ranging from "Rarely or none of the time (Less than 1 day)" (1) to "Most or all of the time (5-7 days)" (4). Responses were reversed coded for positive affect items. Scores on this scale range from 20 to 80 with higher scores reflecting higher levels of depression. This scale has shown

Cronbach alpha reliabilities between .87 and .91 in the Better Beginnings data.

*Immigration factors.* Country of birth of the mother and main home language spoken at home were measured through sociodemographic information obtained in the parent interviews (Arnold, 2000; see Appendix C).

*Neighbourhood/Community Level of Analysis*

*School factors.* Better Beginnings measured School Climate by teacher rating. A four item scale, with items including "School spirit is very high" and "Most children in this school enjoy being there", are measured on a four-point Likert-type scale ranging from "Strongly agree" (1) to "Strongly disagree" (4). Scores on this scale range from 4 to 16. Higher scores on this scale indicate worse teacher-rated school climate. This scale had a Cronbach alpha reliability of .84 in Better Beginnings data (see Appendix J).

Parent's Rating of their Child's School was also completed by Better Beginnings by using a set of questions generated specifically for the Better Beginnings project by the Social Program Evaluation Group at Queen's University. The three items are rated on a five-point Likert type scale ranging from "Not at all" (0) to "A great deal" (4). Scores on this scale range from 0 to 12. Responses were reversed coded so that higher scores indicate a better parent rating of the child's school. The measure has been consistently unifactorial, with Cronbach alpha reliabilities between .85 and .90 in Better Beginnings data (see Appendix K).

Parent's Rating of Relationship with their Child's Teacher/Involvement in School was also completed by using a set of questions generated specifically for the Better Beginnings project by the Social Program Evaluation Group at Queen's

University. Each of the seven items in this measure is rated on a five-point Likert-type scale ranging from "Not at all" (0) to "A great deal" (4). Scores on this scale range from 0 to 28 with higher scores indicating a better relationship with their child's teacher and greater involvement in their child's school. This measure has been consistently unifactorial. The Cronbach alpha reliability was .89 in Better Beginnings data (see Appendix L).

*Neighbourhood/community factors.* The five-item Neighbourhood Activities scale was developed by Better Beginnings to determine whether involvement in neighbourhood recreational activities was affected by the programs. No more than a single factor has been apparent on any occasion. Involvement in each activity is rated on a three-point scale with "Not at all" (0), "Occasionally" (1), and "Frequently" (2). Scores on this scale range from 0 to 10 with higher scores indicating greater involvement in neighbourhood recreational activities. Cronbach alpha reliability was .78 in Better Beginnings data (see Appendix M).

To examine their use of community resources, parents were asked about their use of programs in the past 12 months. A dichotomous response scale with "No" (0) and "Yes" (1) was used to answer the six item use of programs questionnaire (see Appendix N). The Cronbach alpha reliability was .49 in Better Beginnings data.

Furthermore, Sense of Community was measured using five items drawn from a larger measure by Buckner (1986). Each item is rated on a four-point Likert-type scale ranging from "Strongly agree" (1) to "Strongly disagree" (4). Scores on this scale range from 5 to 20. Higher scores indicate less sense of community. This scale had a Cronbach alpha reliability of .78 in Better Beginnings data (see Appendix O).

Finally, the Neighbourhood Satisfaction/Perceived Quality of Neighbourhood items were drawn from the Quality of Urban Life surveys conducted by the Institute for Behavioural Research at York University in 1977, 1979, and 1981. Although these items were not originally intended to be part of a scale, factor analyses with the original Quality of Life Survey data, and with Better Beginnings data support their unidimensionality. This Neighbourhood Satisfaction/Perceived Quality of Neighbourhood scale has five items. Four items are answered using a five-point Likert-type scale ranging from "Excellent" (1) to "Poor" (5). The fifth item is answered on a 10-point scale ranging from "Completely dissatisfied" (0) to "Completely satisfied" (10). Responses were reversed coded so that higher scores indicate greater neighbourhood satisfaction and greater perceived quality of neighbourhood. Scores on this scale range from 4 to 30. Cronbach alpha reliability coefficient for Better Beginnings data was .74 (see Appendix P).

*Procedure*

Due to the preassigned nature of the intervention sites by the government, random assignment to treatment/intervention and comparioson sites was not possible in this study. Participants in this study were children recruited via take-home school letters to parents explaining the Better Beginnings intervention opportunity in the three project sites. Children of parents who agreed to participate in the intervention project constituted the intervention group. The children forming the intervention group were compared to participants recruited in a comparison site, which was the control group in this study.

Interviews with parents were held in-home by project staff. Interviews for

English-speaking parents and French-speaking parents lasted approximately two hours. Interviews conducted in languages other than English and French were considerably longer. Interviews were conducted and questionnaires were translated for other common languages when spoken by more than 25 research participants, whereas translators were provided for participants speaking languages spoken by less than 25 participants.

As a result of the interviews with parents, longitudinal data on the above measures were collected from parents when the children were in Grade 3 and again in Grade 6. In addition, data were collected from teachers via questionnaires at the same times. Parents were paid $25 for each interview, and teachers were compensated for time spent completing the rating scales.

## *Data Analysis*

A multiple regression analysis (variable-oriented analysis) and a regression decision tree analytic strategy (person-oriented analysis) were used in this study.

### *Multiple Regression*

Six backward multiple regressions considering main effects of risk factors were conducted in this study. A backward multiple regression of risk factor main effects for each of the dependent variables (childhood hyperactivity-inattention Grade 6 outcome, childhood delinquency Grade 6 outcome, childhood physical aggression Grade 6 outcome) assessed by parent-rating was conducted. Additionally a backward multiple regression of risk factor main effects for each of the dependent variables assessed by teacher-rating was conducted. The matched childhood externalizing

disorder Grade 3 scores were also included in the risk factor main effect regression analyses as a control variable.

Since the ultimate goal of this study was to examine the effectiveness of the intervention for high risk subgroups of participants, multiple regressions considering the interaction between site and risk factor were completed. All significant risk factors indicated in the multiple regression analysis of risk factor main effects were investigated in subsequent multiple regressions considering the interaction between site and risk factor. Each of the subsequent multiple regressions were conducted by including site and risk factor main effects and the interaction between site and the risk factor. The variable selection technique was the enter method for all subsequent multiple regression analyses considering the interactions between site and risk factors.

*Regression Decision Tree*

When using the decision tree analytic strategy, all independent variables are selected and tested one at a time for removal from the model and variables are removed from the model based on the most powerful predictor to the depending variable. This method of removing independent variables from the statistical model is called backward elimination, which is a stepwise approach for fitting statistical models. Therefore, the remaining statistical model only includes the independent variables that were significant predictors of the dependent variable. That is why the particular multiple regression variable selection technique was chosen to be backward regression for the multiple regressions considering the main effects of risk factors.

Many regression decision tree analytic strategies, based on recursive partitioning algorithms, exist. In this study, the Exhaustive CHAID (Chi-Square Automatic Interaction Detection) option of the SPSS Answer Tree© (SPSS, 1999) computer program was used to achieve regression decision trees. A single dependent variable and one or more independent variables are required for the regression decision tree analytic strategy, as are required for regression techniques. The aim of this regression decision tree analysis is to uncover homogenous subgroups of individuals, which are empirically derived, reflecting the interactions of several independent variables.

In the present study, the resulting tree diagram reflects groups of children placed in subgroups based on their similarity across multiple variables or risk factors, not simply the relationship between variables as identified in a traditional multiple regression analysis. Therefore, subgroups represent children with similar patterns of scores on the independent variables used to define the specific subgroups. For the purpose of testing the hypothesis that the higher the level of risk the more likely participants would be to respond positively to the Better Beginnings intervention, the regression decision tree allows for identification of possible high-risk subgroups.

The variables included in a regression decision tree analysis have no meaning in themselves. They are considered only as components of the pattern under analysis and interpreted in relation to all other variables considered simultaneously. The relevant aspect in a regression decision tree analysis is the pattern of scores of the empirically derived subgroups of subjects.

The parent node, or top group of the tree diagram, is made up of the overall

dependent variable mean and its accompanying sample size. The independent variable that has the strongest statistical significance with the dependent variable is diagrammed as the first level or generation of the tree, specifying homogeneous subgroups of individuals with their accompanying dependent variable means. For each subgroup misclassification error, the error representing the percentage of cases in the subgroup that are incorrectly classified (cases that do not in actuality share the dependent variable mean that makes up the homogeneous subgroup) in this way, was minimized so as to provide optimal classification by the computer program. Further division of these subgroups, on the basis of the next most predictive variable, are produced thereby creating subsequent generations of the decision tree diagram. The tree generations grow until a stopping rule is met. Stopping rules are specified prior to analysis and are based on either the maximum number of tree generations and/or a minimum child node sample size. For regression decision tree analyses in this study, stopping rules for maximum tree generations were set at 10 and the minimum child node sample size was set at 5. The choice of 10 for maximum tree generations was based on the fact that regression decision trees become too complex if there are too many generations. The minimum child node sample size of 5 choice, was based on the logic of Zhang and Singer (1999) that results are generally not so meaningful with fewer than five participants.

The tree grown until stopping rules are met is often selectively pruned by the Answer Tree computer program algorithm, yielding a sequence of smaller and smaller trees as branches are pruned. Each smaller tree in this pruning sequence is chosen as the one that has the smallest misclassification error of any other sub-tree of

comparable size. The tree whose misclassification error is not significantly improved by the pruned branches is chosen as the best sub-tree.

The statistical significance of subgroup differences is determined by either a chi square test, if the dependent variable is categorical, or by an *F*-test when the dependent variable is continuous (SPSS, 1999). In this study each dependent variable, childhood externalizing disorder, were continuous and statistical significance was therefore determined using the *F*-test.

Since multiple statistical tests are used to construct the tree model, there is a possibility that the Type I error rate will increase. To ensure that the Type I error rate did not exceed the pre-determined significance level, which was set at $\alpha = .05$, across all tests collectively the Bonferroni adjustment was utilized to partition the significance level ($\alpha = .05$) across all tests for each of the independent variables, decreasing the possibility of the Type I error.

Regression decision tree analysis has seldom been applied to psychological research. However, recent epidemiological research has often employed this statistical procedure (Doering et al., 1998; Stuss et al., 2000). Furthermore, regression decision tree analysis has several advantages over traditional multivariate statistical techniques. The regression decision tree analysis does not require assumptions of linearity and normality of distribution.

Therefore, it is not necessary for data to be normally distributed or for non normally distributed data to be transformed before analysis. In addition, regression decision tree analysis can detect interactions and non-linear effects, which tend to be missed by other traditional techniques. Complex interactions between the

independent variables can be detected without having to specify them a priori, which allows for subgroups of dependent variable scores to be empirically derived based on the interaction between the dependent and independent variables. Furthermore, interpretation of complex interactions is facilitated by a tree model that resembles the human judgement process and thus, makes intuitive sense.

For instance, one of the first applications of regression decision tree analysis was the development of a method to identify the prognosis of heart attack patients (Breiman, Friedman, Olshen & Stone, 1984 ). This work, conducted at the University of California San Diego Medical Center, narrowed 19 variables measured during the first 24 hours after a heart attack patient was admitted to the hospital down to three critical variables in a decision tree that identified high risk patients (patients who will not survive at least 30 days) from those deemed not high risk. The regression decision tree for prognosis after heart attack is seen in Figure 3.

Prognosis After Heart Attack

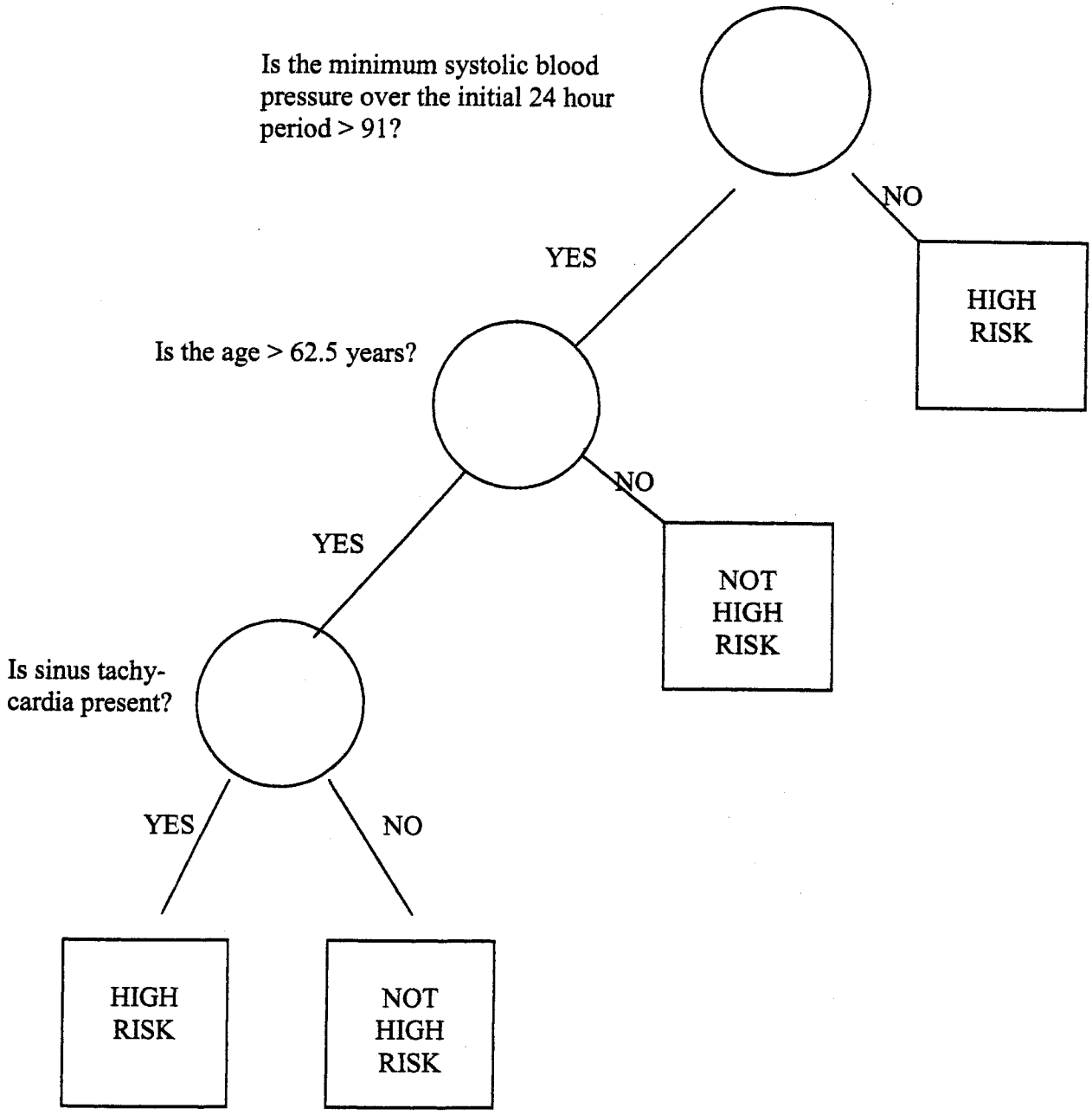


*Figure 3.* Regression decision tree for prognosis after heart attack (Breiman et al., 1984).

The proportion of variance explained by the tree model can also be taken into consideration when evaluating the tree. The risk estimate reflects the error variance in the dependent measure before (total variance) and after (within-node variance) the tree is grown. The within-node variance is divided by the total variance then multiplied by 100 and subtracted from 100% to calculate the proportion of variance in the dependent variable that the tree model describes (SPSS, 1999).

This technique also provides a cross-validation assessment of its results. In the pruning procedure, rather than using the apparent (resubtitution) misclassification error or apparent mean square error, a cross-validation method is used to obtain a more reliable estimate of error, representing the error that would be experienced in replication (Breiman et al., 1984). This ten-fold cross-validation procedure to determine optimal tree size randomly divides the original sample into tenths and a tree is built from 9/10 (or 90%) of the sample, holding out the remaining 1/10 or 10%. This excluded 1/10 is used to test the stability of classification of the tree generated from the 9/10. This happens a total of ten times for each of the randomly divided 1/10 of the original sample.

A cross-validation risk estimate is calculated by Answer Tree by averaging the risk estimate computed for each of the ten trees generated in cross-validation. A comparison of the risk estimate for the tree model and the average cross-validation risk estimate is completed. If the average cross-validation risk estimate is greater than the risk estimate of the tree model *or* the standard error of the average cross-validation risk estimate is greater than the standard error for the risk estimate of the tree model, then the computer program has allowed too much variability in tree

selection rather than consistently selecting a tree with minimized estimated error (StatSoft, 1984-2003). Thus there would be too much error in replication or there is a lack of external validity of generalizeability.

Finally, the missing data algorithm of SPSS Answer Tree© is designed to accomplish two purposes simultaneously: first, to make maximum use of the data cases, complete or not, in the tree construction; second, to construct a tree that will classify any case dropped into it, even if the case has some variable values missing. This differs from the usual missing value procedures in regression, where the covariance matrix is filled in and then used to produce a single prediction equation defined only on complete cases (Breiman et al., 1984).

# Results

In sum, both the variable-oriented analysis and the person-oriented analysis did not reveal high-risk subgroups of differential effectiveness of the Better Beginnings intervention. The multiple regression analyses of risk factor main effects, while controlling for Grade 3 childhood externalizing disorder, indicated risk factors that significantly predicted childhood externalizing disorder outcome. Risk factors identified in the investigation of main effects were included in subsequent multiple regression analyses considering interactions between site and risk factor. The multiple regressions considering the interaction between site and risk factor tested for high-risk subgroups of differential effectiveness of the intervention and uncovered one finding of interest (which had some limitations which will be discussed).

The regression decision-tree statistical approach did not reveal effectiveness of intervention programs for high risk subgroups either. This was due to the fact that site was not the strongest factor predicting childhood externalizing disorder in all decision trees generated by Answer Tree. If site were to have been indicated in decision tree analyses in the first generation of the tree, subgroups of comparison and intervention sites would be sub-grouped. Subsequent generations of the tree would form off of these subgroups of comparison/intervention sites to create interactions with other risk factors allowing for potential formation of high-risk subgroups of participants that showed greater intervention effectiveness.

In subsequent generations of decision trees these novel analyses revealed that comparison sites had equivalent childhood externalizing disorder outcome scores as seen in intervention sites. Finally as found in the more traditional analyses completed

in this thesis, a number of different risk factors for externalizing disorders were noted by the regression decision tree analyses.

*Data Preparation*

The necessary dichotomous variables were created to complete analyses. A site variable was created to denote whether a participant was from a Better Beginnings intervention site (1) or from a comparison site (0). Maternal education level variable was also dichotomized into mothers who had not graduated high school (0) and mothers who had graduated high school (1). Further, unemployment in the mother/partner was dichotomized as unemployed (1) and employed (0). Main home language was dichotomized as main language spoken at home is English or French (1) and main language spoken at home is other than English or French (0). Finally, country of birth for mother was dichotomized into an immigrant variable. A value of one (1) was given to a mother who was not born in Canada and a value of zero (0) was given to a mother who was born in Canada. In addition, only data from biological mothers were used in this study in attempt to keep a unified sample. A large proportion of the sample was made up of biological mother respondents (97%) and thus only a small proportion of the total data sample was excluded.

Assumptions were verified for the data with only biological mother respondents. For the assumption of normality, skewness and kurtosis were verified. The normal probability plot and the histogram of the distribution were also considered. Kline's (2005) convention of the absolute value of three for skewness cutoff was followed and was not exceeded by the data in this study (Kline, 2005). Kline's (2005) convention of the absolute value of 10 for problematic kurtosis and

absolute value of 20 for seriously problematic kurtosis was followed and was exceeded only by the teacher-rated childhood delinquency dependent variable in this study. The assumption of independence, as detected by the Durbin-Watson statistic, was satisfied for all multiple regression analyses. The assumption of homoscedasticity was verified using the scatterplot of the residuals and was satisfied (shown by a uniform shape/distribution across the graph) for all multiple regression analyses. The assumption of linearity (shown by a straight line of data with no shape/curve) was also verified for all multiple regression analyses via use of the scatterplot of the residuals.

For multiple regression analyses, a search for univariate and multivariate outliers was conducted using standardized residuals (using the cut-off of residuals greater than plus or minus three standard deviations) and Mahalanobis' distances (using the chi-square distribution for the number of independent variables as a cut-off) , respectively. Further, a search for influential observations was conducted using the critical leverage cutoff (two times the average leverage value) for each dependent variable. For the parent-rated childhood hyperactivity-inattention multiple regression 233 participants exceeded the cutoffs for indices (standardized residuals, Mahalanobis distances, leverage) and were dropped from the multiple regression analysis. For the teacher-rated childhood hyperactivity-inattention multiple regression 154 participants exceeded the cutoffs for indices (standardized residuals, Mahalanobis distances, leverage) and were dropped from the multiple regression analysis. For the parent-rated childhood delinquency multiple regression 228 participants exceeded the cutoffs for indices (standardized residuals, Mahalanobis distances, leverage) and were

dropped from the multiple regression analysis. For the teacher-rated childhood delinquency multiple regression 127 participants exceeded the cutoffs for indices (standardized residuals, Mahalanobis distances, leverage) and were dropped from the multiple regression analysis. For the parent-rated childhood physical aggression multiple regression 237 participants exceeded the cutoffs for indices (standardized residuals, Mahalanobis distances, leverage) and were dropped from the multiple regression analysis. Finally, for the teacher-rated childhood physical aggression multiple regression 135 participants exceeded the cutoffs for indices (standardized residuals, Mahalanobis distances, leverage) and were dropped from the multiple regression analysis.

After the 127 participants who exceeded the cutoffs for indices (standardized residuals, Mahalanobis distances, leverage) were dropped from the teacher-rated childhood delinquency multiple regression analysis, the violation of normality as seen by the kurtosis and skewness values was no longer problematic. The assumption of normality was therefore met for this particular analysis. In addition, the collinearity statistics of tolerance ($< .1$) and variance inflation factor ($\geq 10$) were considered as indicators for the detection of multicollinearity. There was no detection of multicollinearity for any of the multiple regression analyses.

A large proportion of observations were excluded from the analysis due to the high presence of univariate and multivariate outliers. A great number of influential observations were also excluded from this study. There are no set solutions for handling influential observations. Researchers might elect to collect more data to dampen the influence of these observations or remove these points and treat them as

special cases. The context and nature of the system under study also assists the researcher in selecting a reasonable approach (Gebotys, 2003). It was not possible to collect further data due to the archival nature of the study. Therefore, a decision was made to exclude the influential observations. In retrospect, there may have been utility in keeping the extreme cases in the analysis as there is richness to the data that is lost by excluding these extreme cases. However, it was a prudent choice made to assure that assumptions of multiple regression were satisfied.

In all of the backward multiple regression analyses an alpha level to enter was set at .05 and an alpha level to remove was set at .10. For the subsequent multiple regressions using enter method an alpha level of .05 was set. For decision tree analyses an alpha level of .05 was set. Decision tree analyses stopping rules for maximum tree generations were set at 10 and the minimum child node sample size was set at five. Variables examined in this study are presented in Table 3.

The sample used in this study had a low level of child externalizing disorder both at the outset of the study in Grade 3 and at Grade 6 outcome. For instance, the parent-rated childhood hyperactivity-inattention mean score on a range from 0 to 16 was 3.8 in Grade 3 and was 3.6 in Grade 6. The mean decrease of parent-rated childhood hyperactivity-inattention scores from Grade 3 to Grade 6 was 0.2 and the mean rate of decrease was 5.3% over the time period of Grade 3 to Grade 6. Teacher-rated childhood hyperactivity-inattention mean score on a range from 0 to 14 was 3.2 in Grade 3 and was 4.4 in Grade 6. The mean increase of teacher-rated childhood hyperactivity-inattention scores from Grade 3 to Grade 6 was 1.2 and the mean rate of increase was 37.5% over the time period of Grade 3 to Grade 6. Parent-rated

childhood delinquency mean score on a range from 0 to 16 was 5.0 in Grade 3 and was 5.1 in Grade 6. The overall mean parent-rated increase in childhood delinquency from Grade 3 to Grade 6 was 0.1 and the mean rate of increase was 2.0% over the time period of Grade 3 to Grade 6. Teacher-rated childhood delinquency mean score on a range from 0 to 6 was 0.3 in Grade 3 and was 0.2 in Grade 6. The mean decrease of teacher-rated childhood delinquency scores from Grade 3 to Grade 6 was 0.1 and the mean rate of decrease was 33.3% over the time period of Grade 3 to Grade 6. Parent-rated childhood physical aggression mean score on a range from 0 to 12 was 1.4 in Grade 3 and was 1.5 in Grade 6. The overall mean parent-rated increase in childhood physical aggression from Grade 3 to Grade 6 was 0.1 and the mean rate of increase was 7.1% over the time period of Grade 3 to Grade 6. Teacher-rated childhood physical aggression mean score on a range from 0 to 12 was 1.8 in Grade 3 and was 1.6 in Grade 6. The mean decrease of teacher-rated childhood physical aggression scores from Grade 3 to Grade 6 was 0.2 and the mean rate of decrease was 11.1% over the time period of Grade 3 to Grade 6. Therefore, overall pathology in the Better Beginnings entire sample is at the low end of these scales. A ceiling effect was also not a problem due to the sample having lower childhood externalizing disorder levels at both points in time. However a floor effect was a problem due to the lower childhood externalizing disorder levels, especially for teacher-rated childhood delinquency. This particular dependent variable had very low scores at Grade 3 and Grade 6 and did not have much variance to predict (see Table 3).

Table 3

*Variables included in Analyses*

| Variable | Scale | Range | Mean | Standard Deviation |
|---|---|---|---|---|
| **Dependent Variables* (Time 2, Grade 6)** | | | | |
| Parent-rated childhood hyperactivity-inattention | Continuous | 0 – 16 | 3.6 | 3.7 |
| Teacher-rated childhood hyperactivity-inattention | Continuous | 0 – 14 | 4.4 | 4.0 |
| Parent-rated childhood delinquency | Continuous | 0 – 16 | 5.1 | 4.0 |
| Teacher-rated childhood delinquency | Continuous | 0 – 6 | .2 | .7 |
| Parent-rated childhood physical aggression | Continuous | 0 – 12 | 1.5 | 2.2 |
| Teacher-rated childhood physical aggression | Continuous | 0 – 12 | 1.6 | 2.5 |
| **Control Variables (Time 1, Grade 3)** | | | | |
| Parent-rated childhood hyperactivity-inattention | Continuous | 0 – 16 | 3.8 | 3.7 |
| Teacher-rated childhood hyperactivity-inattention | Continuous | 0 – 14 | 3.2 | 3.7 |
| Parent-rated childhood delinquency | Continuous | 0 – 16 | 5.0 | 3.6 |
| Teacher-rated childhood delinquency | Continuous | 0 – 6 | .3 | .9 |
| Parent-rated childhood physical aggression | Continuous | 0 – 12 | 1.4 | 2.1 |

| Variable | Scale | Range | Mean | Standard Deviation |
|---|---|---|---|---|
| **Control Variables (Time 1, Grade 3)** | | | | |
| Teacher-rated childhood physical aggression | Continuous | 0 – 12 | 1.8 | 2.8 |
| **Independent Variables (Time 1, Grade 3)** | | | | |
| Site | Nominal | Two levels | | |
| Site** | Nominal | Five levels | | |
| Gender | Nominal | Two levels | | |
| Parent-rated conflict-management social skills | Continuous | 3 – 22 | 15.0 | 4.1 |
| Teacher-rated conflict management social skills | Continuous | 0 – 15 | 9.1 | 2.8 |
| Parent-rated cooperative social skills | Continuous | 1 – 14 | 8.8 | 2.8 |
| Teacher-rated cooperative social skills | Continuous | 0 – 18 | 12.9 | 4.4 |
| Parent-rated assertiveness social skills | Continuous | 1 – 16 | 10.4 | 2.5 |
| Teacher-rated assertiveness social skills | Continuous | 0 – 16 | 10.4 | 3.4 |
| Monthly income | Continuous | 300 – 21,000 | 2,887.63 | 1,951.54 |
| Unemployment status | Nominal | Two levels | | |
| Maternal education level | Ordinal | Two levels | | |

| Variable | Scale | Range | Mean | Standard Deviation |
|---|---|---|---|---|
| **Independent Variables (Time 1, Grade 3)** | | | | |
| Maternal education level** | Ordinal | Ten levels | | |
| Single parent status | Nominal | Two levels | | |
| Positive parenting | Continuous | 10 – 25 | 18.2 | 3.0 |
| Hostile-ineffective parenting | Continuous | 7 – 31 | 15.4 | 4.7 |
| Consistent parenting | Continuous | 9 – 25 | 20.0 | 2.9 |
| Family functioning | Continuous | 12 – 48 | 40.0 | 5.7 |
| Stressful life events | Continuous | 0 – 9 | 1.6 | 1.7 |
| Social support | Continuous | 12 – 24 | 20.9 | 2.6 |
| Maternal depression | Continuous | 20 – 72 | 31.2 | 9.3 |
| Main home language | Nominal | Two levels | | |
| Main home language** | Nominal | Ten levels | | |
| Maternal immigrant status | Nominal | Two levels | | |
| School climate | Continuous | 4 – 16 | 6.4 | 2.1 |

| Variable | Scale | Range | Mean | Standard Deviation |
|---|---|---|---|---|
| **Independent Variables (Time 1, Grade 3)** | | | | |
| Parent's rating of child's school | Continuous | 0 – 12 | 10.0 | 2.4 |
| Parent's rating of relationship with child's teacher/ Involvement in school | Continuous | 1 – 28 | 22.4 | 5.3 |
| Neighourhood activities | Continuous | 0 – 10 | 2.4 | 2.3 |
| Use of programs | Continuous | 0 – 6 | 1.7 | 1.2 |
| Sense of community | Continuous | 5 – 20 | 10.2 | 2.2 |
| Perceived quality of neighbourhood/ Neighbourhood satisfaction | Continuous | 4 – 30 | 20.3 | 4.9 |

*Note: A separate analysis for each parent-rated or teacher-rated childhood externalizing disorder at time 2 was completed using the control variable of matched childhood externalizing disorder at time 1 and all other independent variables.

**Note: Variables were only included in regression decision tree analyses as they have more than two levels.

## *Findings*

### *Variable Oriented Analyses*

Results from six backward multiple regression analyses considering risk factor main effects for each of the three childhood externalizing disorders assessed by parent and teacher-rating follow. The same set of predictors was used for all six dependent variables. The Grade 3 matched childhood externalizing disorder control variable and site were also considered in each of the regressions. The multiple regression analyses of risk factor main effects indicated risk factors that significantly predicted childhood externalizing disorder outcome.

*Multiple regression main effect analyses for hyperactivity-inattention.* A summary table of coefficients for both parent-rated and teacher-rated multiple regression analyses considering main effects for prediction of the childhood hyperactivity-inattention Grade 6 outcome are found in Table 4. A backward multiple regression was conducted to determine whether risk variables identified in Table 4, plus the Grade 3 control variable and site predict the parent-rated childhood hyperactivity-inattention Grade 6 outcome. All assumptions (homoscedasticity, normality, independence, and linearity) were met. Risk variables significantly predicted the parent-rated childhood hyperactivity-inattention Grade 6 outcome, $F\,(11, 326) = 31.15, p = .000$, accounting for 51.2 % of the variance.

The standardized regression weights indicate that maternal immigrant status is the strongest predictor ($B = -.21$) of the parent-rated childhood hyperactivity-inattention Grade 6 outcome. Given this model, the associated unstandardized coefficients further indicate that maternal immigrant status significantly predicts the parent-rated childhood

Table 4

*Summary of Coefficients Used in Parent-rated and Teacher-rated Childhood Hyperactivity-Inattention Grade 6 Backward Multiple Regression Analyses Considering Main Effects*

| Variable | *b* | *SE b* | *β* |
|---|---|---|---|
| Parent-rated ($N = 338$) | | | |
| Parent-rated child hyperactivity Grade 3 | .46 | .05 | .46*** |
| Maternal immigrant status | -1.42 | .32 | -.21*** |
| Teacher-rated conflict management social skills | -.20 | .05 | -.17*** |
| Maternal education | -1.27 | .38 | -.13** |
| Teacher-rated assertiveness social skills | .11 | .04 | .11* |
| School climate | -.16 | .07 | -.10* |
| Site | .66 | .31 | .09* |
| Single-parent status | .65 | .32 | .09* |
| Teacher-rated ($N = 287$) | | | |
| Teacher-rated cooperative social skills | -.43 | .05 | -.51*** |
| Maternal immigrant status | -1.59 | .40 | -.20*** |
| Gender of child | -1.43 | .37 | -.18*** |
| Single-parent status | 1.38 | .40 | .16** |
| Positive parenting | -.20 | .06 | -.15** |
| Sense of community | .22 | .09 | .12* |
| Teacher-rated assertiveness social skills | .13 | .06 | .12* |

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

hyperactivity-inattention outcome. Parent ratings of childhood hyperactivity-inattention in Grade 6 were significantly lower for children who had a mother that was an immigrant.

Since maternal immigrant status is a predictor variable and parent-rated childhood hyperactivity-inattention Grade 6 outcome is the criterion, the square of the correlation coefficient was used to interpret the strength of the relationship. The square of the correlation gives the proportion of criterion variance that is accounted for by its linear relationship with the predictor. Therefore for maternal immigrant status there is a medium to large effect size, $r(336) = .46$, $p = .000$, accounting for 21.2% of the variance in the parent-rated childhood hyperactivity-inattention Grade 6 outcome.

Teacher-rated assertiveness social skills also significantly predicts the parent-rated childhood hyperactivity-inattention Grade 6 outcome. Parent ratings of childhood hyperactivity-inattention in Grade 6 were significantly higher for children who had higher teacher-rated assertiveness social skills, which was unexpected. School climate also significantly predicts parent-rated childhood hyperactivity-inattention Grade 6 outcome. It is interesting to note that parent ratings of childhood hyperactivity-inattention in Grade 6 were significantly lower for children who attended schools with a worse school climate. Finally, site significantly predicts the parent-rated childhood hyperactivity-inattention Grade 6 outcome. Parent ratings of childhood hyperactivity-inattention in Grade 6 were significantly higher for children who took part in the Better Beginnings intervention. This finding was also contrary to expectation.

A backward multiple regression was also conducted to determine whether risk variables identified in Table 4, plus the Grade 3 control variable and site predict the teacher-rated childhood hyperactivity-inattention Grade 6 outcome. All assumptions

were met. Risk variables significantly predicted teacher-rated childhood hyperactivity-innattention Grade 6 outcome, $F$ (9, 277) = 25.47, $p$ = .000, accounting for 45.3 % of the variance. The standardized regression weights indicate that teacher-rated cooperative social skills is the strongest predictor ($B$ = -.51) of teacher-rated childhood hyperactivity-inattention Grade 6 outcome.

Given this model, the associated unstandardized coefficients further indicate that teacher-rated cooperative social skills significantly predicts the teacher-rated childhood hyperactivity-inattention Grade 6 outcome. Teacher ratings of childhood hyperactivity-inattention in Grade 6 were significantly lower for children who had higher teacher-rated cooperative social skills. This is a large effect size, $r$(285) = -.56, $p$ = .000, accounting for 31.4% of the variance in the teacher-rated childhood hyperactivity-inattention Grade 6 outcome. Maternal immigrant status also significantly predicts the teacher-rated childhood hyperactivity-inattention Grade 6 outcome. Teacher ratings of childhood hyperactivity-inattention in Grade 6 were significantly lower for children who had a mother that was an immigrant. Finally, teacher-rated assertiveness social skills significantly predicts the teacher-rated childhood hyperactivity-inattention Grade 6 outcome. This interesting finding notes that teacher ratings of childhood hyperactivity-inattention in Grade 6 were significantly higher for children who had higher teacher-rated assertiveness social skills.

*Multiple regression main effect analyses for delinquency.* A summary table of coefficients for both parent-rated and teacher-rated multiple regression analyses considering main effects for prediction of the childhood delinquency Grade 6 outcome is found in Table 5. A backward multiple regression was conducted to determine whether

Table 5

*Summary of Coefficients Used in Parent-rated and Teacher-rated Childhood Delinquency Grade 6 Backward Multiple Regression Analyses Considering Main Effects*

| Variable | *b* | *SE b* | *β* |
|---|---|---|---|
| Parent-rated ($N = 338$) | | | |
| Parent-rated delinquency Grade 3 | .47 | .06 | .44*** |
| Parent-rated conflict management social skills | -.16 | .05 | -.17** |
| Site | 1.30 | .33 | .15*** |
| Hostile-ineffective parenting | .10 | .04 | .13* |
| Sense of community | -.17 | .08 | -.09* |
| Neighbourhood satisfaction | -.07 | .03 | -.09* |
| Teacher-rated ($N = 227$) | | | |
| Teacher-rated delinquency Grade 3 | .12 | .03 | .29*** |
| Teacher-rated cooperative social skills | -.02 | .01 | -.20* |
| Single-parent status | .13 | .05 | .16* |
| School climate | -.02 | .01 | -.13* |

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

risk variables identified in Table 4, plus the Grade 3 control variable and site predict the parent-rated childhood delinquency Grade 6 outcome. All assumptions were met. Risk variables significantly predicted the parent-rated childhood delinquency Grade 6 outcome, $F(9, 328) = 47.27, p = .000$, accounting for 56.5 % of the variance. The standardized regression weights indicate that parent-rated conflict management social skills is the strongest predictor ($B = -.17$) of parent-rated childhood delinquency Grade 6 outcome.

Given this model, the associated unstandardized coefficients further indicate that parent-rated conflict management social skills significantly predicts the parent-rated childhood delinquency Grade 6 outcome. Parent ratings of childhood delinquency in Grade 6 were significantly lower for children who had higher parent-rated conflict management social skills. This is a medium to large effect size, $r(336) = -.55, p = .000$, accounting for 30.3% of the variance in parent-rated childhood delinquency Grade 6 outcome. Site also significantly predicts the parent-rated childhood delinquency Grade 6 outcome. Parent ratings of childhood delinquency in Grade 6 were significantly higher for children who took part in the Better Beginnings intervention, which was an unexpected finding. Sense of community also significantly predicts the parent-rated childhood delinquency Grade 6 outcome. Unexpectedly, parent ratings of childhood delinquency in Grade 6 were found to be significantly lower for children who lived in communities with less sense of community.

A backward multiple regression was also conducted to determine whether risk variables identified in Table 4, plus the Grade 3 control variable and site predict the teacher-rated childhood delinquency Grade 6 outcome. All assumptions were met. Risk

variables significantly predicted the teacher-rated childhood delinquency Grade 6 outcome, $F$ (8, 218) = 8.62, $p$ = .000, accounting for 24.0 % of the variance. The standardized regression weights indicate that teacher-rated cooperative social skills is the strongest predictor ($B$ = -.20) of teacher-rated childhood delinquency Grade 6 outcome.

Given this model, the associated unstandardized coefficients further indicate that teacher-rated cooperative social skills significantly predicts teacher-rated childhood delinquency Grade 6 outcome. Teacher ratings of childhood delinquency in Grade 6 were significantly lower for children who had higher teacher-rated cooperative social skills in Grade 3. Finally, school climate significantly predicts teacher-rated childhood delinquency Grade 6 outcome. It is interesting to note that teacher ratings of childhood delinquency in Grade 6 were significantly lower for children who attended schools with worse school climate.

*Multiple regression main effect analyses for physical aggression.* A summary table of coefficients for both parent-rated and teacher-rated multiple regression analyses for prediction of the childhood physical aggression Grade 6 outcome are found in Table 6. A backward multiple regression was conducted to determine whether risk variables identified in Table 4, plus the Grade 3 control variable and site predict the parent-rated childhood physical aggression Grade 6 outcome. All assumptions were met. Risk variables significantly predicted the parent-rated childhood physical aggression Grade 6 outcome, $F$ (7, 312) = 33.40, $p$ = .000, accounting for 42.8 % of the variance. The standardized regression weights indicate that single-parent status in Grade 3 is the strongest predictor ($B$ = .14) of the parent-rated childhood physical aggression Grade 6 outcome.

Table 6

*Summary of Coefficients Used in Parent-rated and Teacher-rated Childhood Physical Aggression Grade 6 Backward Multiple Regression Analyses Considering Main Effects*

| Variable | *b* | *SE b* | *β* |
|---|---|---|---|
| Parent-rated ($N = 320$) | | | |
| Parent-rated physical aggression Grade 3 | .55 | .05 | .56*** |
| Single-parent status | .64 | .20 | .14** |
| Maternal immigrant status | -.44 | .21 | -.11* |
| Site | .45 | .20 | .10* |
| Teacher-rated ($N = 245$) | | | |
| Teacher-rated physical aggression Grade 3 | .30 | .05 | .38*** |
| Teacher-rated cooperative social skills | -.12 | .03 | -.24*** |
| Maternal depression | .04 | .01 | .14* |
| Unemployment status | .84 | .32 | .14** |
| Teacher-rated assertiveness social skills | .09 | .04 | .14* |
| Maternal immigrant status | -.50 | .23 | -.11* |

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

Given this model, the associated unstandardized coefficients further indicate that single-parent status significantly predicts parent-rated childhood physical aggression Grade 6 outcome. Parent ratings of childhood physical aggression in Grade 6 were significantly higher for children who were from single-parent families. Maternal immigrant status also significantly predicts the parent-rated childhood physical aggression Grade 6 outcome. Teacher ratings of childhood physical aggression in Grade 6 were significantly lower for children who had a mother that was an immigrant. Finally, site significantly predicts the parent-rated childhood physical aggression Grade 6 outcome. Parent ratings of childhood physical aggression in Grade 6 were significantly higher for children who took part in the Better Beginnings intervention, which was an unexpected finding.

A backward multiple regression was also conducted to determine whether risk variables identified in Table 4, plus the Grade 3 control variable and site predict the teacher-rated childhood physical aggression Grade 6 outcome. All assumptions were met. Risk variables were able to significantly predict teacher-rated childhood physical aggression Grade 6 outcome, $F$ (7, 237) = 18.87, $p$ = .000, accounting for 35.8 % of the variance. The standardized regression weights indicate that teacher-rated cooperative social skills in Grade 3 is the strongest predictor ($B$ = -.24) of the teacher-rated childhood physical aggression Grade 6 outcome.

Given this model, the associated unstandardized coefficients further indicate that teacher-rated cooperative social skills in Grade 3 significantly predicts the teacher-rated childhood physical aggression Grade 6 outcome. Teacher ratings of childhood physical aggression in Grade 6 were significantly lower for children who had higher teacher-rated

cooperative social skills in Grade 3, as expected. Teacher-rated assertiveness social skills also significantly predicts teacher-rated childhood physical aggression Grade 6 outcome. It is interesting to note that teacher ratings of the childhood physical aggression in Grade 6 were significantly higher for children who had higher teacher-rated assertiveness social skills. Finally, maternal immigrant status significantly predicts the teacher-rated childhood physical aggression Grade 6 outcome. Teacher ratings of childhood physical aggression in Grade 6 were significantly lower for children who had a mother that was an immigrant.

*Multiple regression interaction analyses.* All significant risk factors identified in the multiple regression analyses considering risk factor main effects for each of the dependent variables were included in multiple regression analyses considering interactions between site and risk factor. The multiple regressions considering the interaction between site and risk factor tested for high-risk subgroups of differential effectiveness of the intervention, which was the goal of the present study. Each of the multiple regressions analyses considering interactions between site and risk factor were conducted by including site and risk factor main effects and the interaction between site and the risk factor in the model. To discern high-risk subgroups of differential effectiveness of the intervention from these regression analyses completed, it was necessary to graph the significant interactions detected. The graphs aimed to assess whether childhood externalizing disorder outcome was lower in the intervention sites than in the comparison sites under conditions where higher levels of a risk factor was present.

A total of 27 risk factors were significantly associated with one of the six outcome measures (or dependent variables). Therefore, 27 multiple regression analyses considering interactions between site and each risk factor were conducted by including site and the risk factor as main effects and the interaction of site and that risk factor as an interaction term in the model. Of these analyses, five models included interactions that were significant. Once each of the five models were graphed for further inspection of high risk subgroups of differential effectiveness of the intervention, only one of the five models showed the pattern of interest. However, this one finding of interest for the dependent variable of teacher-rated childhood delinquency Grade 6 outcome (interaction was between site and single-parent status) had some limitations. The teacher-rated childhood delinquency outcome score (which has small variance) proved difficult to compare the intervention and comparison sites as there was such a miniscule difference.

*Person Oriented Analyses*

Regression decision tree analyses uncovered homogenous subgroups of individuals, which were empirically derived, reflecting the interactions of several independent variables. Results from six regression decision tree analyses, which were completed for each of the six dependent variables, follow. The same set of predictors was used for all six regression decision tree analyses and can be seen in Table 3. The resulting tree diagrams reflect groups of children placed in subgroups based on their similarity across multiple variables or risk factors. Subgroups represent children with similar patterns of scores on the independent variables used to define the specific subgroups. For the purpose of testing the hypothesis that the higher the level of risk the more likely participants would be to respond positively to the Better Beginnings

intervention, the regression decision tree allowed for identification of possible high-risk subgroups.

The regression decision-tree analyses did not reveal effectiveness of intervention programs for high risk subgroups. This was due to the fact that site was not the strongest factor predicting childhood externalizing disorder in all regression decision trees generated by Answer Tree. If site were to have been indicated in decision tree analyses in the first generation of the tree, subgroups of comparison and intervention sites would be sub-grouped. Subsequent generations of the tree would form off of these subgroups of comparison/intervention sites to create interactions with other risk factors allowing for potential formation of high-risk subgroups of participants that showed greater intervention effectiveness.

Site was a factor that was generated in later generations in many decision trees generated. The homogeneous subgroups of sites indicated that comparison sites had equivalent childhood externalizing disorder outcome scores as seen in intervention sites. Finally, a number of different risk factors for externalizing disorders were noted by the regression decision tree analyses.

*Hyperactivity-inattention.* A parent-rated childhood hyperactivity-inattention decision tree diagram describing subgroups of participants with similar patterns of scores on significant predictor variables is summarized in Figure 4. The top node or "parent" node of this decision tree revealed a mean teacher-rated childhood hyperactivity-inattention Grade 6 outcome score of 3.55 in the overall sample ($N = 571$). The first generation of this decision tree displayed stressful life events as the strongest factor predicting parent-rated childhood hyperactivity-inattention Grade 6 outcome. Parent-

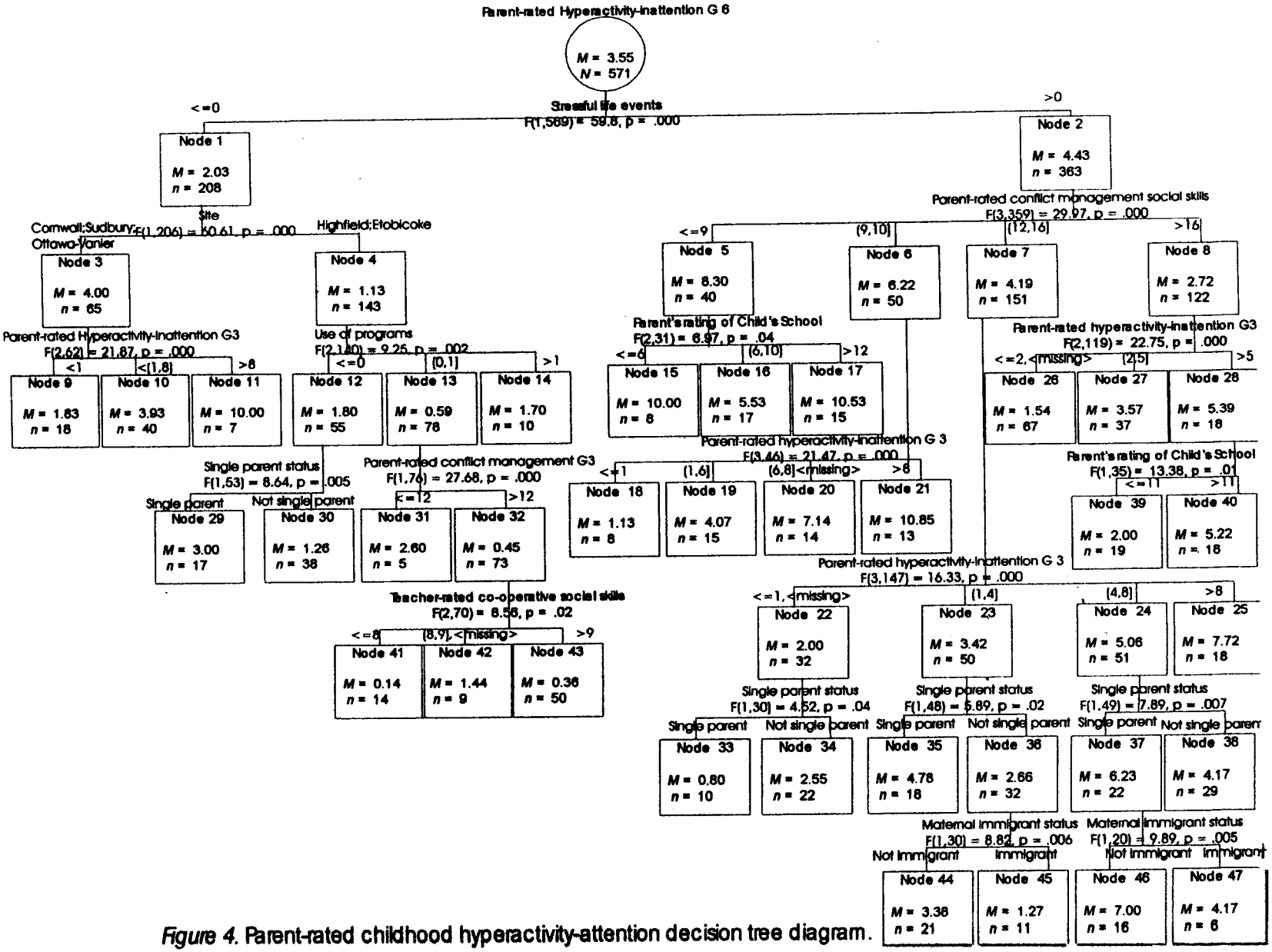


*Figure 4.* Parent-rated childhood hyperactivity-attention decision tree diagram.

rated childhood hyperactivity-inattention Grade 6 outcome scores formed two subgroups for stressful life events. No stressful life events formed node 1 and displayed a mean parent-rated childhood hyperactivity-inattention Grade 6 outcome score of 2.03. Node 2 with stressful life events scores of 1 to 13 showed a higher mean parent-rated childhood hyperactivity-inattention Grade 6 outcome score of 4.43. Several other nodes formed off of the first node (see Figure 4).

Single-parent status was a common predictor in this decision tree, as was the Grade 3 parent-rated childhood hyperactivity-inattention control variable. The last generation of the decision tree indicated the factor maternal immigrant status. Many subgroups in the tree, especially those in the later generations, were composed of a small number of participants.

A summary is provided of the teacher-rated childhood hyperactivity-inattention decision tree diagram, describing subgroups of participants with similar patterns of scores on significant predictor variables in Figure 5. The top node or "parent" node of this decision tree revealed a mean teacher-rated childhood hyperactivity-inattention Grade 6 outcome score of 4.44 in the overall sample ($N = 441$). The first generation of this decision tree displayed gender of child as the strongest factor predicting teacher-rated childhood hyperactivity-inattention Grade 6 outcome. Teacher-rated childhood hyperactivity-inattention Grade 6 outcome scores formed two subgroups for gender. Female children formed node 1 and displayed a mean teacher-rated childhood hyperactivity-inattention Grade 6 outcome score of 2.99. Node 2 with male children and missing gender answers showed a higher mean teacher-rated childhood hyperactivity-inattention Grade 6 outcome score of 5.69.

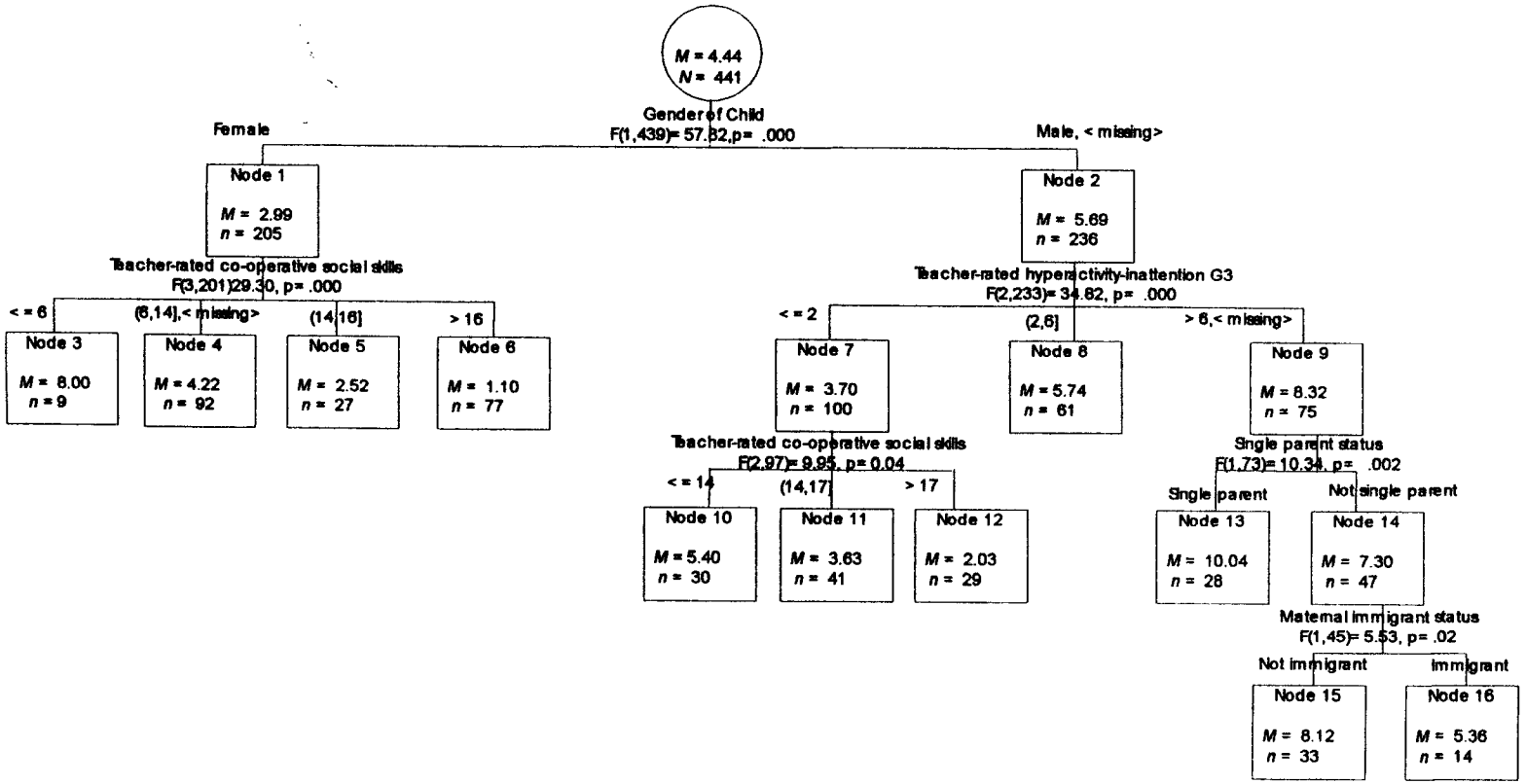


*Figure 5.* Teacher-rated childhood hyperactivity-inattention decision tree diagram.

The second generation of this decision tree revealed teacher-rated cooperative social skills as a predictor variable for the split off of node 1. The second generation of this decision tree also revealed teacher-rated childhood hyperactivity-inattention Grade 3 control variable for the split off of node 2. Single-parent status and maternal immigrant status are also factors in the later generations of this decision tree. This decision tree had only four generations and the sample sizes for subgroups in the later generations were reasonable.

*Delinquency.* A parent-rated childhood delinquency decision tree diagram describing subgroups of participants with similar patterns of scores on significant predictor variables is summarized in Figure 6. The top node or "parent" node of this decision tree revealed a mean teacher-rated childhood delinquency Grade 6 outcome score of 5.13 in the overall sample ($N = 566$). The first generation of this decision tree displayed maternal immigrant status as the strongest factor predicting parent-rated childhood delinquency Grade 6 outcome.

The second generation of this decision tree revealed parent-rated childhood delinquency Grade 3 control variable for the split off of node 1. The second generation of this decision tree revealed parent-rated childhood delinquency Grade 3 scores as the control variable for the split off of node 2. There were two additional generations of nodes (see Figure 6).

A summary is provided of the teacher-rated childhood delinquency decision tree diagram, describing subgroups of participants with similar patterns of scores on significant predictor variables in Figure 7. The top node or "parent" node of this decision tree revealed a mean teacher-rated childhood delinquency Grade 6 outcome score of 0.19

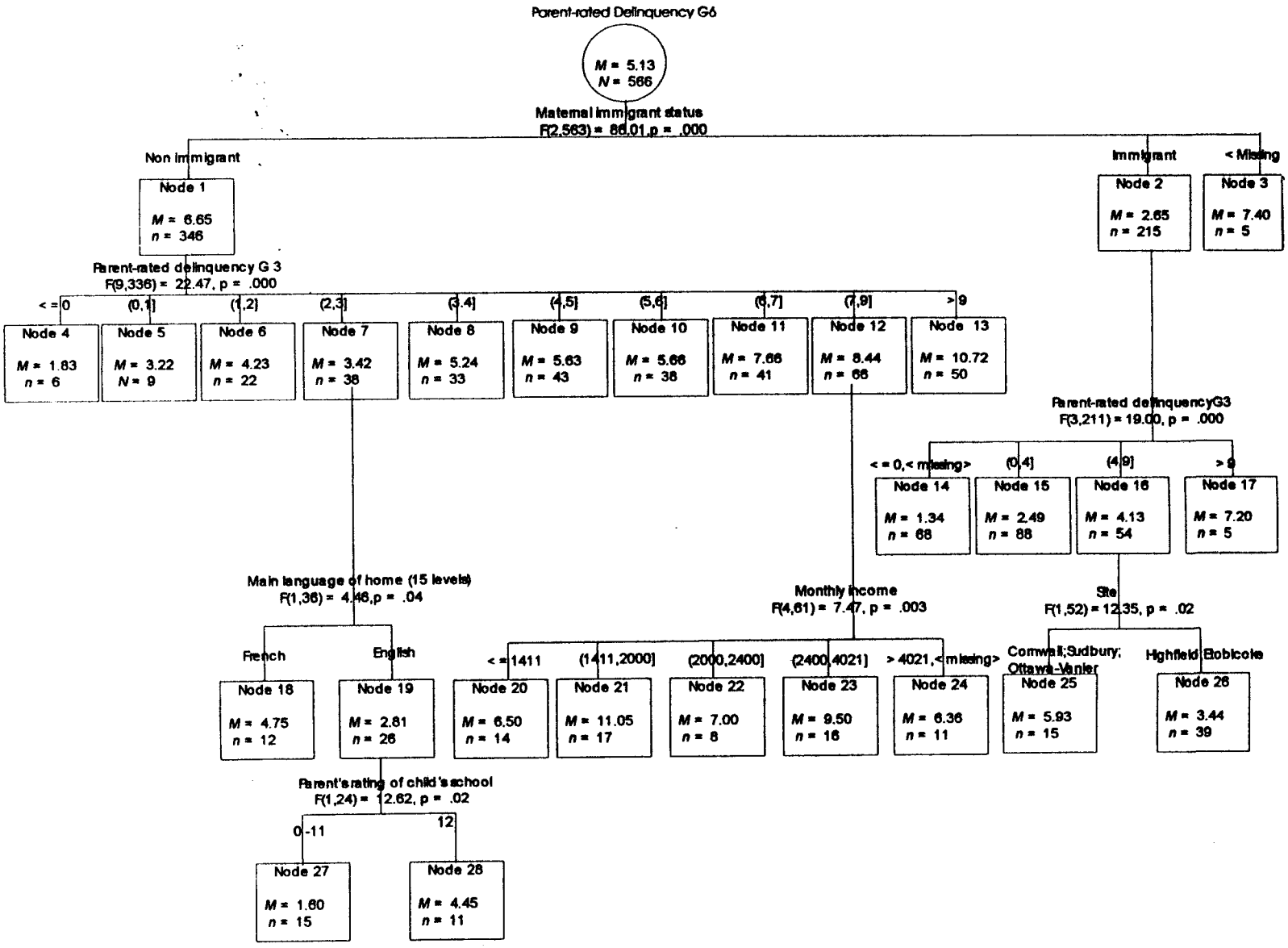


*Figure 6.* Parent-rated childhood delinquency decision tree diagram.

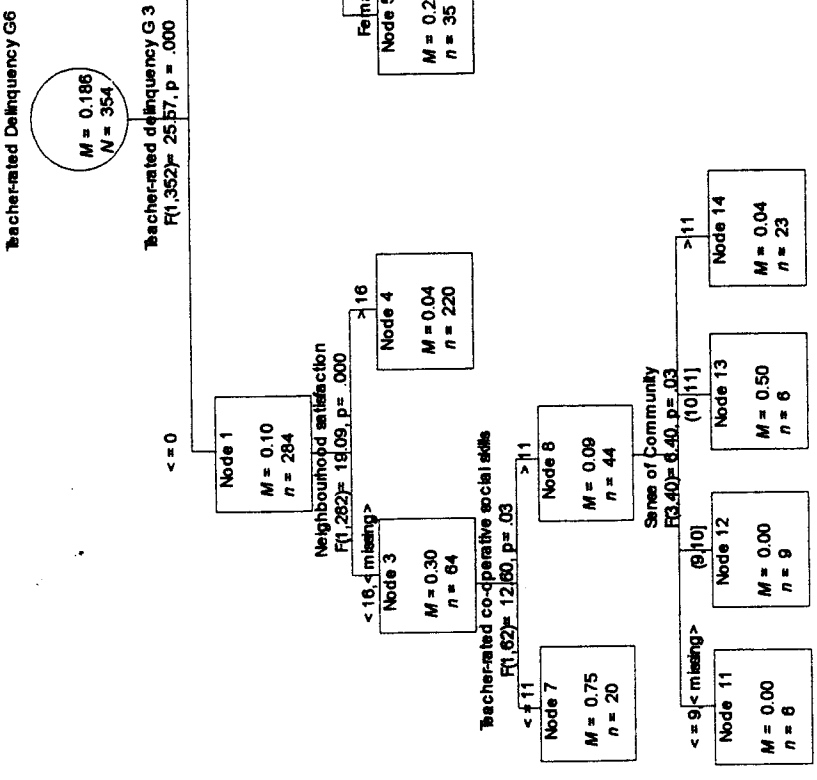


*Figure 7.* Teacher-rated childhood delinquency decision tree diagram.

in the overall sample ($N = 354$). The first generation of this decision tree displayed the control variable of teacher-rated childhood delinquency Grade 3 scores. Teacher-rated childhood delinquency Grade 6 outcome scores formed two subgroups for teacher-rated childhood delinquency Grade 3 scores. Teacher-rated childhood delinquency Grade 3 scores of 0 formed node 1 and displayed a mean teacher-rated childhood hyperactivity-inattention Grade 6 outcome score of 0.10. Node 2 with childhood teacher-rated delinquency Grade 3 scores of 1 to 6 and missing childhood teacher-rated delinquency Grade 3 scores showed a higher mean teacher-rated childhood hyperactivity-inattention Grade 6 outcome score of 0.54.

The second generation of this decision tree revealed neighbourhood satisfaction as the predictor variable for the split off of node 1 and gender of child as the predictor variable for the split off of node 2. The third generation of this decision tree showed teacher-rated cooperative social skills and single-parent status as predictors. Finally, sense of community was seen in the final generation of this decision tree and formed subgroups that had small sample sizes.

*Physical aggression.* A summary is provided of the parent-rated childhood physical aggression decision tree diagram, describing subgroups of participants with similar patterns of scores on significant predictor variables in Figure 8. The top node or "parent" node of this decision tree revealed a mean parent-rated childhood physical aggression Grade 6 outcome score of 1.46 in the overall sample ($N = 557$). The first generation of this decision tree displayed parent-rated childhood physical aggression Grade 3 control scores.

The second generation of this decision tree revealed hostile-ineffective parenting

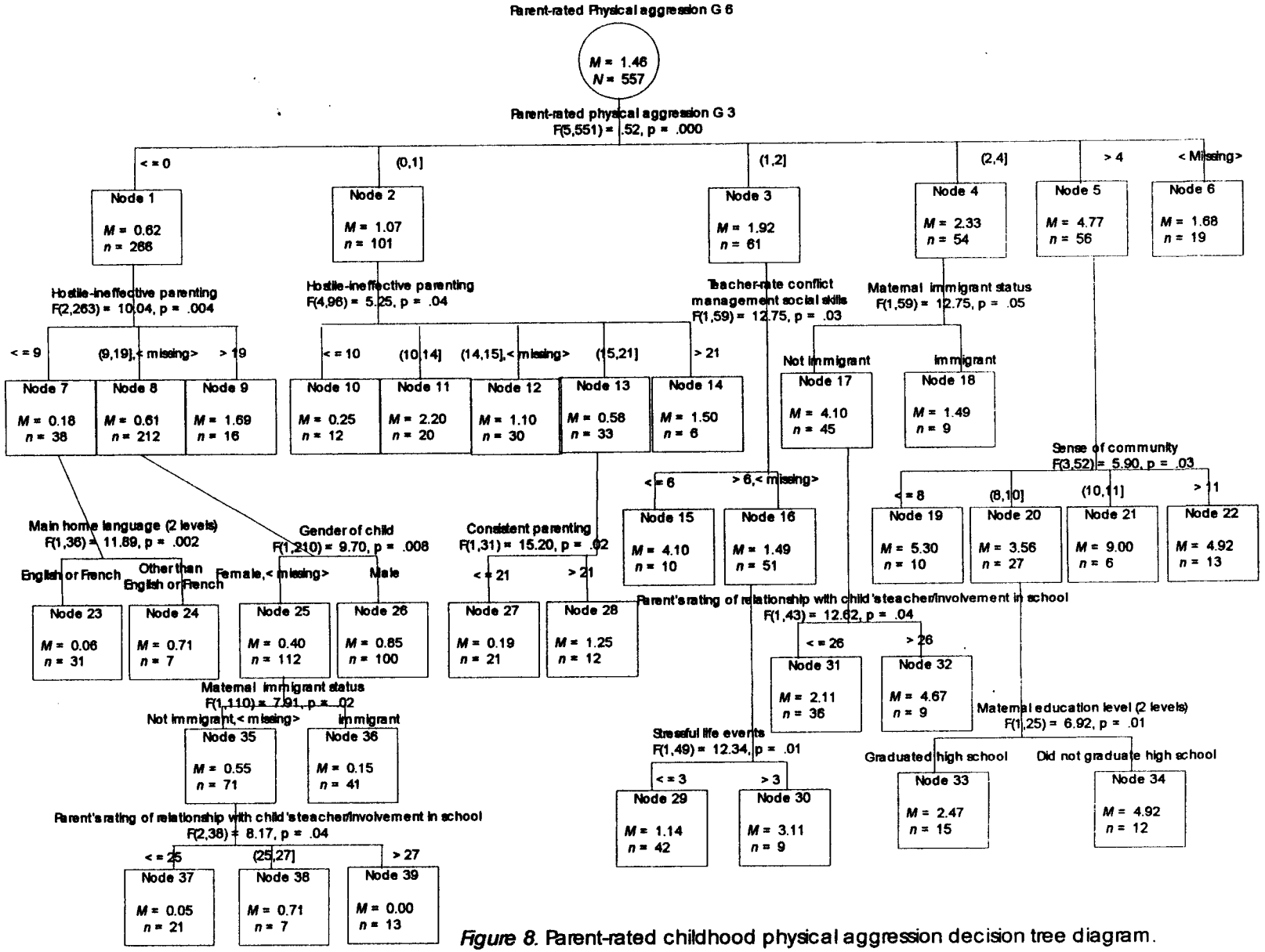


*Figure 8.* Parent-rated childhood physical aggression decision tree diagram.

as the predictor variable for the split off of node 1. The second generation of this decision tree revealed hostile-ineffective parenting as the predictor variable for the split off of node 2 as well. However, in this instance the hostile-ineffective parenting subgroups were not ordered in an expected manner with lower dependent variables means for lower levels of risk and higher dependent variable means for higher levels of risk. The second generation of this decision tree revealed teacher-rated conflict management social skills and maternal immigrant status as predictors as well. Node 18 represented children whose mother was an immigrant and indicated a mean parent-rated childhood physical aggression Grade 6 outcome score of 0.89. Node 17 represented children whose mother was not an immigrant and indicated a higher mean parent-rated childhood physical aggression Grade 6 outcome score of 2.62.

Finally, the second generation of this decision tree revealed sense of community as the predictor variable for the split off of node 5. An unusual order was seen in the dependent variables means for this variable. Increased sense of community did not always result in subgroups of lower dependent variable means. Several subsequent generations are seen in this decision tree diagram.

A summary is provided of the teacher-rated childhood physical aggression decision tree diagram, describing subgroups of participants with similar patterns of scores on significant predictor variables in Figure 9. The top node or "parent" node of this decision tree revealed a mean teacher-rated childhood physical aggression Grade 6 outcome score of 1.55 in the overall sample ($N = 380$). The first generation of this decision tree displayed teacher-rated childhood physical aggression Grade 3 control variable scores. Several other nodes formed off of the first node (see Figure 9).

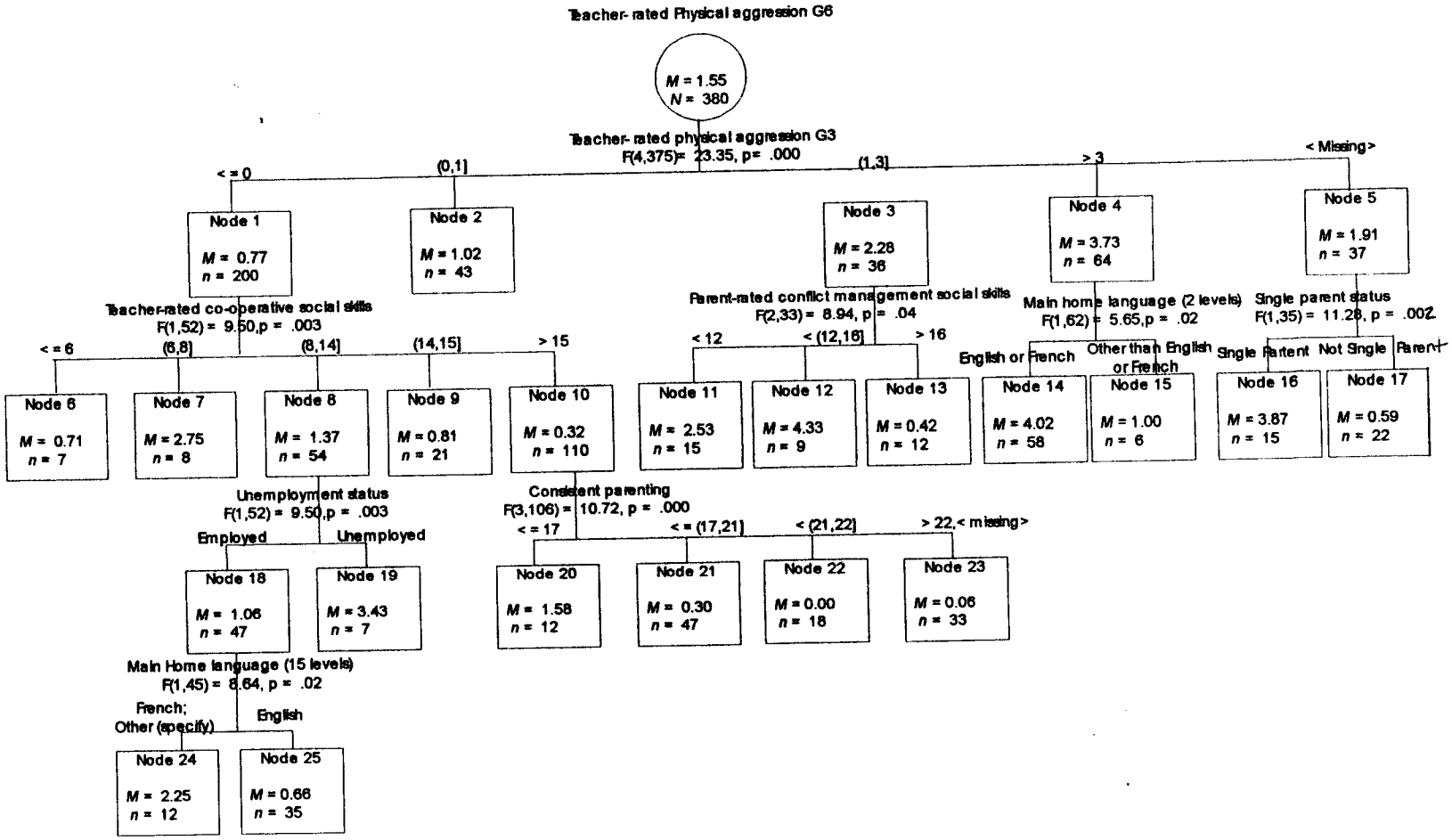


*Figure 9.* Teacher-rated childhood physical aggression decision tree diagram.

*Risk estimates of regression decision trees.* The proportion of variance explained by the tree models was taken into consideration in order to evaluate the tree models. This was done using the risk estimate that reflects the error variance in the dependent measure before (total variance) and after (within-node variance) the tree is grown. To calculate the proportion of variance in the dependent variable that the tree model describes the within-node variance was divided by the total variance then multiplied by 100 and subtracted from 100%.

Risk estimates were provided by SPSS Answer Tree (SPSS, 1999) program for each of the six regression decision trees which enabled a calculation of the amount of variance in childhood externalizing disorder Grade 6 outcome scores explained by these models. For parent ratings, the proportion of variance in childhood hyperactivity-inattention Grade 6 scores that can be explained by the model was 56.15%. For teacher ratings, the proportion of variance in childhood hyperactivity-inattention Grade 6 scores that can be explained by the model was 39.67%.

For parent ratings, the proportion of variance in childhood delinquency Grade 6 scores that can be explained by the model was 53.27%. For teacher ratings, the proportion of variance in childhood delinquency Grade 6 scores that can be explained by the model was 23.56%.

For parent ratings, the proportion of variance in childhood physical aggression Grade 6 scores that can be explained by the model was 48.40%. For teacher ratings, the proportion of variance in childhood physical aggression Grade 6 scores that can be explained by the model was 36.21%.

*Cross-validation risk estimates of regression decision trees.* Regression decision tree analyses also provides a cross-validation assessment of results. In the tree pruning procedure, rather than using the apparent (resubtitution) misclassification error or apparent mean square error, a cross-validation method is used to obtain a more reliable estimate of error, representing the error that would be experienced in replication (Breiman et al., 1984). This ten-fold cross-validation procedure to determine optimal tree size randomly divides the original sample into tenths and a tree is built from 9/10 (or 90%) of the sample, holding out the remaining 1/10 or 10%. This excluded 1/10 is used to test the stability of classification of the tree generated from the 9/10. This happens a total of ten times for each of the randomly divided 1/10 of the original sample.

A cross-validation risk estimate is calculated by Answer Tree by averaging the risk estimate computed for each of the ten trees generated in cross-validation. A comparison of the risk estimate for the tree model and the average cross-validation risk estimate is completed. If the average cross-validation risk estimate is greater than the risk estimate of the tree model *or* the standard error of the average cross-validation risk estimate is greater than the standard error for the risk estimate of the tree model, then the computer program has allowed too much variability in tree selection rather than consistently selecting a tree with minimized estimated error (StatSoft, 1984-2003). Thus there would be too much error in replication or there is a lack of external validity of generalizeability.

Cross-validation risk estimates were also provided by SPSS Answer Tree (SPSS, 1999) program for all six regression decision trees generated. The average cross-validation risk estimate and/or the standard error of the average cross-validation risk

estimate for the parent-rated hyperactivity-inattention decision tree was smaller than the risk estimate and/or the standard error of the risk estimate for the tree model (*CV* : 5.10 vs. 6.14, *SE CV* : 0.51 vs. 0.48). Therefore the model replicates well. The average cross-validation risk estimate and/or the standard error of the average cross-validation risk estimate for the teacher-rated hyperactivity-inattention decision tree was smaller than the risk estimate and/or the standard error of the risk estimate for the tree model (*CV* : 7.60 vs. 9.43, *SE CV* : 0.54 vs. 0.60). Therefore the model replicates well.

The average cross-validation risk estimate and/or the standard error of the average cross-validation risk estimate for the parent-rated delinquency decision tree was smaller than the risk estimate and/or the standard error of the risk estimate for the tree model (*CV* : 6.06 vs. 7.58, *SE CV* : 0.50 vs. 0.60). Therefore the model replicates well. The average cross-validation risk estimate and/or the standard error of the average cross-validation risk estimate for the teacher-rated delinquency decision tree was smaller than the risk estimate and/or the standard error of the risk estimate for the tree model (*CV* : 0.33 vs. 0.35, *SE CV* : 0.09 vs. 0.09). Therefore the model replicates well.

The average cross-validation risk estimate and/or the standard error of the average cross-validation risk estimate for the parent-rated physical aggression decision tree was smaller than the risk estimate and/or the standard error of the risk estimate for the tree model (*CV* : 2.12 vs. 2.52, *SE CV* : 0.23 vs. 0.25). Therefore the model replicates well. The average cross-validation risk estimate and/or the standard error of the average cross-validation risk estimate for the teacher-rated physical aggression decision tree was smaller than the risk estimate and/or the standard error of the risk estimate for the tree model (*CV* : 3.31 vs. 3.91, *SE CV* : 0.39 vs. 0.43). Therefore the model replicates well.

# Discussion

Since medium-term follow-up results of the Better Beginnings intervention indicated no overall effects seen for childhood externalizing disorders (Peters et al., 2005) the goals of the present archival study were to determine whether or not the Better Beginnings intervention had greater or lesser impact on high-risk groups, and if so, what the particular risk variables are that moderate program effectiveness with respect to childhood externalizing disorders. Predictor variable (risk factors) effects on childhood externalizing disorder in Better Beginnings intervention and comparisons sites were investigated. Both the traditional data analysis method of multiple regression (main effects analyses and interaction analyses) and a more novel approach of regression decision tree data analytic strategy were used and compared.

Both the variable-oriented analysis and the person-oriented analysis did not reveal high-risk subgroups of differential effectiveness of the Better Beginnings intervention. The multiple regression analyses of risk factor main effects indicated risk factors, while controlling for Grade 3 childhood externalizing disorder that significantly predicted childhood externalizing disorder outcome. The multiple regressions considering the interaction between site and risk factor tested for high-risk subgroups of differential effectiveness of the intervention and uncovered one finding of interest which had limitations associated with the problem of a floor effect.

The regression decision-tree statistical approach did not reveal effectiveness of intervention programs for high risk subgroups either. This was due to the fact that site was not the strongest factor predicting childhood externalizing disorder in all decision trees generated by Answer Tree. If site were to have been indicated in decision tree

analyses in the first generation of the tree, subgroups of comparison and intervention sites would be sub-grouped. Subsequent generations of the tree would form off of these subgroups of comparison/intervention sites to create interactions with other risk factors allowing for potential formation of high-risk subgroups of participants that showed greater intervention effectiveness.

In subsequent generations of decision tress these novel analyses revealed that comparison sites had equivalent childhood externalizing disorder outcome scores as seen in intervention sites. Finally as found in the more multiple regression analyses, a number of different risk factors for externalizing disorders, while controlling for Grade 3 psychopathology, were noted by the regression decision tree analyses. The multiple regression results are discussed first and a discussion of the very slight value-added, in this instance, by use of regression decision tree follows.

### *Variable Oriented Analyses*

#### *Hyperactivity-Inattention Main Effect Multiple Regressions*

In both parent-rated and teacher-rated childhood hyperactivity-inattention multiple regression analyses when controlling for Grade 3 childhood hyperactivity-inattention, several risk variables significantly predicted childhood hyperactivity-inattention Grade 6 outcome. In the parent-rated childhood hyperactivity-inattention multiple regression analysis, maternal immigrant status was the most significant predictor of parent-rated childhood hyperactivity-inattention Grade 6 outcome. It is interesting to note that maternal immigrant status predicted significantly lower scores of parent-rated childhood hyperactivity-inattention at Grade 6 outcome. This finding is supported by the literature that discusses how being an immigrant is a factor related to child mental health

(Harker, 2001). Two other sociodemographic factors were significant predictors of this outcome. They were maternal education level and single-parent status. Teacher-rated conflict management social skills, teacher-rated assertiveness social skills, and school climate were also significant predictors of parent-rated childhood hyperactivity-inattention Grade 6 outcome. Finally site was also a significant factor, but in an unexpected way. Being from an intervention site predicted higher parent-rated childhood hyperactivity-inattention Grade 6 outcome scores. It was predicted that those from intervention sites would score lower than those from comparison sites on this variable.

All independent variables discussed above were related in the expected direction with the exception of site, teacher-rated assertiveness social skills and school climate. A higher degree of assertiveness social skills is inferred in the literature as a factor in the development of child mental health (Coie, Dodge & Capottelli, 1982; McElwain, Olson & Volling, 2002) and not associated with this unexpected finding of higher psychopathology Grade 6 outcome scores. Poorer school climate predicted significantly lower parent-rated childhood hyperactivity-inattention scores, which is also contrary to the literature that points out positive school climate as a factor related to child mental health (Bateman, 1998; Kasen et al., 1990; Rutter, 1979). These unexpected findings will be qualified further in the discussion as these unexpected findings are repeated in several other analyses. For simplicity, speculations concerning the unexpected findings will be addressed once in this later section of the discussion.

In the teacher-rated childhood hyperactivity-inattention multiple regression analysis, teacher-rated cooperative social skills was the most significant predictor. Higher teacher-rated cooperative social skills significantly predicted lower teacher-rated

childhood hyperactivity-inattention Grade 6 outcome scores. Three other variables that were noted in the parent-rated hyperactivity inattention multiple regression were also noted here as significant predictors. These three predictor variables were maternal immigrant status, single-parent status, and teacher-rated assertiveness social skills. Maternal immigrant status predicted significantly lower teacher-rated childhood hyperactivity-inattention Grade 6 outcome scores. This finding shared the same direction in the parent-rated hyperactivity inattention multiple regression discussed above. Single-parent status predicted significantly higher Grade 6 outcome scores. Finally, higher teacher-rated assertiveness social skills predicted higher psychopathology scores in Grade 6. This unexpected direction of this result was also seen in the parent-rated regression analysis discussed above. Again the literature suggest that assertiveness is a factor in the development of child mental health (Coie, Dodge & Capottelli, 1982; McElwain, Olson & Volling, 2002) and not a risk factor as is seen in this unexpected finding. This finding is referred to later in this discussion for the sake of simplicity.

Other variables that significantly predicted the dependent variable outcome were: gender of child, positive parenting and sense of community. Being female predicted lower outcome scores as expected (Offord and Lipman, 1996). Higher levels of positive parenting predicted lower outcomes scores as expected (Dodge et al., 1994). Finally, lower levels of sense of community predicted lower outcome scores as expected (O'Brien Caughy, O'Campo & Muntaner, 2003).

*Delinquency Main Effect Multiple Regressions*

In both parent-rated and teacher-rated childhood delinquency multiple regression analyses when controlling for Grade 3 rated delinquency, several risk variables

significantly predicted childhood delinquency at Grade 6 outcome. In the parent-rated childhood delinquency multiple regression analysis, parent-rated conflict management social skills was the most significant predictor of parent-rated childhood delinquency Grade 6 outcome. Higher parent-rated conflict management social skills predicted lower Grade 6 outcome as expected (McElwain, Olson & Volling, 2002). As was previously seen in the parent-rated childhood hyperactivity-inattention multiple regression, being from an intervention site predicted higher scores on the parent-rated childhood delinquency Grade 6 outcome. This is the opposite of what one would expect. Hostile-ineffective parenting also significantly predicted Grade 6 delinquency in an expected manner (Eron, Huesmann, & Zelli, 1991; Farrington, 1978; McCord, 1977). Greater hostile-ineffective parenting levels predicted lower childhood delinquency outcomes in Grade 6.

Two other variables that are noted in a child's community, neighbourhood satisfaction and sense of community, significantly predicted Grade 6 delinquencies as well. Neither neighbourhood satisfaction nor sense of community was related in the expected direction. Greater sense of community is considered in the literature as a factor related to child mental health (O'Brien Caughy et al., 2003) and is therefore not supported by this result. However, these effects only account for 1.2% and 0.2% of the variance in the total and are therefore less important in the model.

In the teacher-rated childhood delinquency multiple regression analysis, teacher-rated cooperative social skills was the most significant predictor. Greater teacher-rated cooperative social skills predicted lower childhood delinquency Grade 6 outcome scores as expected (Coie, Dodge & Capottelli, 1982). Other variables that significantly

predicted this outcome were single-parent status and school climate. Single-parent status predicted higher childhood delinquency Grade 6 outcome (Munroe Blum, Boyle & Offord, 1988). Poorer school climate predicted significantly lower parent-rated Grade 6 childhood delinquency scores, which is contrary to the literature which has found that positive school climate is a factor related to child mental health (Bateman, 1998; Kasen et al., 1990; Rutter, 1979). However only .5% of the variance in teacher-rated childhood delinquency Grade 6 outcome is accounted for by school climate, making this result less important.

*Physical Aggression Main Effect Multiple Regressions*

In both parent-rated and teacher-rated childhood physical aggression multiple regression analyses when controlling for Grade 3 rated physical aggression, several risk variables significantly predicted childhood physical aggression at Grade 6. In the parent-rated childhood physical aggression multiple regression analysis, single-parent status was the most significant predictor of parent-rated childhood physical aggression at Grade 6. Single-parent status predicted higher childhood delinquency Grade 6 outcome (Munroe Blum, Boyle & Offord, 1988). It is interesting to note that maternal immigrant status predicted significantly lower scores of parent-rated childhood physical aggression at Grade 6 outcome. This finding is supported by the literature that discusses how being an immigrant is a factor related to child mental health (Harker, 2001). Finally, site was also a significant predictor but was related in an unexpected way. Being from an intervention site predicted higher parent-rated childhood physical aggression Grade 6 outcome scores. It was predicted that being from intervention sites would lead to lower aggression.

In the teacher-rated physical aggression multiple regression analysis, teacher-rated cooperative social skills was the most significant predictor. Greater teacher-rated cooperative social skills predicted lower childhood teacher-rated physical aggression Grade 6 outcome scores as expected (Coie, Dodge & Capottelli, 1982). Other variables that significantly predicted this outcome were maternal depression and unemployment status. Increased levels of maternal depression significantly predicted increased physical aggression outcome in the expected manner (Briggs-Gowan et al., 2000). Unemployment status significantly predicted increased physical aggression outcome in the expected manner (Harland, Reijneveld, Brugman, Verloove-Vanhorick, & Verhulst, 2002). Teacher-rated assertiveness social skills was also significantly related to teacher-rated childhood physical aggression at Grade 6, but in the opposite direction expected. Again the literature infers that high assertiveness is associated with low rates of externalizing disorders (Coie, Dodge & Capottelli, 1982; McElwain, Olson & Volling, 2002). Finally, maternal immigrant status predicted significantly lower teacher-rated childhood physical aggression at Grade 6, just as it had in the parent-rated regression discussed above. Support for immigrant status being considered a factor for the development of child mental health (Harker, 2001) is therefore again evident in this result.

*Multiple Regression Interaction Analyses*

A multiple regression model for the dependent variable teacher-rated delinquency Grade 6 outcome with the main effect of site and single-parent status and the interaction of site by single-parent status showed a high risk subgroup of differential effectiveness of the intervention. However, this one finding of interest for the dependent variable of teacher-rated childhood delinquency Grade 6 outcome had some limitations. The

teacher-rated childhood delinquency outcome score (which has small variance) proved difficult to compare the intervention and comparison sites as there was such a miniscule difference.

*Person-Oriented Analyses*

Subgroups of children with different childhood externalizing disorder Grade 6 scores were indicated by the regression decision tree analysis of Better Beginnings data. Site was not chosen as the strongest predictor for any of the dependent variable decision tree analyses. Therefore, analyses did not confirm the high-risk hypothesis that children in the intervention sites at higher risk would be more likely to respond to the Better Beginnings intervention. Therefore, no evidence of high-risk intervention effects were uncovered by regression decision tree analyses.

There is some added-value of the decision tree. For instance, it is important to note that when site showed up in later generations of decision trees, information regarding the subgrouping of intervention and comparison sites was revealed. Further, because recursive partitioning allows nominal variables with more than two levels in its analysis, site is an example of how recursive partitioning offers additional information that multiple regression cannot offer with such ease. Multiple regression, in contrast, only allows nominal variables with two dummy coded levels (0 and 1). Additionally, the extra nominal predictors of maternal education level with eleven levels and main home language with fifteen levels were able to be entered into the decision tree analyses along with the dummy coded two level nominal equivalents. Analyses revealed maternal education with eleven levels and main home language with fifteen levels in some of the regression decision trees. Therefore, additional information that was not captured by the

multiple regression analyses was gained. Curvilinear relationships were also denoted in regression decision tree analyses that were not evaluated by the traditional linear multiple regression analyses. Finally, since regression decision tree analyses are not based on the general linear model, general linear model assumptions such as normality, linearity, and independence needed not be verified. Analyses were able to use the full sample without having to delete outliers or influential observations. Therefore, regression decision tree analyses had larger sample sizes than those used in multiple regression analyses.

Participants from intervention and comparison sites were placed into subgroups based on similar scores across multiple predictor variables. Therefore, due to the decision tree approach, sugbroupings are not necessarily limited to predictor information about children who have higher Grade 6 behavioural problems scores and about children who have lower Grade 6 behavioural problem scores.

*Hyperactivity-Inattention*

In the decision tree for parent-rated hyperactivity-inattention, stressful life events was the most significant factor associated with this Grade 6 outcome. This was a different result than the result that was found for the multiple regression analysis and may have been due to use of a larger sample. Children from families with no stressful life events in the preceding year showed lower outcome scores (in node 1) than children from families with stressful life events in the preceding year (subgrouped in node 2). This was expected, as greater stressful life events are seen as a risk factor for the development of childhood externalizing disorders (Briggs-Gowen et al., 2000; Dodge et al., 1994; Velez et al., 1989). Site was the next most significant leading factor associated with the outcome for the homogeneous subgroup of children from families with no stressful life

events. Participants from the intervention site Highfield and the matched comparison site Etobicoke formed a homogeneous subgroup of lower parent-rated childhood hyperactivity-inattention outcome scores. Participants from the intervention site Cornwall and Sudbury created a homogeneous subgroup of higher parent-rated childhood hyperactivity-inattention outcome scores along with participants from the matched comparison site of Ottawa-Vanier. It was predicted that being from intervention sites would reduce parent-rated hyperactivity-inattention. Therefore, the result of homogeneous subgroups of dependent variable means with intervention and comparison sites was unexpected. These unexpected findings may be due to the establishment of early childhood intervention in the comparison sites. This possibility is discussed further later in this discussion as this result is generated in other decision trees as well.

The next most significant leading factor associated with the outcome for the homogeneous subgroup of children from families with a presence of stressful life events, was parent-rated conflict management social skills. Conflict management social skills was considered a significant predictor in the multiple regression analysis, but this predictor was teacher-rated in that instance and not parent-rated as in this decision tree. Homogeneous dependent variable mean subgroups formed from parent-rated conflict management social skills scores were grouped in an expected manner with higher social skills acting as a protective factor for the development of hyperactivity-inattention at Grade 6 (Coie, Dodge & Capottelli, 1982; Lochman, 1987; McElwain, Olson & Volling, 2002).

A curvilinear association was also seen for the predictor of use of programs in this decision tree. This is seen in node 12, 13 and 14 with node 13 having the lower

dependent variable means followed by node 14 with higher dependent variable means and finally with node 12 with even higher dependent variable means. Therefore, those who participated in zero community programs and two or more community programs had higher hyperactivity-inattention scores than those who only participated in one. People who participated in more than one community program may have been children with more severe problems, which would account for higher hyperactivity-inattention scores.

Single-parent status was also seen as a common predictor in this decision tree. With the exception of one case, single parent status was seen as a risk factor for the development of hyperactivity-inattention. Higher dependent variable means were seen in children from single parent families as opposed to two-parent families, as has been reported in the literature (Lipman et al., 1996; Munroe Blum et al, 1988; Wadsworth et al., 1985). This predictor was also seen in the multiple regression analysis and was related in the same manner with single-parent status as a risk factor.

Finally, maternal immigrant status created small subgroups in the last generation of the decision tree. Different subgrouped dependent variable means were found for either children whose mother was an immigrant or not an immigrant. Maternal immigrant status indicated lower parent-rated childhood hyperactivity-inattention Grade 6 outcome scores, just as it had in all of the multiple regression analyses. Support for immigrant status being considered a factor for the development of child mental health (Harker, 2001) is therefore again present in this decision tree.

In the teacher-rated decision tree, gender of child was the leading most significant factor associated with teacher-rated childhood hyperactivity-inattention Grade 6 outcome. This was also a significant predictor in the multiple regression analysis. Female children

showed lower outcome scores than male children or children with missing answers for gender of child. This result was in line with previous research considering the role of gender in the development of child hyperactivity-inattention (Lewinsohn et al., 1993; Loeber et al., 1998; Robins et al., 1991; Offord et al., 1996).

Teacher-rated cooperative social skills was the next most significant leading factor associated with the outcome for the homogeneous subgroup of female children. Female children with higher cooperative social skills showed lower teacher-rated hyperactivity-inattention means as compared to female children with lower cooperative social skills who showed higher means on this variable, as expected (Coie, Dodge & Capottelli, 1982; McElwain, Olson & Volling, 2002). This factor was found to be an important risk factor in the multiple regression analysis as well.

Finally, other common multiple regression predictors seen in this decision tree were single-parent status and maternal immigrant status. Single-parent status proved to be a risk factor and showed higher dependent variable means as expected (Lipman et al., 1996; Munroe Blum et al, 1988; Wadsworth et al., 1985). Maternal immigrant status indicated lower teacher-rated childhood hyperactivity-inattention Grade 6 outcome scores again in this tree. Therefore support for immigrant status being considered a factor for the development of child mental health (Harker, 2001) was again present in this decision tree.

*Delinquency*

In the parent-rated decision tree, maternal immigrant status was the leading most significant factor associated with the parent-rated childhood delinquency Grade 6 outcome. This was a different result than was found for the multiple regression analysis

and may have been due to use of a larger sample. Children whose mother is an immigrant showed lower outcome scores than children whose mother is not an immigrant. Therefore support for immigrant status being considered a factor for the development of child mental health (Harker, 2001) was again present in this decision tree.

Parent-rated childhood delinquency Grade 3 scores was the next most significant leading factor associated with the parent-rated childhood delinquency Grade 6 outcome. Grade 3 scores were subgrouped together in an expected manner with higher Grade 3 delinquency scores having higher dependent variable means and lower Grade 3 delinquency scores having lower dependent variable means. Many subgroups were formed as each homogeneous subgroup was deemed too different from each of the other homogeneous subgroups of dependent variable means.

Main home language is seen as a predictor in the third generation of this tree. This was the main home language nominal independent variable with fifteen levels that could only be added to the decision tree analyses as recursive partitioning allows nominal variables with more than two levels. Site was also seen as a predictor variable in the third generation of this decision tree. Site was also a significant predictor in the multiple regression analysis. Again further information was given as to how comparison and intervention sites grouped together based on dependent variable mean outcomes by this type of novel statistical analysis as compared to the more traditional method of multiple regression. Similar groupings seen in the parent-rated hyperactivity-inattention decision tree occurred again in this decision tree. Participants from intervention site Highfield and matched comparison site Etobicoke formed a homogeneous subgroup of lower parent

rated childhood delinquency outcome scores. Participants from the intervention site Cornwall and Sudbury created a homogeneous subgroup of higher parent-rated childhood delinquency outcome scores along with participants from the matched comparison site of Ottawa-Vanier. It was predicted that being from intervention sites would be a factor related to child mental health. Therefore the result of homogeneous subgroups of dependent variable means with intervention and comparison sites was again, unexpected and will be discussed further later in this discussion.

Finally, monthly income was a significant predictor in this decision tree. Results were not useful, however, as any information regarding low-income cutoffs were unable to be considered— which places monthly income in the context of family size and city of residence (Statistics Canada, 2001). Low-income cutoffs are not yet available and thus not part of this archival database. Without the type of information low-income cutoffs provide, monthly income results do not give context to indicate higher risk subgroups of participants who live in poverty.

In the teacher-rated decision tree, teacher-rated childhood delinquency Grade 3 scores were subgrouped in the first genearation. Neighbourhood satisfaction and gender of child were also seen as predictors in the second generation of this decision tree and were subgrouped in an expected fashion showing higher dependent variable mean scores for subgroups with greater risk. Although, it is important to note that all subgroups of dependent variable means were not severe due to the floor effect seen in this dependent variable. Single-parent status was also seen as a predictor in this decision tree and was seen in the multiple regression analysis as well. Single-parent status was seen as a risk factor for the development of delinquency. Higher dependent variable means were seen

in children from single-parent families as opposed to two-parent families as seen in the literature (Lipman et al., 1996; Munroe Blum et al, 1988; Wadsworth et al., 1985). Expected results were also found for teacher-rated cooperative skills in this decision tree (Coie, Dodge & Capottelli, 1982; McElwain, Olson & Volling, 2002).

Finally, the last generation of this decision tree showed that those with a higher sense of community had lower mean scores on the outcome of Grade 6 delinquency scores. This variable was not shown as a significant predictor in the multiple regression analysis. Also, this result was expected as previous research considering the role of sense of community on development of behavioural problems found greater sense of community as a factor related to child mental health (O'Brien Caughy et al., 2003).

*Physical Aggression*

In the teacher-rated decision tree, the first generation of the tree subgrouped means of the control factor parent-rated childhood physical aggression Grade 3 scores. All other predictor variables seen in this tree, with the exception of maternal immigrant status, were different than those that were noted as significant predictors in the multiple regression. The predictor variable maternal immigrant status was a significant predictor and indicated that children whose mother is an immigrant showed lower outcome scores than children whose mother is not an immigrant. Therefore support for immigrant status being considered a factor for the development of child mental health (Harker, 2001) was again present in this decision tree.

All other predictor variables seen in this tree that were different than the predictor variables noted as significant predictors in the multiple regression follow. Hostile-ineffective parenting was seen in the second generation, as was teacher-rated conflict

management social skills and sense of community. Sense of community results were curvilinearily related, and therefore were unexpected as higher sense of community did not predict lower dependent variable mean outcome in every instance. Previous research considering the role of sense of community on development of behavioural problems, found greater sense of community as a factor related to child mental health (O'Brien Caughy et al., 2003). Node 22, for instance, subgrouped children from lower sense of community neighbourhoods and exhibited lower dependent variable mean outcomes. Hostile-ineffective parenting in one instance was also related non-linearly and therefore did not show the expected clear relationship of higher hostile-ineffective parenting being a risk factor for the development of childhood behaviour problems (Eron et al., 1991; Farrington, 1978; McCord, 1977).

Lower generations of this decision tree exhibited other predictor variables that were not seen in the multiple regression such as consistent parenting, gender of child, main home language (with two levels), maternal education level (with two levels), parent's rating of relationship with teacher/involvement in school, and stressful life events. Results generally were in line with expected trends for risk factors.

In the teacher-rated decision tree, the first generation of the tree subgrouped means of the control factor teacher-rated childhood physical aggression Grade 3 scores. Only the second tree generation predictor of teacher-rated cooperative social skills was seen in the multiple regression analysis. A non-linear relationship was seen for this predictor in the decision tree analysis. Greater cooperative social skills were not always related to lower dependent variable outcome scores as seen in the literature considering greater cooperative social skills as a factor related to child mental health (Coie, Dodge &

Capottelli, 1982; McElwain, Olson & Volling, 2002). Other second generation predictor variables were single-parent status, parent-rated conflict management social skills, and main home language (with two levels). Main home language showed a similar trend as results seen with maternal immigrant status in this thesis, due to main home language being a factor related to immigrant status. Having a main home language other than English or French predicted lower dependent variable means (see node 15) than having a main home language of English or French, which had higher dependent variable means (see node 14). This result, therefore, lends support for immigrant status being considered a factor for the development of child mental health (Harker, 2001).

Single-parent status was also seen as a predictor in this decision tree. Higher dependent variable means were seen in children from single-parent families (see node 16), as opposed to two-parent families (see node 17) as seen in the literature (Lipman et al., 1996; Munroe Blum et al, 1988; Wadsworth et al., 1985). Also, consistent parenting was a significant predictor variable that had results in line with previous literature showing greater levels of consistent parenting as a factor related to child mental health (Barkley et al., 1995; Dodge et al., 1994; Olweus, 1980). Finally, unemployment status was seen in this decision tree as a significant predictor, as was seen in the multiple regression analysis. Children from unemployed families were subgrouped together with higher dependent variable means (see node 19), as compared to children from employed families (see node 18). This result was also in line with previous research that discussed family unemployment as a risk factor (Harland et al, 2002; Kohen et al, 2002; Wang et al., 2005).

*Better Beginnings Comparison Sites*

The prediction that children from Better Beginnings intervention sites would have lower externalizing disorder scores than children from comparison sites was not supported by the results of this thesis. The decision tree results of homogeneous subgroups of dependent variable means with participants from specific intervention and comparison sites added insight into this conundrum. Participants from intervention site Highfield and matched comparison site Etobicoke formed homogeneous subgroups of childhood externalizing disorder outcome scores. Participants from the intervention site Cornwall and Sudbury formed homogeneous subgroups of childhood externalizing outcome scores along with participants from the matched comparison site of Ottawa-Vanier. The two Better Beginnings comparison sites, Etobicoke and Ottawa-Vanier, both have prevention programs for children and families offered to community members. Therefore, comparison of the Better Beginnings program neighbourhoods to matched comparison neighbourhoods is difficult because intervention effects are possible in comparison site families.

*Programs Offered by Etobicoke (matched comparison site)*

Etobicoke comparison site has for many years had many early childhood intervention programs that are similar in nature to the Highfield project (Nelson et al., 2005). Comparison site intervention effects are plausible in Etobicoke and could account for the unexpected findings in this thesis concerning site effects. For instance, the Early Years' Centre for Etobicoke North provides programming to families for their children from birth to six years of age. They offer a wide variety of programs which include: a parent resource library, a toy lending library, craft programs, kindergarten readiness,

gross motor programs, programs for families, and sensory exploration (My Five Senses). This Early Years' Centre also has a licensed child care centre which has an enrollment of 62 children between the ages of two to nine years.

This comparison site also hosts another early childhood program entitled the Braeburn Neighbourhood Place and Boys and Girls Club. This parent-driven program has been in operation for 30 years and is funded by the United Way. Staff conduct focus groups with residents to assist in program planning and parents are members of the Board of Directors. In addition, community capacity building is a priority of this program as are partnerships with other community organizations (e.g., Children's Aid Society and Metro Toronto Housing). This organization has a strong administration with an Executive Director, Board of Directors, senior management team, and Program Committee of the Board of Directors. This organization also serves as a member of two other community-wide coalitions: the Etobicoke Brighter Futures and the Etobicoke Food for Kids Coalition. Further, it is a part of Early Years network and the Boys and Girls Club Network of Great Toronto.

This organization provides a number of programs for elementary school aged children with a special focus on school readiness with programming in English. Examples of programs include: before and after school programs, child nutrition programs, homework programs, sports activities, and arts programming (Focus on the Future). Youth programs and a Youth Committee are also available to residents. Finally, an emergency food bank, a supplementary food program, a community garden, and a summer camp program that focuses on reinforcing academic skills learned in school are offered.

It is also important to note that all of these early childhood intervention programs in Etobicoke were implemented after the demonstration phase of the Better Beginnings intervention. Therefore, these intervention programs that are similar in nature to the Highfield project were up and running only when Better Beginnings programming stopped. Only one exception to this was the Etobicoke Brighter Futures Coalition which was implemented during the Better Beginnings demonstration phase.

The Etobicoke Brighter Futures Coalition is another local program. This coalition aims to enhance services for children's health and well-being by jointly developing and implementing inclusive and integrated family and community based programs for at risk children from birth to age six years in Etobicoke. This work is mainly done through planning, coordinating, networking and advocating. In sum, comparison site intervention effects are plausible in Etobicoke and could account for the unexpected findings in this thesis concerning site effects.

*Programs Offered by Ottawa-Vanier (matched comparison site)*

Ottawa-Vanier, also has a number of programs for its residents. An Early Years Program with a focus on health promotion is run in Ottawa-Vanier. This program was implemented after the demonstration phase of the Better Beginnings program. This program is run primarily by public health staff and conducts many workshops on topics such as: nutrition, toilet training, reaching physical milestones, and immunization.

Another program in Ottawa-Vanier, Six Ans Gagnant, operates out of a community centre. This program, which focuses on single mothers who are on social assistance, is offered to women from the time they become pregnant and serves children up to the age of six years. Assistance is given in the form of nutrition, prenatal classes,

classes on child development in the early ages, early literacy, outreach to parents, book and toy exchanges, play groups. All programs are free of charge to parents and funding is provided by the city of Ottawa. Another program in the comparison community is run in a school with a high level of illiteracy. Promotion of reading through a variety of non-traditional means of achieving literacy skills, such as music, cooking, and kinesthetics, is offered. This program gives an opportunity for literacy skills to be obtained in methods other than traditional phonics and reading. The program which encourages parent involvement, begins at age four and continues for three years.

Le Centre des Resources Pour Enfants de Vanier is also a program in this community offered to families with children from the ages of six to fourteen. Le Centre des Resources Pour Enfants de Vanier offers programming that is aimed at the topic of behaviour management and has services such as telephone support and books on parenting and other information. There is also a Coalition of Community Health and the Resource Centres of Ottawa offered to residents. This coalition aims to offer services for low-income families in the area and to encourage community members in social action.

The Ottawa-Vanier programs have been offered independently as there is not a focus on partnership building. Involving residents in programming has also proven difficult in this community. Therefore, it is fair to say that the Ottawa-Vanier comparison site does not have the same type of well-developed community-based prevention programs that exist in the Cornwall site (Nelson et al., 2005). However, comparison site intervention effects are plausible in Ottawa-Vanier and could account for the unexpected findings in this thesis concerning site effects.

In sum, the comparison communities of Etobicoke and Ottawa-Vanier were selected as comparison sites due to their compatibility of socioeconomic disadvantage. However, this socioeconomic disadvantage makes these communities targets for other interventions such as Brighter Futures or Early Years. Therefore, over time these communities are not suitable as comparison sites for the Better Beginnings intervention as they have received intervention. Therefore the comparison strategy of Better Beginnings over time must change to meet this challenge. The Canadian National Longitudinal Survey of Children and Youth will serve as another possible comparison for the Better Beginnings communities.

### *Severity of Child Psychopathology*

The severity of child psychopathology is another important point to consider. The sample used in this study had a low level of child externalizing disorder both at the outset of the study and at Grade 6. It is instinctive to compare the Grade 6 childhood externalizing disorder means to the Grade 3 childhood externalizing means listed in Table 3. Such consideration of change over time for childhood externalizing disorder does not prove to be very large. Decrease in childhood externalizing disorder ranges from 2% to 33% and one increase of 37.5% is also seen. Results of this thesis are still informative as they indicate predictors of higher and lower scoring subgroups of children, but it is important to note the degree of psychopathology at both points in time to place results in a frame of reference.

### *Immigrant Status as a Factor for the Development of Lower Child Psychopathology*

In this project maternal immigrant status predicted significantly lower scores of parent-rated childhood externalizing disorder at Grade 6 outcome in all analyses. It is

also important to note that the intervention site Highfield and the comparison site Etobicoke were communities with a high proportion of immigrants. Highfield and Etobicoke had often subgrouped together in the regression decision tree analyses with lower childhood externalizing disorder scores as compared to other sites. Three approaches to understanding immigrant' psychopathology are considered in the literature. The first approach, the "migration-morbidity" hypothesis, proposes that immigrants are expected to have worse mental health than persons in the host population. A second approach, the "healthy migrant" effect, suggests that immigrants have better mental health than the host population. Finally, a third point of view on this topic argues that the mental health advantage that some immigrant groups show in the early years of migration disappears the longer the migrants live in the host country. This third point of view is called the "transitional effect" (Abraido-Lanza, Dohrenwend, Ng-Mak & Turner, 1999). The results in this project support the literature that discusses how being an immigrant is a factor for the development of child mental health (Harker, 2001) or the "healthy migrant" effect. Since information on child immigrant generation status is not able to be discerned in this study, nor is year of migration, more specific conclusions are not able to be made on whether there is any evidence against the "transitional effect". If children of immigrants have been in this host country for a long duration and have lower childhood psychopathology scores as compared to children of non-immigrants of this host country despite years of residence in this host country, there would be evidence against the "transitional effect". For now, however, there is evidence to support the "healthy migrant" effect and evidence against the "migrant-morbidity" hypothesis.

"Selection of the fittest" underlies the reasoning surrounding the "healthy migrant" effect (Uitenbroek & Verhoeff, 2002). The strict health requirements that must be met before migration to the host country makes this population abnormally healthy both physically and mentally, as compared to regular citizens of the host country. Therefore, superior mental health in this population of immigrants allows for a more "healthy migrant". Another similar concept is "self selection" where healthier individuals are more inclined to migrate than more unhealthy counterparts, making for healthier immigrants as compared to the host population in general.

Positive factors related to being an immigrant are considered as part of the formula that allows for better mental health in immigrants. Greater sense of belonging and ethnic identity, given from smaller minority networks that reflect the pattern of networks from the place of origin (Clement, Noels & Deneault, 2001), is one of the factors which may enhance immigrants' mental health. Harker (2001) also posited a number of family influences such as higher parental supervision, lack of parent-child conflict, presence of religious practices, and greater social support which serve as positive factors that may enhance immigrant mental health. Greater psychological flexibility to assume different identities in order to survive and "cultural capital" to endure hardship, given from the ability to switch between identities, languages and cultural norms (Trueba, 2002), is another factor which may enhance immigrants' mental health. Finally, immigrants who have moved voluntarily to a host country for better opportunities and more freedom may encounter hardships. However, these hardships are met with resiliency, and immigrants may have the cultural capital to succeed (Trueba, 2002). This could account for enhanced mental health of immigrant children.

Further research/consideration needs to focus on the particular protective factors that immigrant children possess in the Better Beginnings project. Also, further longitudinal study will allow for an investigation of potential "transitional effect", where initial mental health advantage seen in this immigrant group disappears the longer they live in their host country of Canada.

*The Role of Assertiveness Social Skills*

A higher degree of assertiveness social skills has been shown in the literature as a factor related to child mental health (Coie, Dodge & Capottelli, 1982; McElwain, Olson & Volling, 2002) and not associated with the unexpected findings in this study of higher psychopathology Grade 6 outcome scores. However, in an examination of peer status and aggressive behaviour in white male children in Grade 5 and Grade 6, Lesser (1959) found that physical aggression, when provoked by peers, was positively related to popularity ($r = .31$). Lesser concluded that peers accepted children who appropriately stood up for themselves and did not allow themselves to be abused or dominated by others. Since greater assertiveness social skills play a role in peer acceptance, greater assertiveness social skills may not be inferred to be peer rejection as previously hypothesized in this thesis. This is possible as children who are assertive when in a social situation where aggression is provoked would not be rejected by peers. Therefore, this would account for the results seen in this thesis where higher degree of assertiveness social skills predict higher childhood psychopathology. Children with higher assertiveness would practice provoked physical aggression and thus would have higher physical aggression or delinquency Grade 6 outcomes.

However, the rationale for the results in this thesis that found higher hyperactivity-inattention scores in highly assertive children is harder to explain. The only explanation may be that children, who are higher in hyperactivity-inattention, may also be considered higher in assertiveness social skills due to the impulsivity of their disorder. This impulsivity may fuel assertiveness. An impulsive hyperactive child may be more apt to introduce him or herself to new people without being told to do so, may question rules that may be unfair, may invite others to join in activities, may initiate conversations with peers, may tell someone they have treated them badly, and may join an ongoing activity or group without being told to do so. Thus, this result may not be so unexpected after all as greater assertiveness may be common in children who have greater hyperactivity-inattention due to the impulsive nature of their disorder.

### *Ecobehavioural Risk*

An ecological model of human development (Bronfenbrenner, 1979) assisted the analysis of risk factors for the development of externalizing disorders in this study. The comprehensive view of Better Beginnings children's development was considered including parent, family, neighbourhood, school and cultural/societal factors. All levels of factors were uncovered as predictors in this study. Therefore, an ecological model proved to be appropriate when considering prediction of childhood externalizing disorder Grade 6 outcome. However, the largest influence on childhood externalizing disorder Grade 6 outcomes were mainly from the child level of analysis. This is due to the fact that Grade 3 childhood externalizing disorders predicted later Grade 6 outcomes. Social skills were also common as the top predictors for five of the multiple regression analyses

and four regression decision tree analyses. Gender of the child was also seen as a top predictor in one mutiple regression analysis and two regression decision tree analyses.

The second largest influence on childhood externalizing disorder outcomes were from the parent/family level of analysis. Immigration factors were common predictors of childhood externalizing disorder outcomes. Maternal immigrant status was one of the top predictors for three multiple regression analyses and for two regression decision tree analyses. Main home language was also a top predictor in one regression decision tree analysis. Family and Parenting Factors also had a large influence mainly from single-parent status that was a top predictor in two multiple regression analyses and one regression decision tree analysis. Parenting also was a top predictor in another regression decision tree analysis. Finally, the parent factor of stressful life events was a top predictor for one regression decision tree analysis.

The neighbourhood/community level of analysis did not have a large influence on childhood externalizing disorder outcomes. In a regression decision tree analysis, the neighbourhood/community factor of sense of community was a top predictor. Another neighbourhood/community factor, neighbourhood satisfaction, was a top predictor in a regression decision tree analysis. No school factors were top predictors in any analyses.

### *Conclusion*

As seen in the results of the Better Beginnings medium-term follow-up, no overall intervention effects were seen for childhood externalizing disorders in this thesis study. Further investigation into effectiveness of the Better Beginnings intervention in certain subgroups of participants at higher risk also proved to be unfruitful. However, regression decision tree analyses allowed for subgrouping of intervention and comparison site

participants based on Grade 6 externalizing disorder score outcomes, which was not clearly shown in multiple regression analyses. The grouping together of comparison and intervention sites fuelled a discussion of non-equivalent comparison of these control sites caused by their own distinct community intervention programs. Further, participants whose mother was an immigrant was an important factor for the development of child mental health in this sample. This novel statistical approach to prevention research proved slightly informative. Despite the fact that consideration of differential intervention effectiveness in subgroups of intervention participants in this case did not prove any high-risk effectiveness, this novel statistical approach continues to be an important part of research considering intervention effects.

*Limitations and Implications*

All the data were self-reported and thus suffer from associated problems, including maternal reported opinion of their child's psychopathology and the possibility that honest answers may not always be given to sensitive questions (Krahe, 1989). In addition, data from the Better Beginnings database were limited in ability to investigate certain potential risk variables such as low-income cutoff status. Finally, the results of this study cannot be generalized to all communities in Ontario as intervention and matched comparison sites in the Better Beginnigs project were chosen due to the fact that they were considered high risk communities. It should be noted, however, that not all families in the comparison and intervention neighbourhoods in the Better Beginnings project are considered high risk.

Standard methods of examining linear relationships between risk variables and specific outcomes, such as multiple regression, were compared with a unique regression

decision tree analysis in this study. Homogeneous subgroups of participants that share risk factors were identified based on the dependent variable in a visually intuitive decision tree. Future use of this relatively new statistical procedure is thus recommended as a novel, informative, and powerful way to present empirically derived categorical or person oriented as opposed to variable oriented data, particularly in treatment intervention studies in the social and behavioural sciences.

# Appendix A

## Description of the Better Beginnings Programming at each Intervention Site (Nelson et al., 2005).

| CORNWALL | | | |
|---|---|---|---|
| *Program Title* | *Participants* | *Service Provider/Coordinator/Facilitator* | *Major Program Activities* |
| **Child and Family- Focused Programs** | | | |
| 1. Playground (Summer Games) | Children ages 4-12 | BBBF, L'Estrie Family Resource Centre Coordinator, staff instructors, volunteers | 8- week long summer program of athletic, recreational, & cultural activities, field trips, & puppet shows on conflict resolution, etc. A parent work group has input into activities implemented |
| 2. Holiday Activities | Pre-kindergarten to grade 2 children | BBBF, parent volunteers, L'Estrie Family Resource Centre, school councils | offers interesting day trips & educational activities for children on civic holidays & professional development days (trips to zoo, museums, biodome, outdoor games, crafts, films, etc) |
| 3. Community Toy Library | Community families | Toy librarian, Community Volunteers | For an annual fee of $20, families can borrow educational games, family resource films, books, etc as often as they like. Volunteers do a lot of fundraising for the library |
| 4. Theme Boxes (now part of the toy library) | Community families and teachers | Project coordinator, teacher, parents | Many different theme boxes containing games & learning activities based on a theme (jobs, jungle animals, etc). Can be borrowed by families or for use in classrooms. |
| 5. Family Visits | Community families | Family Workers | Family workers maintain regular contact with interested families to offer support, information about child development, community services & resources. Also runs seminars on various topics related to family development. |
| 6. Family Activity Centre | Community families | BBBF staff, Community Volunteers | Objectives are to develop & improve parental competence & create good family relationships for optimal child development. Volunteers decide what activities they want and how to implement them (eg workshops, seminars, day trips) |
| 7. Saturday Playtime | Children ages 4-8 | BBBF educator | Activities held every Saturday morning at community schools (arts, music, cooking, etc) |

| CORNWALL (Continued) | | | |
|---|---|---|---|
| *Program Title* | *Participants* | *Service Provider/Coordinator/Facilitator* | *Major Program Activities* |
| 8. Family Vacation Camp | Community families | BBBF staff, Community Volunteers | Sessions are offered to families in summer and March breaks. Volunteers are in charge of rules of conduct, raising funds to support activities, planning & implementing activities, etc. |
| **School- Based Programs** | | | |
| 1. School Activities Centre | Children in kindergarten to grade 2 | Activity organizers | Objective is promotion of the French language & the Francophone culture by supplying an activity organizer into the schools to help the teachers provide high quality activities for the children. |
| 2. Mini- Breakfast | Children in kindergarten to grade 2 | BBBF staff | Children can have a healthy breakfast (muffins, fruits, juice, milk, cheese) when they arrive at school. Pamphlets & other information on healthy eating are distributed to families |
| 3. Homework Support | Community families | Educators, Volunteers, Coordinator | Parents & children meet together at the Family Activity Centre. They have a snack & then do homework together with the help of trained educators |
| **Community-Focused Programs** | | | |
| 1. Community Action Group | Community Members | BBBF, Community Volunteers | Organizes social activities, community gardens, environmental programs, supports different local programs like French week & P'Tits Francos, fundraises, increases visibility & accessibility of BBBF, etc. |

| HIGHFIELD | | | |
|---|---|---|---|
| *Program Title* | *Participants* | *Service Provider/Coordinator/Facilitator* | *Major Program Activities* |
| **Child and Family Focussed Programs** | | | |
| 1. Family Resource Centre Drop-in | Families with children aged 0-4 | 1 Family Support Coordinator, 1 Parent Volunteer, 1 Nurse from Rexdale Health Centre | 4 mornings/wk (2hr sessions), families can participate in activities (crafts, etc.), special events, & summer outings. A nurse visits 2x/month to talk about women and children's health. |
| 2. Home Visits | Families of children from JK to Gr. 2 | 4 Enrichment Workers | Families visited prior to child entering JK to provide info about area services, encouragement, referrals, and general support. Home Visitors spend .5 day/wk in JK classroom. After the child is in JK, home visits focus on school related issues |
| 3. Summer and March Break Program | Children from JK to Gr. 2 | 1 Enrichment Worker, 4 Volunteers | Fun and educational activities provided for children to prepare them for school |
| 4. Toy Lending Library | Families that use the drop-in | 1 PT Librarian, 3-4 Parent Volunteers | Library is open 4 days/ wk. Materials include over 500 toys, games, & puzzles. "Take a Book Program" has question sheets to get parents talking to kids about books. Also parenting resource books & activities to do with children. |
| 5. Play Groups | Families with children in JK | 2 Child and Family Enrichment Workers | Activities are unstructured, with an emphasis on providing nurturing and educational environment where families can learn and interact together |
| 6. Preschool Computer Program | Children aged 2- 4.5 yrs who attend drop-in | BBBF main service provider, 1 parent volunteer | Operates during drop-in hours on a first come first served basis. Children each have five minutes on the computer |
| 7. Preschool Literacy | Children aged 2-4.5 yrs who attend drop-in | In-school Coordinator, Family Support Coordinator, School Librarian, 1 SK teacher, BBBF funded | Intended to encourage preschoolers to read, support families, assist with transition to JK by familiarizing family with school personnel. Began in Jan '98 |
| 8. Before-and-After-School Program | Children aged 4-8 and 9-12 | Community Development Coordinator, Recreation Staff | Age-appropriate recreational activities and nutritional snacks provided for children at the primary school level |

| HIGHFIELD (Continued) | | | |
|---|---|---|---|
| *Program Title* | *Participants* | *Service Provider/Coordinator/Facilitator* | *Major Program Activities* |
| **School-Based Programs** | | | |
| 1. Health and Nutrition Program | All children at Highfield Junior School get snacks 3x/wk | 1 Nutrition Coordinator, 3 paid parents, 10 parent volunteers, funding from BBBF, the school, parent donations, & other sources | Hold nutrition assemblies, fairs, & other activities. Workshops for parents, Hot Lunch Program ($.50/lunch), providing sandwiches for kids w/o lunches, fitness activities, Play Days, etc |
| 2. Educational Assistants, Parent Volunteers, & Academic/ Language Development | Children from JK to Gr.2 | 4 Enrichment Workers (EW), 1 certified Teacher, 2 FT assistants for JK and SK classes, 6-10 volunteers | 4 EWs spend time in JK Classes to increase kids' exposure to English and adult support, Summer Enrichment programs, After-school Enrichment reading programs, Family Literacy Nights, Made Dual Language tapes to be used by families |
| 3. Classroom Social Skills, Intervention, Storytelling and Drama | School classes | In-School Coordinator, university students, funded by BBBF, Highfield Junior School, Lion's Club | Including a curriculum-based social/ citizenship skills intervention. Also, Gr. 3 students visit a seniors' lodge 1x/wk and spend time with seniors. EW and Parent Volunteers help children to develop better social skills. 2 drama trips/ yr for JK, SK |
| 4. Home-School Connection and Parental Involvement | Parents of children in project school | BBBF Project Manager, In-School Coordinator and other Coordinators and staff, Parent Volunteers | Parents participate in in-school & nutrition committees, School Council, Inner City Committee, School Design Committee, Snack Program, and some have been hired as EW and Research Ass.'s |
| 5. Community and Ethno-Cultural Relations | School and Community members | In-school Coordinator, Enrichment Workers, BBBF, Highfield Junior School | Special events held at school to increase the exposure and participation of various cultures in the community eg., annual Multicultural Caravan |
| **Parent-Focused Programs** | | | |
| 1. Parent Relief | Community Residents (space for 5-10 children at a time) | BBBF main service provider, 2 paid Parents | Child care is offered 2 days/ wk (9 am - 11:30 am) for parents needing a break. Parents must book ahead b/c space is usually filled to capacity |
| 2. Parents' Group | Parents who participate in Drop-In or who have children at Highfield | Family Support Coordinator, CAS Family Support Team, Nurse & Nutritionist from Rexdale Health Ctr | Parents meet weekly to socialize, organize special events, do crafts, or have workshops (eg., women's issues, childhood illnesses, discipline, nutrition) |

| HIGHFIELD (Continued) | | | |
|---|---|---|---|
| *Program Title* | *Participants* | *Service Provider/Coordinator/Facilitator* | *Major Program Activities* |
| **Community-Focused Programs** | | | |
| 1. Resident Participation and Leadership | Community Parents | Community Development Coordinator & Staff; Community Development Committee | Parents are informally encouraged to join project committees, to get involved in planning community events, to advocate for the community (eg, lighting, bus shelters etc). Parents are given skill development and leadership building workshops |
| 2. Welcome Baskets | Community Families | BBBF | Baskets contain info about BBBF, other community services, & goodies. Given to new families through the schools in BBBF area to welcome them and encourage involvement in the project and the community |
| 3. Language and Prevocational Skills | Community Residents | BBBF refers students to the ESL program run by the school board | ESL Program has been running for several years. A Hindi class also ran for one year. |
| 4. Neighbourhood Safety | Community Residents | Community Development Coordinator and Staff, parents | Several community safety forums held. Have implemented security guards, improved lighting, removal of derelict cars, crossing guard, etc |
| 5. Social and Recreational Programs | Community Residents | BBBF staff | Before and After School Programs, March Break Programs, fun activities, and ballet lessons for kids, aerobics and bus trips for parents |
| 6. Ethno-Cultural Programs & Activities | Community Residents | Community Development Coordinator & Staff | Several different cultural events (eg., Diwali, Holi, Black History Month). Also staff are hired that have cultural backgrounds similar to residents |

| SUDBURY | | | |
|---|---|---|---|
| *Program Title* | *Participants* | *Service Provider/Coordinator/Facilitator* | *Major Program Activities* |
| **Child and Family Focussed Programs** | | | |
| 1. After School/ Holiday Programs | Children aged 4 to 8 | 9 PT Child Care Workers, College Boreal Placement Students, 3 cooks, 2-4 volunteers, City Parks and Recreation | Daily program provides a safe place for 100 children to play after school and on school holidays. Snacks and special activities are offered. Children are encouraged to solve problems and conflicts fairly. |
| 2. Summer Programs | Programs are offered at 3 sites in the community | 9 PT Child Care Workers | Offered 8/wk 9am-3pm, kids participate in activities similar to the After School programs, but with more emphasis on outdoor activities. |
| 3. BBBF Membership and Volunteer | Open invitation to all community residents to become a member of BBBF | Membership Coordinator | The coordinator visits the community residents to explain BBBF and receive feedback from them on the program. Criteria for membership is agreement with BBBF vision and principles. Responsible for running 3 membership meetings a year. |
| 4. L'Arc-en-ciel du Moulin a Fleur | Families with children aged 0-5 yrs. | 1 Francophone Community Worker, 1 PT Child Care Worker. Parents who bring their children monitor their children | Mom and tots drop-in program with participant- driven activities. Organized workshops and presentations are very successful |
| 5. Family Visiting Program | Community members | 2 S-BBBF staff (1 anglophone, 1 francophone) | Advocates and supports families' needs, provides support to Child Care teams, do presentations for other agencies, schools |
| 6. Travelling Road Show | Open to all community residents. | 2 BBBF staff, 3-5 parent volunteers | Staff visit 3 different sites 1/wk to play with children while parents discuss parenting problems and solutions, and organize events. |
| 7. Hallowe'en Haunted House | Whole community | 3 PT Child Care Staff, Community Workers | Extend After School program at Hallowe'en to open Haunted House constructed by staff. |
| 8. Summer Camp Experience *Discontinued | Parents and children in the community | BBBF Staff, Local Native Centre | Parents & children go camping for 5 days, & learn Native culture & respect for the environment |

| SUDBURY (continued) | | | |
|---|---|---|---|
| *Program Title* | *Participants* | *Service Provider/Coordinator/Facilitator* | *Major Program Activities* |
| **School Based Programs** | | | |
| 1. Peaceful Playgrounds Program | Children JK to grade 6 in three local schools | 2 BBBF staff, 1 placement student | Teach cooperative games, teach kids how to listen to each other, how to vote democratically, etc. A week is allotted to an anger management course, as well as peer mediation skills for teachers and children. |
| 2. Native Cultural Program | Children in grade 1-3 at 2 schools | 2 BBBF staff, 4 Placement Students | Through traditional methods kids are taught about equality of all cultures, and to respect each other, self and mother earth |
| 3. Early Bird Breakfast and Play Program | Focus is on children 4-8, but no one is turned away. Approximately 250 children participate daily. | 3 BBBF staff, Child Care Workers, volunteers | Nutritious food is served (eg., eggs, sausages, cereal, etc) and children participate in crafts and physical activities (eg., basketball) |
| 4. Multicultural Support Program *NEW | 2 Francophone schools, 3 different classes | 1 BBBF PT staff from Rwanda working as a teacher's aide | Children are exposed to different cultures in an informal way. Teacher's aide is currently translating a Rwandan children's book which will be used in the classes. |
| **Parent-Focused Programs** | | | |
| 1. Back to School Teen Mom Program *Discontinued | Teenage mothers in the community | Teacher | 5 days/wk a teacher provides continuing education to young mothers. Also provides informal support |
| 2. Christmas Baskets | Whole Donovan/Flour Mill community | Community Workers, Family Support Workers | Assistance in the way of gifts and food at Christmas |
| 3. Babysitting and Transportation | Community Members | Family Support Worker | Provide child care and transportation to permit parents to participate in programs, committees |
| 4. Can Skate | | | Free skating every winter in partnership with the City. Skates provided. |
| 5. Tout Pour Reussir *Discontinued | Francophone Teen Mom Program | 1 FT Francophone Community Worker | Support for teen moms |

| SUDBURY (continued) | | | |
|---|---|---|---|
| *Program Title* | *Participants* | *Service Provider/Coordinator/Facilitator* | *Major Program Activities* |
| 6. Mom & Tot Drop *Discontinued | Whole community | Family Support Worker | Support for Anglophone moms |
| 7. Parenting Program *Discontinued | Parents in the community | Family Support Worker and Community Worker | Provide parenting sessions, support and information |
| **Community-Focused Programs** | | | |
| 1. Community Kitchen Program | Community residents | 1 BBBF staff, parent volunteers, funding from Steel Workers Humanities Fund | Participants plan menu, then cook and clean while staff watch children. Staff shop for groceries and supplies. Each participant takes food home. |
| 2. The Environmental Program | Parents and children | 1 BBBF staff, EJLB Grant, placement students, summer students | Offers information about caring for the environment. Annual development of community gardens, which involves participation of children, school yard naturalization, park and stream rehabilitation, recycling, local walks to recognize indiginous plants, animals. |
| 3. Research Program | Community members | 1 BBBF FT and 1 PT staff, 1-2 volunteers | Offers the community the possibility to develop local research projects and use the data from the activities to initiate other programs |
| 4. Mediation Group | Parents in the community | Community Workers | Encourages dialogue amongst community workers & parents in order to deal with disagreements through effective conflict resolution techniques |
| 5. Myths & Mirrors Community Arts Program | Community; all ages | 1 FT Community Development Worker, 20 volunteers, placement students | Community Arts programs featuring giant puppets, mask making, large scale community art projects and celebrations, theatre, festivals, costumes, parades. Now an independently incorporated organization. |
| 6. Community Development | Native Community<br>Francophone Community<br>Anglophone Community *Discontinued<br>Multicultural Community *Discontinued | 1 FT Native Community Worker<br>1 FT Francophone Community Worker<br>1 FT Anglophone Worker (discontinued)<br>1 PT Multicultural Worker (discontinued) | To organize respective communities, help identify community needs, liaise with respective caucuses, implement programs and initiatives in community, advocate, provide support to child care workers. |
| 7. Pre-Teen Program | Pre-teens in the community | Adults & teens from community | 2 Programs (English & French) offer activities appropriate for pre-teen age group |

| SUDBURY (continued) | | | |
|---|---|---|---|
| *Program Title* | *Participants* | *Service Provider/Coordinator/Facilitator* | *Major Program Activities* |
| 8. GEODE (Grassroots Economic Opportunities Development and Evaluation) | Whole community | 1 PT Community Organizer, volunteers: Bronfman funding | To provide community economic development opportunities to low income people including a "Good Food Box", Community Shared Agriculture, a green dollar bartering system for individuals and non-profit organizations. Now an independently incorporated organization. |
| 9. BBBF Provincial Network *Discontinued | All BBBF sites in Ontario | Project Coordinator, 1 PT Provincial Network Coordinator - Atkinson, Trillium Grant | To coordinate BBBF sites throughout the province for the purpose of fundraising, promotion, advocacy, mutual support, sharing expertise and training community members. |
| 10. Fundraising | Community Members | Project Coordinator | Raise funds for programs via small bake sales to large mail campaigns. |
| 11. Committee Training | Community Members | Project Coordinator | To provide training and expertise and ensure community ownership by having all Council Committees run by Council and Community Members, i.e., Finance Committee, Personnel Committee, Program Committee, Membership Committee, Ad Hoc Committees, Newsletter Committee. |
| 12. General Training | BBBF Council Members, Staff, Community Members | Project Coordinator, Community Workers, Membership Coordinator | Provide training on Community Development, First Aid, CPR, Communication, Racism, Child Care Techniques, Chairing and Facilitating Meetings, Concensus Process, How to be a Council Member, Healthy Eating, Environment, Advocacy, Legal Issues, Welfare. |
| 13. Volunteer Recognition | Volunteers | 1 FT Volunteer Coordinator | Annual celebration to recognize efforts of volunteers. |
| 14. Community Advisory Committee | Friends of Better Beginnings, Better Futures (including many service providers) | Project Coordinator | A group of over 50 community leaders to provide advice and support on an on-going basis. |
| 15. You Won't Believe It's A Theatre Group *Discontinued | Parents and Children in the community | Community Workers | Provides a safe environment for parents & children to expose & relate social problems that affect their daily lives |

# Appendix B

## *Behavioural Problems Subscales*

### *Parent-Rated Hyperactivity-Inattention Scale*

Which of the responses best describe your child now or within the last 6 months.

| | |
|---|---|
| Never | 0 |
| Sometimes | 1 |
| Often | 2 |

1. Can't concentrate, can't pay attention for long.
2. Fidgets.
3. Impulsive, acts without thinking.
4. Has difficulty awaiting turn in games or groups.
5. Distractible has trouble sticking to any activity.
6. Can't sit still, is restless, or hyperactive.
7. Cannot settle to anything for more than a few minutes.
8. Is inattentive.

### *Teacher-Rated Hyperactivity-Inattention Scale*

Which of the responses best describe your student now or within the last 6 months.

| | |
|---|---|
| Never | 0 |
| Sometimes | 1 |
| Often | 2 |

1. Can't sit still, restless, or hyperactive.
2. Has difficulty awaiting turn in games or groups.
3. Distractible, has trouble sticking to any activity.
4. Cannot concentrate/pay attention for long.
5. Is impulsive, acts without thinking.

6. Cannot settle to anything for more than a few moments.

7. Is inattentive.

*Parent-Rated Delinquency Scale*

Which of the responses best describe your child now or within the last 6 months.

| | |
|---|---|
| Never | 0 |
| Sometimes | 1 |
| Often | 2 |

1. Argues a lot with adults.

2. Blames others for own mistakes.

3. Easily annoyed by others.

4. Angry and resentful.

5. Temper tantrums or hot temper.

6. Does things that annoy others.

7. Gets back at people.

8. Defiant, talks back to adults.

*Teacher-Rated Delinquency Scale.*

Which of the responses best describe your student now or within the last 6 months.

| | |
|---|---|
| Never | 0 |
| Sometimes | 1 |
| Often | 2 |

1. Steals.

2. Destroys things belonging to others.

3. Vandalism.

*Parent-Rated Physical Aggression Scale*

Which of the responses best describes your child now or within the last 6 months.

| | |
|---|---|
| Never | 0 |
| Sometimes | 1 |
| Often | 2 |

1. Gets into many fights.
2. Physically attacks people.
3. Threatens people.
4. Is cruel, bullies, or is mean to others.
5. Kicks, bites, or hits other children.
6. When another child accidentally hurts him/her s/he reacts with anger and fighting.

*Teacher-Rated Physical Aggression Scale*

Which of the responses best describe your student now or within the last 6 months.

| | |
|---|---|
| Never | 0 |
| Sometimes | 1 |
| Often | 2 |

1. Gets into many fights.
2. (When accidentally hurt) assumes that other child meant to do it, and then reacts with anger and fighting.
3. Physically attacks people.
4. Threatens people.
5. Cruelty, bullying or meanness to others.
6. Kicks, bites, hits other children.

# Appendix C

*Sociodemographic Questionnaire*

*Gender*

| | |
|---|---|
| Male | 0 |
| Female | 1 |

1. What is the sex of the child?

*Single parent*

| | |
|---|---|
| Yes | 1 |
| No | 0 |

2. Are you currently living with your husband/wife?

3. Are you living with a partner or in a common-law relationship?

*Maternal Education Level*

| | |
|---|---|
| Not completed high school | 0 = dummy code |
| Completed high school | 1 = dummy code |

| | |
|---|---|
| No formal schooling | 1 |
| Some primary school | 2 |
| Primary school | 3 |
| Some secondary or high school | 4 |
| Completed secondary school or high school | 5 |
| Some community college | 6 |
| Completed community college, technical college, CEGEP, or RN program without a university degree | 7 |
| Some university | 8 |
| University degree (completed) B. A./B. Sc | 9 |
| University degree (completed): Professional (e.g., law, nursing, dentistry, medicine, commerce, engineering) degree | 10 |
| University degree (completed) M. A./Ph. D. | 11 |

4. What is the highest level of schooling that you have completed?

*Unemployment Status*

No 0
Yes 1

5. Do you have a paid full-time job?

6. Do you have a paid part-time job?

7. Are you looking for paid work?

8. Does your partner have a paid full-time job?

9. Does your partner have a paid part-time job?

10. Is your partner looking for paid work?

*Monthly Income*

11. What is your current total monthly household income from all sources before taxes or other deductions?

*Home Language*

| | |
|---|---|
| Language other than English or French | 0 = dummy code |
| English or French | 1 = dummy code |

| | |
|---|---|
| Arabic | 1 |
| Chinese | 2 |
| English | 3 |
| French | 4 |

| | |
|---|---|
| German | 5 |
| Hindi | 6 |
| Italian | 7 |
| Ojibway | 8 |
| Polish | 9 |
| Portuguese | 10 |
| Somali | 11 |
| Urdu | 12 |
| Vietnamese | 13 |
| Punjabi | 14 |
| Other | 15 |

12. What is the main language spoken at home?

*Country of Birth*

| | |
|---|---|
| Immigrant (not born in Canada) | 1 = dummy code |
| Not immigrant (born in Canada) | 0 = dummy code |

| | |
|---|---|
| In Canada... | |
| Ontario | 1 |
| Outside Ontario | 2 |
| Outside Canada... | |
| China | 3 |
| Germany | 4 |
| Hong Kong | 5 |
| India | 6 |
| Iran | 7 |
| Italy | 8 |
| Jamaica | 9 |
| Pakistan | 10 |
| Poland | 11 |
| Portugal | 12 |
| Somalia | 13 |
| Sri Lanka | 14 |
| Trinidad | 15 |
| United Kingdom | 16 |
| U.S.A. | 17 |
| Vietnam | 18 |

| | |
|---|---|
| Lebanon | 19 |
| Haiti | 20 |
| Other | 21 |

14. What country were you born in?

# Appendix D

*Social Skills Rating System*

*Teacher-Rated Conflict Management*

Never 0
Sometimes 1
Very often 2

1. Controls temper in conflict situations with peers.
2. Controls temper in conflict situations with adults.
3. Receives criticism well.
4. Accepts peers' ideas for group activities.
5. Responds appropriately when pushed or hit by other children.
6. Gets along with people who are different.

*Teacher-Rated Cooperation*

Never 0
Sometimes 1
Very often 2

1. Uses free time in an acceptable way.
2. Finishes class assignments within time limits.
3. Uses time appropriately while waiting for help.
4. Produces correct school work.
5. Follows your directions.
6. Puts work materials or school property away.
7. Ignores peer distractions when doing class work.
8. Keeps desk clean and neat without being reminded.
9. Easily makes transition from one classroom activity to another.

*Teacher-Rated Assertiveness*

Never 0
Sometimes 1
Very often 2

1. Introduces herself or himself to new people without being told.
2. Appropriately questions rules that may be unfair.
3. Says nice things about himself or herself when appropriate.
4. Invites others to join in activities.
5. Makes friends easily.
6. Initiates conversations with peers.
7. Appropriately tells you when he or she thinks you have treated him or her unfairly.
8. Joins ongoing activity or group without being told to do so.

*Parent-Rated Conflict Management*

Never 0
Sometimes 1
Very often 2

1. First, would you say he/she follows your instructions.
2. Asks permission before using another family member's property.
3. Avoids situations that are likely to result in trouble.
4. Controls temper in conflict situations with you.
5. Controls temper when arguing with other children.
6. Follows rules when playing games with others.
7. Compromises in conflict situations by changing own ideas to reach agreement.
8. Waits turn in games or other activities.

9. Receives criticism well.

10. Ends disagreements with you calmly.

11. Speaks in an appropriate tone of voice at home.

*Parent-Rated Cooperation*

Never 0
Sometimes 1
Very often 2

1. Helps you with household tasks without being asked.

2. Attempts household tasks before asking for your help.

3. Volunteers to help family members with tasks.

4. Keeps room clean and neat without being reminded.

5. Completes household tasks within a reasonable time.

6. Puts away toys or other household property.

7. Pays attention to speakers in meetings such as in church or youth groups.

*Parent-Rated Assertiveness*

Never 0
Sometimes 1
Very often 2

1. Introduces herself or himself to new people without being told.

2. Invites others to your home.

3. Starts conversations rather than waiting for others to talk first.

4. Appropriately expresses feelings when wronged.

5. Makes friends easily.

6. Is self-confident in social situations such as parties or group outings.

7. Joins group activities without being told.

# Appendix E

*Parenting Scale*

Please use these answers to answer the following questions.

| | |
|---|---|
| Never | 1 |
| About once a week or less | 2 |
| More than once a week but less than once a day | 3 |
| One or two times a day | 4 |
| Many times each day | 5 |

*Positive Parenting*

1. How often do you praise your child, by saying something like "Good for you!" or "what a nice thing you did!" "Thank you!" or "That's good going!"

2. How often do you and your child talk or play with each other focusing attention on each other for five minutes or more, just for fun?

3. How often do you and your child laugh together?

4. How often do you do something special with your child that he or she enjoys?

5. How often do you play sports, hobbies, or games with your child?

*Hostile-Ineffective Parenting*

1. Of all the times that you talk to your child about his or her behaviour, what proportion is praise?

2. Of all the times you talk to your child about his or her behaviour, what proportion is disapproval?

3. If you tell your child s/he will get punished, s/he doesn't stop doing something, and s/he keeps doing it, how often will you punish him/her?

4. How often do you get angry when you punish your child?

5. How often do you think that the kind of punishment you give your child depends on your mood?

6. How often do you feel you are having problems managing your child in general?

7. How often do you discipline your child repeatedly for the same thing?

*Consistent Parenting*

1. When you give your child a command or order to do something, what proportion of the time do you make sure that your child does it?

2. If you tell your child s/he will get punished, s/he doesn't stop doing something, and s/he keeps doing it, how often will you punish him/her?

3. How often does your child get away with things that you feel should have been punished?

4. How often is your child able to get out of a punishment when s/he really sets his or her mind to it?

5. How often when you discipline your child, does s/he ignore the punishment?

# Appendix F

*Family Functioning Scale*

| | |
|---|---|
| Strongly Agree | 1 |
| Agree | 2 |
| Disagree | 3 |
| Strongly Disagree | 4 |

1. Planning family activities is difficult because we misunderstand each other.
2. In times of crisis we can turn to each other for support.
3. We cannot talk to each other about sadness we feel.
4. Individuals (in the family) are accepted for what they are.
5. We avoid discussing our fears and concerns.
6. We express feelings to each other.
7. There are lots of bad feelings in our family.
8. We feel accepted for what we are.
9. Making decisions is a problem for our family.
10. We are able to make decisions about how to solve problems.
11. We don't get along well together.
12. We confide in each other.

# Appendix G

*Stressful Life Events Scale*

Please indicate which of the following has happened to you (or your spouse/partner) during the past 12 months.

No 0
Yes 1

1. Stopped full-time schooling.
2. Lost job or was unemployed.
3. Got married.
4. Someone moved into your home.
5. Had financial problems.
6. My spouse/partner and I separated.
7. Arrival of baby at home.
8. Someone moved out of our home.
9. Serious illness.
10. Serious illness of someone dear.
11. Quit or retired from full-time work.
12. Started working or changed jobs.
13. Death of someone dear.

# Appendix H

*Social Support Scale*

| | |
|---|---|
| Strongly Agree | 1 |
| Agree | 2 |
| Disagree | 3 |
| Strongly Disagree | 4 |

1. If something went wrong, no one would help me.

2. I have family and friends who help me feel safe, secure and happy.

3. There is someone I trust whom I could turn to for advice if I were having problems.

4. There is no one I feel comfortable talking about problems with.

5. I lack a feeling of intimacy with another person.

6. There are people I can count on in an emergency.

# Appendix I

*Center for Epidemiological Studies Depression Scale*

How often have you felt or behaved this way during the past week.

| | |
|---|---|
| Rarely or none of the time (less than 1 day) | 1 |
| Some or a little of the time (1-2 days) | 2 |
| Occasionally or a moderate amount of the time (3-4 days) | 3 |
| Most or all of the time (5-7 days) | 4 |

1. I was bothered by things that usually don't bother me.
2. I did not feel like eating; my appetite was poor.
3. I felt that I could not shake off the blues even with help from my family and friends.
4. I felt that I was just as good as other people.
5. I had trouble keeping my mind on what I was doing.
6. I felt depressed.
7. I felt that everything I did was an effort.
8. I felt hopeful about the future.
9. I thought my life had been a failure.
10. I felt fearful.
11. My sleep was restless.
12. I was happy
13. I talked les than usual.
14. I felt lonely.
15. People were unfriendly.
16. I enjoyed life.
17. I had crying spells.

18. I felt sad.

19. I felt that people disliked me.

20. I could not "get going".

# Appendix J

*School Climate*

| | |
|---|---|
| Strongly agree | 1 |
| Agree | 2 |
| Disagree | 3 |
| Strongly disagree | 4 |

1. Academic progress is very important at this school.

2. Most children in this school enjoy being there.

3. Parents are made to feel welcome in this school.

4. School spirit is very high.

# Appendix K

*Parent's Rating of Child's School*

The following are possible descriptions of your child's school. For each, please indicate whether you:

| | |
|---|---|
| Not at all | 0 |
| A little | 1 |
| Some | 2 |
| A lot | 3 |
| A great deal | 4 |

1. You feel your child's school is a good place for your child to be.

2. You feel the staff at your child's school is doing good things for your child.

3. You feel confident in the people at your child's school.

# Appendix L

*Parent's Rating of Relationship with Child's Teacher/Involvement in School*

Please indicate the number that best completes each statement.

| | |
|---|---|
| Not at all | 0 |
| A little | 1 |
| Some | 2 |
| A lot | 3 |
| A great deal | 4 |

1. You feel welcome to visit your child's school.

2. You enjoy talking with your child's teacher.

3. You feel your child's teacher cares about your child.

4. You think your child's teacher is interested in getting to know you.

5. You feel comfortable talking with your child's teacher about your child.

6. You feel your child's teacher pays attention to your suggestions.

7. You ask your child's teacher questions or make suggestions about your child.

# Appendix M

*Neighbourhood Activities*

In the last year, how often did you...Would you say you did this...

| | |
|---|---|
| Not at all | 0 |
| Occasionally | 1 |
| Frequently | 2 |

1. Attend or take part in a recreational event in the community e.g. a sporting event or concert?

2. Work with a children's group, club or team?

3. Help with a neighbourhood or community social event, e.g., by organizing or making food for it?

4. Go to meetings dealing with community concerns? e.g., meetings of a committee you served on or meetings called by a residents' organization?

5. Go to neighbourhood events, e.g. picnics, meals?

# Appendix N

*Use of Programs*

Have you or your child participated in any of the following programs or activities in the last 12 months?

No 0
Yes 1

1. A toy lending library

2. A recreation/playground program

3. Sports, crafts, or clubs

4. After-school care program or drop-in centre

5. A library

6. A parent resource centre, parent group, etc.

# Appendix O

*Sense of Community*

How much do you agree or disagree with these statements?

| | |
|---|---|
| Strongly agree | 1 |
| Agree | 2 |
| Disagree | 3 |
| Strongly disagree | 4 |

1. I feel like I belong to this neighbourhood.

2. If some change was going to be made in my neighbourhood that I did not like, I would try to stop it.

3. I feel I am important to this neighbourhood.

4. I would be willing to work with others on something to improve my neighbourhood.

5. I like to think of myself as similar to the people who live in this neighbourhood.

# Appendix P

*Neighbourhood Satisfaction/Perceived Quality of Neighbourhood*

Please tell me how good you think each aspect of the neighbourhood is using one of:

| | |
|---|---|
| Excellent | 1 |
| Very Good | 2 |
| Good | 3 |
| Fair | 4 |
| Poor | 5 |

1. What about the condition of other houses and buildings in your neighbourhood?

2. How would you describe the other people who live around here as neighbours?

3. How about the safety from crime in your home or building?

4. Safety walking on the streets at night?

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Completely Dissatisfied | | | | | | | | | | Completely Satisfied |

5. All things considered, how satisfied or dissatisfied are you with this neighbourhood as a place to live? Which number from 0 to 10 comes the closest to how you feel, where 0 is completely dissatisfied and 10 is completely satisfied?

# References

Abraido-Lanza, A.F., Dohrenwend, B.P., Ng-Mak, D. S., & Turner, J. B. (1999). The Latino mortality paradox: A test of the "salmon bias" and healthy migrant hypotheses. *American Journal of Public Health, 89* (10), 1543-48.

Achenbach, T. M., & Edelbrook, C. S. (1983). *Manual for the Child Behavior Checklist and the Revised Child Behavior Profile.* Burlington, VT: University of Vermont.

Alati, R., Najman, J. M., Shuttlewood, G. J., Williams, G. M., & Bor, W. (2003). Changes in mental health status amongst children of migrants to Australia: A longitudinal study. *Sociology of Health and Illness, 25* (7), 866 – 888.

American Psychiatric Association (1987). *Diagnostic and statistical manual of mental disorders: DSM-III-R* (3rd ed., rev). Washington, DC: Author.

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders: DSM-IV* (4th ed.). Washington, DC: Author.

Arnold, R. (2000). Socio-demographic characteristics. In R. DeV., Peters, R., Arnold, K., Petrunka, D. E., Angus, K., Brophy, S. O., Burke, G., Cameron, S., Evers, Y., Herry, D., Levesque, S. M., Pancer, G., Roberts-Fiati, S., Towson, & W. K., Warren. *Developing capacity and competence in the Better Beginnings, Better Futures communities: Short-term findings report* (pp. 5-21). Kingston, Ontario: Better Beginnings, Better Futures Research Coordination Unit Technical

Report.

Barkley, R. A. (1985). The family interactions of hyperactive children: Precursors to aggressive behavior? In D. Routh & M. Wolraich (Eds.), *Advances in behavioral pediatrics* (pp. 117-150). Greenwich, CT: JAI Press.

Barkley, R. A. (1990). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment.* New York: Guilford Press.

Barkley, R. A., Fischer, M., Edelbrock, C., & Smallish, L. (1991). The adolescent outcome of hyperactive children diagnosed by research criteria –III. Mother-child interactions, family conflicts and maternal psychopathology. *Journal of Child Psychology and Psychiatry, 32*(2), 233-255.

Barkley, R. A., Karlsson, J., Pollard, S. (1985). Effects of age on the mother-child interactions of ADD-H and normal boys. *Journal of Abnormal Child Psychology, 13*(4), 631-637

Bateman, H. V. (1998). Psychological sense of community in the classroom: Relationship to students' social and academic skills and social behavior. Unpublished doctoral dissertation, Vanderbilt University: Nashville, TN. In A. T. Fisher, C. C. Sonn, & B. J. Bishop. (Eds.) (2002). *Psychological sense of community: Research, applications, and implications* (pp. 161-179). New York, NY: Kluwer Academic/Plenum Publishers.

Biederman, J., Mick, E., Faraone, S. V., & Burback, M. (2001). Patterns of remission and symptom decline in conduct disorder: A four-year prospective study of an ADHD sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 40,* 290-298.

Boyle, M. H., & Offord, D. R. (1990). Primary prevention of conduct disorders: Issues and prospects. *Journal of the American Academy of Child and Adolescent Psychiatry, 29*(2), 227-233.

Boyle, M., Offord, D., Hofmann, H. G., Catlin, G. P., Byles, J. A., Cadman, D. T., Crawford, J. W., Links, P. S., Rae-Grant, N. I., & Szatmari, P. (1987). Ontario Child Health Study I: Methodology. *Archives of General Psychiatry, 44*, 826-831.

Boyle, M. H., Offord, D. R., Racine, Y., Fleming, J. E., Szatmari, P., & Sanford, M. (1993). Evaluation of the revised Ontario Child Health Study Scales. *Journal of Child Psychology and Psychiatry, 34*, 189-213.

Breiman, L., Friedman, J. H., Olshen, R. A., & Stone, C. J. (1984). *Classification and regression trees.* Belmont, CA: Wadsworth Inc.

Briggs-Gowan, M. J., Horwitz, S. M., Schwab-Stone, M. E., Leventhal, J. M., & Leaf, P. J. (2000). Mental health in pediatric settings: Distribution of disorders and factors related to service use. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*(7), 841-849.

Bronfenbrenner, C., Spiker, D., & Shapiro, S. (1992). Enhancing the cognitive outcomes of low birth weight, premature infants: For whom is the intervention most effective? *Pediatrics, 89*(6), 1209-1215.

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design.* Cambridge, MA: Harvard University Press.

Buckner, J. (1986). The development of an instrument and procedure to assess

the cohesiveness of neighbourhoods. *Dissertation Abstracts International, 47*(6-B), 2669-2670.

Cadoret, R. J., Yates, W. R., Troughton, E., Woodworth, G., & Stewart, M. A. (1995). Genetic environmental interaction in the genesis of aggressivity and conduct disorders. *Archives of General Psychiatry, 52,* 916-924.

Clement, R., Noels, K. A., & Deneault, B. (2001). Interethnic contact, identity, and psychological adjustment: The mediating and moderating roles of communication. *Journal of Social Issues, 57* (3), 559 – 578.

Coie, J. D., & Dodge, K. A. (1998). Aggression and antisocial behavior. In W. Damon & N. Eisenberg (Eds.) *Handbook of child psychology: Social, emotional and personality development* (Vol. 3, pp. 779-862). New York: Wiley.

Coie, J. D., Dodge, K. A., & Copottelli, H. (1982). Dimensions and types of social status: A cross-age perspective. *Developemenal Psychology, 18* (3), 557 – 571.

Cutrona, C. E., & Russell, D. W. (1989). The provisions of social relationship and adaptation to stress. *Advances in Personal Relationship, 1*, 37-67.

Devins, G. M., & Orme, C. M. (1985). Center for Epidemiologic Studies Depression Scale. In D. J. Keyser & R. C. Sweetland (Eds.), *Test critiques* (Vol. 2, pp. 144-160). Kansas City, MO: Test Corporation of America.

Dodge, K. A., Pettit, G. S., & Bates, J. E. (1994). Socialization mediators of the relation between socioeconomic status and child conduct problems. *Child Development, 65*, 649-665.

Doering, S., Muller, E., Kopcke, W., Pietzcker, A., Gaebel, W., Linden, M., Muller, P., Muller-Spahn, F., Tegeler, J., & Schussler, G. (1998). Predictors of relapse and

rehospitalization in schizophrenia and schizoaffective disorder. *Schizophrenia Bulletin, 24*(1), 87-98.

Dubow, E. F., Edwards, S., & Ippolito, M. F. (1997). Life stressors, neighborhood disadvantage, and resources: A focus on inner-city children's adjustment. *Journal of Clinical Child Psychology, 26*(2), 130-144.

Eisenberg, A. R. & Garvey, C. (1981). Children's use of verbal strategies in resolving conflict. *Discourse Processes, 4*, 149 – 170.

Elliott, D., Wilson, W. J., Huizinga, D., Sampson, R., Elliott, A., & Rankin, B. (1996). The effects of neighbourhood disadvantage on adolescent development. *Journal of Research in Crime and Delinquency, 33* (4), 389 - 426.

Epstein, N. B., Baldwin, L. M., & Bishop, D. S. (1983). The McMaster Family Assessment Device. *Journal of Marital and Family Therapy, 9*, 171-179.

Eron, L. D., Huesmann, L. R., & Zelli, A. (1991). The role of parental variables in the learning of aggression. In D. J. Pepler & K. H. Rubin (Eds.) *The development and treatment of childhood aggression* (pp. 169-188). Hillsdale, NJ: Erlbaum.

Essau, C. A. (2003). *Conduct and oppositional defiant disorders: Epidemiology, risk factors, and treatment.* Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Farrington, D. P. (1978). The family backgrounds of aggressive youths. In L. Hersov, M. Berger, & D. Shaffer (Eds.) *Aggression and antisocial behavior in childhood*

*and adolescence* (pp. 73-93). Oxford: Pergamon.

Farrington, D. (1991). Childhood aggression and adult violence: Early precursor and later-life outcomes. In D. J. Pepler & K. H. Rubin (Eds.), *The development and treatment of childhood aggression* (pp. 5-29). Hillsdale, NJ: Erlbaum.

Fenton, B. T. (1998). *Familial correlates of anxiety and depression in high-risk offspring*. Unpublished doctoral dissertation, Yale University: Connecticut.

Field, T. M., Widmayer, S. M., Stringer, S., & Ignatoff, E. (1980). Teenage, lower-class, black mothers and their preterm infants: An intervention and developmental follow-up. *Child Development, 51*, 426-436.

Fischer, M. Barkley, R. A., Fletcher, K. E., & Smallish L. (1993). The adolescent outcome of hyperactive children: Predictors of psychiatric, academic, social, and emotional adjustment. *Journal of the American Academy of Child and Adolescent Psychiatry, 32*(2), 324-332.

Gebotys, R. (2003). *Introduction to statistics/multivariate analysis.* Retreived from, www.wlu.ca/~wwwpsych/gebotys.

Gorman-Smith, D., & Henry, D. (May 2002). SAFE Children: Community moderation of intervention effects. *Society for Prevention Research 10th Annual Meeting "Effectiveness and Dissemination, in Prevention Research"*. Seattle: Washington.

Government of Ontario (1989). *Ontario Child Health Study: Summary of initial findings.* Toronto: Queen's Printer.

Goyette, C. H., Conners, C.K., & Ulrich, R. F. (1978). Normative data on revised parent and teacher rating scales. *Journal of Abnormal Child Psychology, 6*, 221-236.

Gresham, F. M. & Elliott, S. N. (1990). *Social skills rating system manual.* Circle Pines, Minnesota: American Guidance Services.

Harker, K. (2001). Immigrant generation, assimilation, and adolescent psychological well-being. *Social Forces, 79* (3), 969 – 1004.

Harland, P., Reijneveld, S. A., Brugman, E., Verloove-Vanhorick, S. P., & Verhulst (2002). Family factors and life events as risk factors for behavioural and emotional problems in children. *European Child and Adolescent Psychiatry, 11,* 176-184.

Harrington, R., Fudge, H., Rutter, M., Pickles, A., & Hill, J. (1991). Adult outcomes of childhood and adolescent depression: II Links with antisocial disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 30,* 434-439.

Herbert, M. (1987). *Conduct disorders of childhood and adolescence: A social learning perspective.* Chichester, UK: John Wiley & Sons.

Human Resources Development Canada/Statistics Canada (undated). *National Longitudinal Survey of Children and Youth: User's handbook and microdata guide.* Ottawa, ON: Statistics Canada.

Institute for Social Research, York University (1977; 1979; 1981). *Social change in Canada series.*

Kasen, S., Johnson, J., & Cohen, P. (1990). The impact of school emotional climate on student psychopathology. *Journal of Abnormal Child Psychology, 18* (2), 165 – 177.

Kazdin, A. E. (1995). *Conduct disorders of childhood and adolescence* (2nd ed.). Thousand Oaks, CA: Sage.

Keenan, K., & Shaw, D. (1997). Developmental and social influences on young girls' early problem behavior. *Psychological Bulletin, 121,* 95-113.

Klein, R. G., & Mannuzza, S. (1991). Long-term outcome of hyperactive children: A review. *Journal of the American Academy of Child and Adolescent Psychiatry, 30,* 383-387.

Klimidis, S., Stuart, G., Minas, I. H., & Ata, A. W. (1994). Immigrant status and gender effects on psychopathology and self-concept in adolescents: A test of the migration-morbidity hypothesis. *Comprehensive Psychiatry, 35*, 393 – 404.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). NY: Guilford.

Kohen, D. E., Brooks-Gunn, J., Leventhal, T., & Hertzman, C. (2002). Neighbourhood income and physical and social disorder in Canada: Associations with young children's competencies. *Child Development, 73* (6), 1844 – 1860.

Krahe, B. (1989). Faking personality profiles on a standard personality inventory. *Personality and Individual Differences, 10*, 437-443.

Lahey, B. B., Loeber, R., Quay, H. C., Frick, P. J., & Grimm, J. (1997). Oppositional defiant disorder and conduct disorder. In T. A. Widiger, A. J. Frances, H. A. Pincus, R. Ross, M. B. First, & W. Davis (Eds.). *DSM-IV sourcebook* (Vol. 3, pp. 189-209). Washington DC: American Psychiatric Association.

Lambert, N. M., Sandoval, J., & Sassone, D. (1978). Prevalence of hyperactivity in elementary school children as a function of social system definers. *American Journal of Orthopsychiatry, 48*, 446-463.

Lesser, G. S. (1959). The relationship between various forms of aggression and

popularity among lower-class children. *Journal of Educational Psychology, 50,* 20 – 25.

Lewinsohn, P. M., Hops, H., Roberts, R. E., Seeley, J. R., & Andrews, J. A. (1993). Adolescent psychopathology: I. Prevalence and incidence of depression and other DSM-III-R disorders in high school students. *Journal of Abnormal Psychology, 102,* 133-144.

Lipman, E. L., Offord, D. R., & Boyle, M. H. (1994). Economic disadvantage and child psychosocial morbidity. *Canadian Medical Association Journal, 151,* 431-437.

Lipman, E. L., Offord, D. R., & Dooley, M. D. (1996). What do we know about children from single-mother families?: Questions and answers from the National Longitudinal Survey of Children and Youth. *Growing up in Canada: National Longitudinal Survey of Children and Youth* (pp. 127-137). Ottawa: Human Resource Development Canada.

Lochman, J. E. (1987). Self-and peer perceptions and attributional biases of aggressive and nonaggressive boys in dyadic interactions. *Journal of Consulting and ClinicalPsychology, 55* (3), 404 – 410.

Loeber, R., & Farrington, D. P. (Eds.). (1998). *Serious and violent juvenile offenders: Risk factors and successful interventions.* Thousand Oaks, CA: Sage.

Loeber, R., Green, S. M., Keenan, K., & Lahey, B. B. (1995). Which boys will fare worse? Early predictors of the onset of conduct problems in a six-year longitudinal study. *Journal of the American Academy of Child and Adolescent Psychiatry, 34,* 499-509.

Loeber, R., Keenan, K., Russo, M. F., Green, S. M., Lahey, B. B. & Thomas, C. (1998).

Secondary data analysis for DSM-IV on the symptoms of oppositional defiant disorder and conduct disorder. In T. A. Widiger, A. J. Frances, H. J. Pincus, R. Roth, M. B. First, W. Davis, & M. Kline. (Eds.), *DSM-IV sourcebook* (Vol. 4, pp. 465-490). Washington, DC: American Psychiatric Press.

Loeber, R., & Stouthamer-Loeber, M. (1998). Development of juvenile aggression and violence: Some common misconceptions and controversies. *American Psychologist, 53,* 242-259.

Mash, E. J. & Wolfe, D. A. (1999). *Abnormal child psychology.* Toronto, Ontario: Wadsworth.

McCord, J. (1977). A comparative study of two generations of native Americans. In R. F. Meier (Ed.), *Theory in criminology* (pp. 83-92). Beverly Hills, CA: Sage.

McElwain, N. L., Olson, S. L. & Volling, B. L. (2002). Concurrent and longitudinal associations among preschool boys' conflict management, disruptive behaviour, and peer rejection. *Early Education and Development, 13* (3), 245 – 263.

Munroe Blum, H., Boyle, M. H., & Offord, D. R. (1988). Single-parent families: Child psychiatric disorder and school performance. *Journal of the American Academy of Child and Adolescent Psychiatry, 27,* 214-219.

National Longitudinal Survey of Children and Youth. (1994, 1996, 1998). *Child behaviour problems and parenting scale.* Department of Human Resources Development, Canada.

Nelson, G. (2005) Personal Web Site. Retrieved February 1, 2005, from http://www.info.wlu.ca/~www.psych/gnelson/bbbf.htm.

Nelson, G., Pancer, S. M., Peters, R. Dev., Hayward, K., Petrunka, K., & Bernier, J. R.

(2005). *Better Beginnings, Better Futures: Project Sustainability*. Kingston, ON: Better Beginnings, Better Futures' Research Coordination Unit Technical report.

Nelson, G., & Prilleltensky, I. (Eds.). (2005). *Community psychology: Towards liberation and well-being*. London: Palgrave Macmillan.

O'Brien Caughy, M., O'Campo, P., & Muntaner, C. (2003). When being alone might be better: Neighbourhood poverty, social capital, and child mental health. *Social Science and Medicine, 57*, 227-237.

Offord. D., & Bennett, K. (1994). Long-term outcome of conduct disorder and interventions and their effects. *Journal of the American Academy of Child and Adolescent Psychiatry*, 33, 1069-1078.

Offord, D. R., Boyle, M. H., & Racine, Y. (1989). Ontario Child Health Study: Correlates of disorder. *Journal of the American Academy of Child and* Adolescent Psychiatry, 28(6), 856-860.

Offord, D. R., & Lipman, E. L. (1996). Emotional and behavioural problems. *Growing up in Canada: National Longitudinal Survey of Children and Youth* (pp.119-126). Ottawa: Human Resource Development Canada.

Olds, D. L., Henderson, C. R., Kiztman, H. J., Eckenrode, J. J., Cole, R. E., & Tatelbaum, R. C. (1999). Prenatal and infancy home visitation by nurses: Recent findings. *The Future of Children, 9*(1), 1-8.

Olweus, D. (1980). The consistency issue in personality psychology revisited –with special reference to aggression. *British Journal of Social and Clinical Psychology, 19*, 377-390.

Patterson, C. J., Kupersmidt, J. B., & Vaden, N. A. (1990). Income level, gender,

ethnicity, and household composition as predictors of children's school-based competencies. *Child Development, 61*, 485-494.

Patterson, G. R. (1982). *Coercive family process.* Eugene, OR: Castalia.

Patterson, G. R., Reid, J. B., & Dishion, T. J. (1992). *Antisocial boys.* Eugene, OR: Castalia.

Peters, R. DeV., Arnold, R., Petrunka, K., Angus, D. E., Belanger, J.-M., Boyce, W., Brophy, K., Burke, S. O., Cameron, G., Craig W., Evers, S., Herry, Y., Mamatis, D., Nelson, G., Panser S. M., Roberts-Fiati, G., Russell, C. C. & Towson, S. (2004). *Better Beginnings, Better Futures: A comprehensive community-based project for early childhood development. Highlights of Lessons Learned.* Kingston, Ontario: Better Beginnings, Better Futures Research Coordination Unit Technical Report.

Peters, R. DeV., Arnold, R., Petrunka, K., Angus, D. E., Brophy, K., Burke, S. O., Cameron, G., Evers, S., Herry, Y., Levesque, D., Pancer, S. M., Roberts-Fiati, G., Towson, S., & Warren, W. K. (2000). *Developing capacity and competence in the Better Beginnings, Better Futures communities: Short-term findings report.* Kingston, Ontario: Better Beginnings, Better Futures Research Coordination Unit Technical Report.

Peters, R. DeV., Petrunka, K., Angus, D. E., Arnold, R., Bélnager, J-M., Boyce, W., Brophy, K., Burke, S. O., Craig, W., Currie, A., Evers, S., Herry, Y., Irving, L. G., Khan, S., Kocher, P., Mamatis, D., Nelson, G., Pancer, M., Russell, C. C., & Towson, S. (2005). *Do better beginnings lead to better futures? Three-year follow-up outcomes for Grade 6 children and their families.* Kingston, ON:

Better Beginnings, Better Futures Research Coordination Unit Technical Report.

Peters, R. DeV., Petrunka, K. & Arnold, R. (2003). The Better Beginnings, Better Futures project: A universal, comprehensive, community-based prevention approach for primary school children and their families. *Journal of Clinical Child and Adolescent Psychology, 32* (2), 215-227.

Peters, R. DeV., & Russell, C. C. (1996). Promoting development and preventing disorder: The Better Beginnings, Better Futures project. In R. DeV. Peters & R. J. McMahon (Eds.), *Preventing childhood disorders, substance abuse and delinquency* (pp. 19-47). Thousand Oak, CA: Sage Publishers.

Pettit, G. S., Bates, J. E., Dodge, K. A., & Meece, D. W. (1999). The impact of after-school peer contact on early adolescent externalizing problems is moderated by parental monitoring, perceived neighbourhood safety, and prior adjustment. *Child Development, 70* (3), 768 – 778.

Pinderhughes, E., & Nix, R. (May 2002). Neighborhood and family contextual moderators of the impact of an intervention designed to prevent conduct problems. *Society for Prevention Research 10th Annual Meeting "Effectiveness and Dissemination, in Prevention Research"*. Seattle: Washington.

Reid, J., Patterson, G. R., & Snyder, J. (2002). *Antisocial behavior in children and adolescents: A developmental analysis and model for intervention.* Washington: American Psychological Association.

Robins, L. N., & Price, R. K. (1991). Adult disorders predicted by childhood conduct problems: Results from the NIMH Epidemiologic Catchment Area project. *Psychiatry*, 54, 116-132.

Romano, E., Tremblay, R. E., & Vitaro, F. (2001). Prevalence of psychiatric diagnosis and the role of perceived impairment: Findings from an adolescent community sample. *Journal of Child Psychology and Psychiatry, 42,* 451-461.

Rutter, M. (1979). Protective factors in children responding to stress and disadvantage. In M. W. Kent & J. E. Rolf (Eds.), *Primary prevention of psychopathology. Vol. III: Social competence in children* (pp. 49-74). Hanover: University Press Of New England.

Sampson, R. J. (1997). Collective regulation of adolescent misbehaviour: Validation results from eighty Chicago neighbourhoods. *Journal of Adolescent Research, 12* (2), 227 – 244.

Sampson, R. J., & Groves, W. B., (1989). Community structure and crime: Testing social disorganization theory. *American Journal of Sociology, 94* (4), 774 – 780.

Sampson, R. J., Raudenbush, S. W., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science, 277,* 918 – 924.

Shaw, C., & McKay, H. (1942). *Juvenile delinquency and urban areas.* Chicago: University of Chicago Press.

Simeonsson, R. J. (1994). *Risk, resilience, and prevention: Promoting the well-being of all children.* Baltimore, Maryland: Paul H. Brookes Publishing Co.

SPSS. (1999). *SPSS Version 9.0.* Chicago: Author.

Statistics Canada (Income Statistics Division) (2001). *Low income cutoffs from 1991 to 2000 and low income measures from 1990 to 1999* (Ottawa: Minister of Industry, November 2001), Catalogue No. 17F0002MIE—01007, pp. 32 – 34.

StatSoft Electronic Textbook (1984-2004). *Classification Trees.* Web site:

http://www.statsoft.com/textbook/stclatre.html.

Steinhausen, H. C., Edinsel, E., Fegert, J. M., Gobel, D., Reister, E., & Rentz, A. (1990). Child psychiatric disorders and family dysfunction in migrant workers' and military families. *European Archives of Psychiatry and Neurological Science, 239,* 257 – 262.

Stuss, D. T., Binns, M. A., Carruth, F. G., Levine, B., Brandys, C. F., Moulton, R. J., Snow, D. T., & Schwartz, M. L. (2000). Prediction of recovery of continuous memory after traumatic brain injury. *Neurology, 54*, 1337-1344.

Trueba, H. T. (2002). Multiple ethnic, racial and cultural identities in action: From marginality to a new cultural capital in modern society. *Journal of Latinos and Education, 1* (1), 7 – 28.

Uitenbroek, D. G. & Verhoeff, A. P. (2002). Life expectancy and mortality differences between migrant groups living in Amsterdam and the Netherlands. *Social Science and Medicine, 54* (9), 1379 – 1388.

Velez, C. N., Johnson, J., & Cohen, P. (1989). A longitudinal analysis of selected risk factors for childhood psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 28*(6), 861-864.

Vitaro, F., Gendreau, P. L., Tremblay, R. E., & Oligny, P. (1998). Reactive and proactive aggression differentially predict later conduct problems. *Journal of Child Psychology and Psychiatry, 39,* 377-385.

Vitiello, B., & Stoff, D. M. (1997). Subtypes of aggression and their relevance to child psychiatry. *Journal of the American Academy of Child and Adolescent*

*Psychiatry, 36,* 307-315.

Wadsworth, J., Burnell, I., Taylor, B. & Butler, T. (1985). The influence of family type on children's behaviour and development at five years. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 26*, 245-254.

Wang, J., Zhang, Y., & Leung, P. (2005). Achenbach Youth Self-Report for 12-18 years of age students in Beijing. *Chinese Journal of Clinical Psychology, 13* (2), 131-152.

Weissman, M. M., Warren, V., & Fendrich, M. (1990). Applying impairment criteria to children's psychiatric diagnosis. *Journal of the American Academy of Child and Adolescent Psychiatry, 29*, 789-795.

Zhang, H. & Singer, B. (1999). *Recursive partitioning in the health sciences.* New York: Springer-Verlag.