

CONCEPTUALIZING AND EXAMINING THE IMPACT OF NEIGHBOURHOODS
ON THE SCHOOL READINESS OF
KINDERGARTEN CHILDREN IN BRITISH COLUMBIA

by

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ABSTRACT

In the current research project, the relationship between neighbourhood environment and school readiness was investigated. To support this investigation, the school readiness and neighbourhood effects literatures were reviewed. To measure neighbourhood environment, data from the 2001 Canadian Census were used, while school readiness was measured using the Early Development Instrument (EDI). EDI data were collected for kindergarten children across BC in the school years 2000-2001 through 2004-2005 by the Human Early Learning Partnership (HELP). For the first portion of the current study, a hierarchical linear modeling (HLM) approach to data analysis was taken given the complex structure of the data (children nested within neighbourhoods). Results from this study suggest that neighbourhood environment is related to children's school readiness outcomes as measured by the EDI. Specifically, all five EDI domains and the EDI Total score were significantly predicted by between two and eight of 13 neighbourhood variables that were conceptually grouped into eight categories accounting for family structure, income, education, aboriginal status, language, labour force occupations, employment rates, and domestic work. Following these analyses, the second portion of the current study involved an exploratory analysis of neighbourhoods where children had performed better or worse than expected on the EDI (according to the HLM models) to better understand what differentiates these neighbourhoods from those where children had performed according to the model predictions. Important patterns included differences in residential stability, proportion of immigrants and lone-parents, employment rates, types of occupations and industries, amount of domestic work, male-female income discrepancy, and income levels. Overall, three themes emerged from this study that suggest neighbourhood-level sources of social wealth: the importance of neighbourhood culture, stability, and heterogeneity in promoting better school

readiness outcomes for children. The strengths and limitations of the current research project were discussed, and formulations regarding areas for future research were presented.

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CHAPTER I

Introduction

School readiness is related to many important outcomes, including academic success, completion of high school, and eventual gainful employment and the ability to contribute to society (Barrington & Hendricks, 1989; Doherty, 1997; Tremblay & Masselink, 1992). Recently, there has been an increased emphasis by governments, parents, and educators on the promotion of school readiness in young children (Janus & Offord, 2000b; Zaslow, Calkins, & Halle, 2000).

Coupled with this increasing recognition of the importance of school readiness has been a heightened awareness of the impact of social context on child development. Previously, it was thought that a child's developmental outcomes were primarily determined by genetic and biological factors. However, it is now recognized that the environmental milieu that surrounds the developing child has a large influence on cognitive, socioemotional and physical development (e.g. Broman, Nichols, & Kennedy, 1975; Caspi, Taylor, Moffitt, & Plomin, 2000; Miller, Jenkins, & Keating, 2002; Raudenbush & Kasim, 1998). Bronfenbrenner's (1977, 1979) ecological theory, which highlights the interplay between child-level variables and system-level variables in determining developmental outcomes, was largely responsible for this shift away from a primary focus on biological determinants to contextual determinants (Bronfenbrenner, 1977, 1979). Researchers have now established that a wide range of contextual variables, including maternal depression, adolescent parenthood, low level of home stimulation, low maternal education, lone-parent family structure, and socioeconomic status (SES), are related to cognitive, socioemotional and physical developmental outcomes (Barnett, Macmann, & Carey, 1992; Dahinten & Willms, 2002; Field, 1998; Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002; McLoyd, 1998; Resnick *et al.*, 1999; Stipek & Ryan, 1997; Vandivere, Pitzer, Halle, &

Hair, 2004; Zaslow et al., 2000). Beyond these parent- and family-level contextual variables, neighbourhood-level variables, such as safety, cohesion, SES, and proportion of unemployed adults, lone-parent families, and immigrants, have also been linked to developmental outcomes (e.g. Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993; Caspi et al., 2000; Chase-Lansdale & Gordon, 1996; Hertzman, McLean, Kohen, Dunn, & Evans, 2002).

This combination of the increased awareness of the importance of school readiness and the key role that social context in general, and neighbourhood context in particular, play in early development lead to the current study. The focus of this research was on exploring the relationship between neighbourhood context and school readiness in kindergarten children in British Columbia (BC), Canada. In the current study, the relationship between school readiness, as measured by the Early Development Instrument (EDI), and neighbourhood context, as measured by selected variables from the 2001 Canadian Census, was examined. These census data were reconfigured according to conceptually derived neighbourhood boundaries. A hierarchical linear model (HLM) approach to examining the relationship between neighbourhood context and school readiness was employed. The HLM approach, sometimes referred to as multi-level modeling, accounted for the complex structure of the data – specifically, children nested in neighbourhoods. In addition, neighbourhoods where children performed better or worse than expected (as per the HLM models fit in the current study) were examined to better understand what differentiates these neighbourhoods from those where children performed according to the model predictions. The findings suggest that neighbourhood context is related to children's school readiness outcomes as measured by the EDI, and further, that culture, stability, and heterogeneity are key sources of social wealth that can be used to promote more positive neighbourhood environments. The results from the current study contribute further information

to the growing literature on the role of neighbourhoods in the development of school readiness in the Canadian context.

Rationale for the Present Study

Through the efforts of the Human Early Learning Partnership (HELP; see Human Early Learning Partnership, 2006) there exists a very rich source of data documenting children's school readiness outcomes in five key domains across BC ($N = 53\,059$). As part of their data collection effort, HELP has collaborated with early childhood development (ECD) coalitions at the local level to establish "natural" neighbourhood boundaries for the entire province of BC that are more meaningful to residents than prescribed census tract boundaries and data from the 2001 Canadian Census have been reformatted to reflect these natural neighbourhood boundaries (described in more detail in Chapter III). Taken together, the availability of a virtual census of school readiness outcomes in BC and neighbourhood-level variables from the 2001 Canadian Census that can be analyzed according to meaningful neighbourhood boundaries presented a unique opportunity for exploring the relationship between children's school readiness and their neighbourhood environment in an expansive and systematic way, and resulted in the design and completion of the current study.

Explorations of the relationship between neighbourhoods and school readiness in the Canadian context in general, and the BC context specifically, were needed because the majority of neighbourhood effects studies have been completed in the American context (Leventhal & Brooks-Gunn, 2000). The BC focus of the current research study permitted analysis of whether or not Canadian neighbourhoods (rural and urban) are "ghettoized" enough to yield neighbourhood effects, as well as the opportunity to include neighbourhood predictor variables that were sensitive to the BC context (such as variables addressing culture and provincial

industry). In addition, the large number of children ($N = 53\,059$) and neighbourhoods ($N = 476$) meant that HLM or multi-level modeling techniques could be used to examine the relationship between neighbourhood and school readiness. An HLM approach to such examinations is critical because it allows the researcher to account for the complex structure of the data (children nested within neighbourhoods; Raudenbush & Bryk, 2002). The current study also focused only on young children. The majority of neighbourhood effects research has been completed with adolescent samples. By exploring the impact of neighbourhood effects on young children, who have presumably had less “exposure” to their neighbourhood environments, this study constitutes a comparably strict test of neighbourhood effects. Finally, the large number of neighbourhoods in the present study also permitted the identification of off-diagonal neighbourhoods where children were performing better or worse than expected (based on the HLM models fit in the current study). An exploratory analysis of the features of these off-diagonal neighbourhoods was possible through the reformatted 2001 Canadian Census data and presented a unique opportunity for better understanding their characteristics. The rationale for the current study, therefore, was to improve the understanding of the relationship between neighbourhood environment and school readiness in the BC context through the use of HLM analyses and the exploration of off-diagonal neighbourhoods such that at-risk groups of children and neighbourhoods can be more easily identified, and resources for prevention and intervention appropriately allocated.

Purpose of the Present Study

Biological embedding describes the process by which contextual effects, such as those from the neighbourhood environment, become incorporated into the child’s organic make-up, actually influencing the child’s development at the cellular level (Hertzman, 1999; Hertzman &

Frank, 2006; Hertzman & Wiens, 1996). The promotion of early development from a preventative or early intervention stance is key in ensuring the “embedding” of positive influences such that children get the best possible start in school. Therefore, it is important to understand the components of the child’s environment, including those in his or her neighbourhood, that promote or detract from the child’s development. Thus, the purpose of the current study was to further understand the components of the neighbourhood context that are related to children’s school readiness outcomes.

Research Questions

Research Question 1

To what extent are children’s neighbourhood environments in BC related to their outcomes in the five domains of school readiness measured by the EDI - Physical Health and Well-Being, Social Competence, Emotional Maturity, Language and Cognitive Development, and Communication and General Knowledge?

Expectation/Hypothesis 1

Previous research (as described in the literature review) indicates that there is a small, yet significant effect of neighbourhood environment on developmental outcomes. Similar findings are expected for kindergarten children in BC using results from each of the five domains of the EDI as the outcome variables. Although the expected trend was improved EDI outcomes with more favourable neighbourhood environments, it was also anticipated that some neighbourhoods would not conform to these patterns (i.e., children that do very well on the EDI despite residence in an impoverished neighbourhood, or vice versa).

Research Question 2

What are the unique neighbourhood-level characteristics of “off-diagonal”

neighbourhoods where children are performing better or worse than expected (according to the HLM models fit as part of examining Research Question 1)?

Expectation/Hypothesis 2

The exploratory nature of this research question carried with it limited preconceived expectations regarding the unique character of off-diagonal neighbourhoods that differentiate them from neighbourhoods where children perform as expected on the EDI (given the HLM models fit in the current study). However, it was anticipated that there would be neighbourhood features, such as residential stability or heterogeneity in terms of the mix of higher and lower status characteristics, that may buffer the effects of specific neighbourhood risk factors in neighbourhoods where children perform better than expected. Likewise, the absence of such buffers, or the presence of more pervasive social risk factors at the neighbourhood level, may be found in neighbourhoods where children perform worse than expected.

Definition of Terms

Key terms that are used throughout the proposed study are defined in the following section.

Neighbourhood

Neighbourhoods are typically conceived of as a geographic space (Jencks & Mayer, 1990; Sampson, 1999) and are unique from communities which may be thought of as friendship networks (Earls & Carlson, 2001). There are different methods for defining a neighbourhood's geographic space that have been detailed in the literature, including: (a) Community areas, which are usually known by name and are bounded by major freeways, parks, and/or streets; (b) Census tracts, which are defined by governments for administrative data collection and are smaller than community areas; (c) Block groups, which are even smaller than a census track and represent

what is typically thought of as “neighbourhood”; and (d) Street or face blocks, which are the smallest geographical unit used in research and are defined by “the sides of the street facing and including one’s home” (Sampson, 1999, p. 248-249). Although the definition of neighbourhood varies in the neighbourhood effects literature, most researchers define neighbourhoods according to some existing administrative function and neighbourhoods are thought to reflect an underlying organizational force whereby people of similar race, social class and family status cluster together, enabling neighbourhood effects to emerge (Sampson, Morenoff, & Gannon-Rowley, 2002). In the current study the term ‘neighbourhood’ is used to denote geographic spaces that have been defined at the local level by key early childhood development stake holders in BC.

Off-diagonal neighbourhoods. The term “off-diagonal neighbourhoods” is used in the current study to denote those neighbourhoods where children are not performing as predicted given their neighbourhood context. The “off-diagonal” reference stems from the attempt to relate neighbourhood context in a linear fashion to EDI outcomes. The line-of-best-fit will represent the majority of outcomes based on the neighbourhood context HLM prediction equation. However, with the use of this type of prediction there can be outliers, or neighbourhoods where actual outcome scores are either much better than expected or much worse than expected given the HLM equation. It is these outlier neighbourhoods that are called off-diagonal neighbourhoods.

Janus neighbourhoods. Off-diagonal neighbourhoods have been described as “Janus communities,” as per Kershaw and colleagues (2005). This term was selected by Kershaw et al. as it both pays tribute to Dr. Magdalena Janus, one of the EDI authors, and it references the Roman god who “was historically worshipped at important life-course events that coincided with young people growing up” (Kershaw et al., 2005, p. 68). This god’s double-faced head

symbolizes a person looking simultaneously in opposite directions. Kershaw and colleagues believed that the term Janus was therefore an apt descriptor of neighbourhoods that embody the character of a disadvantaged community but whose children perform surprisingly well on the EDI, or vice versa. Neighbourhoods that are performing better than expected are called advantaged Janus neighbourhoods, while those that are performing worse than expected are called disadvantaged Janus neighbourhoods.

School Readiness

In the most traditional sense, readiness refers to whether the child is able to meet the demands of the school setting including being able to sit quietly and respond to instruction (Doherty, 1997; Kagan, 1992). More contemporary definitions differentiate between readiness to learn and readiness for school. Readiness to learn focuses primarily on an individual's readiness to comprehend and respond to instruction and is thought to be largely influenced by that individual's environment, whereas readiness for school pertains more to a young child's acquisition of specific skills thought to be necessary for success in school, such as cognitive and linguistic skills (Kagan, 1992). Current best practice suggests that measures of school readiness should incorporate assessment of the major developmental domains, including physical health, cognitive development, socioemotional health and competence, and language development (Doherty, 1997). In this research project, the term school readiness is used to reflect both the readiness to learn and readiness for school concepts, and unless otherwise specified, school readiness is conceptualized as being inclusive of the different developmental domains.

Kindergarten

Kindergarten refers to the level of formal schooling completed in the year prior to entering Grade 1. Kindergarten is compulsory in BC (Ministry of Education, 2001). It is

delivered in public and private schools and is available to all children who are five years old before December 31 in the school year in question (Ministry of Education). Children attend for a half day of instruction for one year of the standard school calendar (Ministry of Education). Kindergarten classes in public schools are taught by certified teachers and follow curriculum goals outlined by the Ministry of Education. Since the EDI is intended to measure the school readiness of children between the ages of four and six years, for the purposes of this study, the term kindergarten will refer to children attending school, who have not yet started Grade 1, and are between the ages of four and six years.

CHAPTER II

Review of the Literature

In this chapter the literature relevant to school readiness, neighbourhood context, and the relationship between the two is reviewed. This literature review is divided into two sections. In the first section, the literature on school readiness is reviewed. In the second section, the literature on the relationship between neighbourhood and school readiness is reviewed.

School Readiness

School readiness is a term that has received increasing attention recently, with both the Canadian and American governments highlighting the need to have children enter kindergarten ready and able to learn (Janus & Offord, 2000b; Zaslow et al., 2000). The purpose of this section is to review the literature on the definition of school readiness, the relationship of school readiness to other life outcomes, and the methodological and theoretical issues that accompany the measurement of school readiness.

The Importance of School Readiness

Early experience and early intervention are important determinants of children's developmental trajectories across the life course (Bloom, 1964; Hertzman & Wiens, 1996; McLoyd, 1998; Nelson, 2000). The focus on the early developmental period has led to an increased emphasis on the importance of school readiness as a marker of children's overall developmental progress. The United States government articulated its National Education Goals in 1990, with the first goal being: "by the year 2000 all children in America will start school ready to learn" (Zaslow et al., 2000, p. 4). The Canadian government indicated in the 1997 Federal Speech from the Throne that it is important to "measure and report on the readiness to learn of Canadian children so that we can assess our progress in providing our children with the

best possible start” (Janus & Offord, 2000b, p. 71-72). The Canadian government has since become involved in developing measures of school readiness, including the EDI. The BC provincial government has also acknowledged the importance of school readiness through initiatives to measure and support the competencies of kindergarten children (Mustard & Picherack, 2002). The involvement of government, and the interest of parents and educators has been motivated by research findings suggesting that school readiness is related to several important outcomes, including early academic success (Hertzman, 2004; Tremblay & Masselink, 1992), completion of high school (Barrington & Hendricks, 1989), and eventual gainful employment and the ability to contribute to society (see Doherty, 1997). It appears that children who are school ready in the early years of formal education are better able to capitalize on academic and social experiences, and as a result, develop high self-esteem to motivate success in future educational, personal and career endeavours (see Doherty, 1997). Unfortunately, as many as one quarter of Canada’s young children are not ready and able to learn at school entry (Willms, 2002a).

Defining School Readiness

Traditionally, school readiness has been defined at the level of the child and has included assessment of whether the child is able to meet the demands of the school setting, such as sitting quietly, and absorbing and responding to instruction (Doherty, 1997; Gillespie-Silver & Scarpati, 1992; Kagan, 1992). However, there has been much debate over the definition of school readiness, and in particular, over the concepts of readiness to learn and readiness for school (Kagan, 1992). Readiness to learn refers to an individual’s readiness to comprehend and respond to instruction, and is thought to be largely influenced by that individual’s environment (Kagan, 1992). The onus for early success is therefore placed on the child’s environment, including the

capacity of the school to be adaptive and flexible in meeting the child's needs. Alternatively, readiness for school refers to a young child's acquisition of specific concepts thought to be necessary for success in school, such as cognitive and linguistic skills (Kagan, 1992), with the onus for early success placed on the child.

The readiness to learn versus readiness for school dichotomy has grown out of the historical evolvement of our understanding of how children develop. The traditionally espoused maturationist perspective that is most strongly embedded in public education today, implies that readiness develops according to an internal clock that cannot be tampered with, that children have to meet a certain standard of knowledge and skill prior to school entry (readiness for school), and that achievement of this standard is highly individual, occurring on a different schedule for each child (Gredler, 1992; Kagan, 1992). According to the maturationist perspective, children should be kept out of school until they are ready to learn and able to live up to the expectations of the school environment, otherwise, the benefits of instruction will be minimal.

The maturationist perspective is giving way to a more contemporary perspective rooted in Vygotskian theory that is aligned with the "readiness to learn" concept. This Vygotskian perspective is based on the notion that the child needs to be stimulated for development to occur (Carlton & Winsler, 1999; Kagan, 1992). Vygotsky and Luria (1993) outlined how development occurs along a natural line and a cultural line. The natural line is a lower-order level of development involving maturation of the nervous system and other organic components of the child. The cultural line is a higher-order level of development that involves sculpting of the mind as a result of the cultural activities and stimulation that surround the child. In order for this higher order development to occur, the child must be exposed to "culture" and "stimulation". As

this Vygotskian perspective takes hold, definitions of school readiness are shifting. Instead of focusing on whether or not children are ready for school, they are beginning to incorporate the notion that schools must adapt instructional styles and goals to be ready for children. In this way, “school readiness” can be thought of as “an outcome of the early years” (Janus & Offord, in press, p. 3), whereby the child’s school readiness has been influenced by his or her environment and experiences over the first years of life.

With this shift in focus away from the readiness of children, and towards the readiness of schools, there is also an increasing emphasis being placed on the resources that exist within the community to foster child development and to support families as the primary teachers of children. Doherty (1997) expertly summarizes this in the following passage:

A prosperous society is one in which all citizens have the means to meet their basic needs, where there is social cohesion rather than social division, where the various segments of society cooperate for the common good, and where safe, attractive communities make it relatively easy to attract new citizens and new businesses. This type of society is associated with social stability as well as economic growth. Social stability and economic growth, in turn, provide the societal willingness and the resources to support optimal child development. Children whose development has been supported and encouraged are more likely to be ready for school at age six than children whose developmental needs have not been met. The extent of a child’s school readiness predicts the likelihood that the child will develop a strong sense of self-respect and a concern for others, have good people, literacy, numerical and problem-solving skills, and an interest in life-long learning. Citizens with these skills provide an innovative and competitive workforce as well as a caring, supportive community. This in turn, encourages economic

growth and social stability, both factors which increase the prosperity of the society (p.9).

Thus, school readiness is an issue that cannot be conceptualized as a trait belonging solely to the child, but instead should be viewed as a dynamic state of learning and development within the child that is supported by family, community, school and society (Kagan, 1992; Love, Aber, & Brooks Gunn, 1994; Meisels, 1999; Rimm-Kaufman & Pianta, 2000; Zaslow et al., 2000). This contemporary shift from the “readiness for school” to the “readiness to learn” concept, and the resultant emphasis on schools needing to be ready for children, has implications for the assessment of school readiness. These implications are discussed in the following section.

Approaches to Assessment and Measurement of School Readiness

Approaches to the Assessment of School Readiness

Meisels (1999) outlined four approaches to the assessment of school readiness, each with different theoretical roots. The first is the Idealist/Nativist approach, which suggests that school readiness is a maturational issue not alterable by environmental influences, being driven instead by the child’s internal clock. The second is the Empiricist/Environmental approach which, in contrast, attributes the development of school readiness entirely to external factors –school readiness is driven by the environment and is an absolute trait, being either absent or present (Zaslow et al., 2000). Third is the Social Constructivist approach, which holds that school readiness is a relatively defined concept that fluctuates according to the interpretation of the community within which the assessment of readiness is embedded. Fourth and finally is the Interactionist approach, which combines information about the child and the environments in which the child is learning to define school readiness as a “bi-directional concept,” focused on both the child’s learning and the school’s ability to meet the child’s needs.

Contemporary approaches to the assessment of school readiness typically acknowledge

an ecological foundation (Bronfenbrenner, 1977, 1979, 1986, 1992) and draw from the Social Constructivist and/or the Interactionist theoretical approaches (Meisels, 1999). Thus, the contributions of the child as well as the various settings within which the child exists, including home, school and community are important. In an effort to account for each of these contributions, assessments of school readiness have been encouraged by the National Education Goals Panel to include five key domains (as outlined by Doherty, 1997): (a) physical well-being and appropriate motor development, (b) emotional health and a positive approach to new experiences, (c) age-appropriate social knowledge and competence, (d) age-appropriate language skills, and (e) age-appropriate general knowledge and cognitive skills. Since a child who receives average to high ratings on each of these scales would presumably have received the care, attention, stimulation and nurturance needed from his/her home, community, and school for healthy development, it is thought that measurement of these five characteristics provides a window into the functioning of both the child and the multiple settings within which he/she exists.

Measuring School Readiness

Measures of school readiness typically assess either the child's attainment of important developmental milestones, or the child's store of academic knowledge (Carlton & Winsler, 1999). By assessing just one or the other of these, the predictive power of school readiness measures is often limited, with such measures correctly placing, on average, just over half of the children assessed (Carlton & Winsler). School readiness measures range from tests that are administered by teachers or other professionals to direct assessments that are administered under the rigorous supervision of qualified individuals, such as school psychologists. The extent to which readiness test results are actually predictive of future performance varies not only with the

chosen assessment measure but also with the rater (Carlton & Winsler). Despite variations in the predictive validity of different approaches to measuring school readiness, the costly nature of direct assessments has translated into a more frequent reliance on teacher-completed readiness tools (Carlton & Winsler; Teisl, Mazzocco, & Myers, 2001).

The psychometric properties of teacher rated assessments are variable. However, there are data that suggest teachers are valid and reliable judges of school readiness, with their judgements being relatively highly correlated with the child's future achievement (Meisels, 1999; Teisl et al., 2001). For example, teacher assigned marks in first grade are very predictive of a child's marks throughout elementary school, perhaps "because they are sensitive to the child's gender, ethnicity, and economic background" (Entwisle, Alexander, & Olson, 1997, p. 12). In addition, teachers are able to adequately account for other factors that may influence learning, by adjusting their assessment according to whether or not they believe the child's past performance is actually indicative of the child's potential, or if the performance has been hampered by low SES or other such factors (Vandivere et al., 2004). Thus, teacher judgements are seen as an effective way to evaluate a child's learning potential, and are often used as the vehicle by which school readiness is assessed (Teisl et al., 2001).

When to measure school readiness. To promote and facilitate early intervention, the goal should be to assess school readiness across the five domains previously named prior to a child's entrance into Grade 1. School readiness should not be measured prior to entrance into Kindergarten because this would suggest that there is "a common core of learning happening before school [entry]" (Janus & Offord, in press, p. 13) when instead, according to the "readiness to learn" interpretation of school readiness, readiness is more aptly conceptualized as a process that occurs over time. In order to establish a common core of learning and allow the "process" of

acquiring readiness to occur (Meisels, 1999), school readiness should be measured well into the kindergarten year but still with enough time to interpret the results and apply them towards intervention and prevention programming for Grade 1 (Janus & Offord, in press).

Community measures versus diagnostic assessment of school readiness. Although variables at the level of the individual child typically account for the largest proportion of variance in school readiness outcomes (Boyle & Lipman, 2002), there is a strong research literature that suggests neighbourhood environment also accounts for significant and meaningful proportions of variance (Leventhal & Brooks-Gunn, 2000). It stands to reason, therefore, that improvements in neighbourhood environment may promote the development of school readiness. Even small improvements in environment can positively influence outcomes for all children within that environment (Offord et al., 1999) and further, “a large number of children at a small risk for school failure may generate a much greater burden of suffering than a small number of children with a high risk” (Janus & Offord, in press, p. 4). In order to effectively link school readiness and neighbourhood environment, to advocate for changes that improve neighbourhood environment and promote school readiness, and to encourage schools to embrace the “readiness to learn” interpretation of school readiness, the assessment of school readiness needs to be completed much more widely than what is afforded by individual diagnostic assessment. That is, school readiness needs to be assessed for large representative groups of children within neighbourhoods. This, combined with the need to include all five of the key domains of school readiness (Doherty, 1997), and the time constraints to assess school readiness within a small period of time in the second half of the kindergarten year creates a measurement challenge: a tool is needed for the universal assessment of school readiness that assesses all five domains of school readiness, that is quick and easy to complete, and that is cost effective.

Specific tools for measuring school readiness are discussed next.

Instruments for measuring school readiness. Janus & Offord (in press) reviewed some of the more well-known and widely available measures of school readiness. These include the Gesell School Readiness Test (Haines, Ames, & Gillespie, 1980), the Developmental Indicators for the Assessment of Learning (Mardell-Czudnowski & Goldberg, 1998), the Brigance Diagnostic Inventory of Early Development (Brigance, 1992), the Lollipop Test (Chew & Lang, 1990), the Metropolitan Readiness Test (Swanson, Payne, & Jackson, 1981), and the Phelps Kindergarten Readiness Scale (Phelps, 2003). Janus and Offord note that of this collection of school readiness tests, there are only two that include an optional measure of social/emotional development, none permit assessment of children's relationships with peers or with adults other than their parents, and motor assessment is typically confined to fine motor skills. In addition, all require specialized training by an external examiner to administer (thereby increasing costs), and only three of these measures have been validated to "screen" for readiness. In this absence of appropriate measures for the universal assessment of children's school readiness across the five key domains in a cost-effective and time efficient manner, Janus and Offord (2000a) collaborated with teachers and other professionals to develop the EDI. It consists of 104 items allocated to five domains: Physical Health and Well-Being, Social Competence, Emotional Maturity, Language and Cognitive Development, and Communication and General Knowledge. The EDI was specifically designed to address the shortcomings of other school readiness measures. The EDI is intended for use at the community level, is based on teacher ratings, and is meant to be administered in the second half of the kindergarten year. The EDI, its psychometric properties, and its design are reviewed thoroughly in Chapter III.

The Relationship Between Neighbourhood Environment and School Readiness

The importance of a child's environment in stimulating healthy development is well established (Bronfenbrenner, 1977). More recently, neighbourhoods have emerged as a specific kind of environmental influence on early development (Brooks-Gunn et al., 1993; Chase-Lansdale & Gordon, 1996; Duncan, Brooks-Gunn, & Klebanov, 1994; Jencks & Mayer, 1990; Kohen et al., 2002). An investigation into the relationship between neighbourhood environment and school readiness in young children was the focus of the current study. In the following section, the relevant literature is reviewed, including the role of social context in development, the theoretical underpinnings of neighbourhood influences on early development, and the relationship between neighbourhood environment and cognitive, socioemotional, and physical health outcomes.

Social Context and the Impact of Early Experience on the Life Course

Early experience is important in establishing a healthy developmental trajectory for children that will sustain them across their life course (Hertzman & Frank, 2006; Hertzman & Power, 2006; Power & Hertzman, 1999). Positive early experience is made possible by social environments that are rich with culture and opportunities for development (see Hertzman, 2004). It is now well-established that a healthy start in a positive environment has implications for outcomes in a variety of domains, including physical aggression (Tremblay, 2004), emotional health and ability to respond to stress (Gunnar, 2000; Lupien *et al.*, 2006), cognitive development (Huttenlocher, Levine, & Vevea, 1998), language skills (Hart & Risley, 1992; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Walker, Greenwood, Hart, & Carta, 1994), and academic achievement (Walker et al., 1994). For children who begin life in an impoverished environment, it is important to intervene early, when development is the most rapid and

dynamic, and when the human mind is the most malleable (Bloom, 1964; McLoyd, 1998). For example, early intervention with highly disruptive kindergarten boys from lower SES areas has been shown to alter the long-term developmental trajectories of undesirable behaviours, including physical aggression, vandalism, and theft (Lacourse et al., 2002). Neurobiological studies also support the importance of early intervention, confirming that the early years represent a critical developmental period during which neural plasticity enables internalization of positive environmental change (see Nelson, 2000). Thus, early experience, whether positive or negative, becomes embedded in the child's organic make-up and impacts outcomes across all domains over the life course, including cognitive, social-emotional, and physical health. Researchers interested in the lasting impact of early experience call this process 'biological embedding' (Hertzman, 1999; Hertzman & Frank, 2006; Hertzman & Wiens, 1996).

Since the conditions surrounding a child during the early years of development have been shown to be important to healthy development across the life span, there has been much interest in understanding what conditions promote a healthy developmental trajectory. To better identify and understand these conditions, researchers typically invoke a life course perspective. Among other things, this perspective emphasizes the primacy of social context across all stages of development, and views social context as a vehicle by which development can be altered (Entwisle, Alexander, & Olson, 1997).

The impact of social context on development is witnessed, in part, through the presence of socioeconomic gradients whereby childhood vulnerability is ameliorated or exacerbated by the child's position on the economic social hierarchy (Adler *et al.*, 1994; Hertzman, 1999; Miller, Jenkins, & Keating, 2002). This impact has been noted for a variety of outcomes including mental health (Lupien, King, Meaney, & McEwen, 2001), language development (Hart

& Risley, 1992; Walker et al., 1994) and academic or behaviour outcomes (Miller et al., 2002; Raudenbush & Kasim, 1998). Presumably, the social context that accompanies differing positions on the economic social hierarchy, such as differences in neighbourhood conditions, has an impact on the developmental trajectory of the child (Hart & Risley, 1992; Miller et al., 2002; National Research Council Institute of Medicine, 2000).

Genetic Versus Environmental Influences on Developmental Outcomes

While the impact of social context on early development is well-established, the nature versus nurture debate persists. A major criticism of research looking at environmental effects on early development is the possibility that the association between environmental factors, such as impoverished neighbourhoods, and developmental outcomes is erroneous, being instead attributable to a third variable - that of genetics (Rowe & Rodgers, 1997). For example, in the case of neighbourhood factors influencing childhood cognitive development, parents may genetically pass along cognitive ability to their children, and further, if reduced parental cognitive ability limited the parents' likelihood of securing a well-paid job so they could afford to live in a desirable neighbourhood, then there would be a spurious correlation between neighbourhood factors and cognitive ability, with both being better explained by genetic factors (Caspi, Taylor, Moffitt, & Plomin, 2000 provide a similar example with behavioural tendencies). Thus, social scientists must acknowledge both the notion of a gene-environment correlation and that of a gene-environment interaction.

Most social scientists would concede that developmental outcomes are influenced by both genetic and environmental factors. However, it is possible that in some situations, the environmental factors assume added importance. This may be the case, for example, with children from lower SES families. For these children, environment may become more important

as it works to combat or exacerbate the ‘selection effects’ (such as parental mental health, and/or parental IQ) that may have resulted in that child’s designation as ‘low SES’ in the first place. Indeed, heritability estimates for academic achievement were found in one study to be lower for children living in poorer areas, lending some credence to the idea that environment can alter the impact of certain traits that are at least partially genetically encoded (Scarr, 1981). This finding is further supported by research specifically designed to measure heritability coefficients and environmental effects (including neighbourhood deprivation) on children’s cognitive and behavioural outcomes, indicating that the way children react to deprivation is partly heritable and partly environmental, with a significant proportion of the variance being accounted for by environmental effects (Caspi et al., 2000; Kim-Cohen, Moffit, Caspi, & Taylor, 2004). While most studies do find a connection between environment and developmental outcomes, it is worth noting that the effect sizes can be small. However, they are hardly trivial (Prentice & Miller, 1992), being similar in magnitude to the “impact of dramatic environmental events, such as premature loss of a parent through death or separation on psychopathology” (Caspi et al., 2000, p. 341). Overall, it is clear that environmental deprivation, such as living in an impoverished neighbourhood, has a significant degree of influence on developmental outcomes and that this influence cannot be explained simply with genetics (Huston, McLoyd, & Garcia Coll, 1997).

Specific Social Contextual Influences on Developmental Outcomes

Previously, hard-wired biological differences in children were used as the primary predictors of developmental outcomes. However, an abundance of research has established that contextual factors also have predictive power for developmental outcomes. For example, in the Collaborative Perinatal study, it was found that cognitive outcomes by age 4 were better explained by contextual variables such as family SES or maternal education, than by 161

biomedical variables assessing the condition of the mother and child in the first postpartum year (Broman, Nichols, & Kennedy, 1975). Recent research has documented the relationship between a variety of contextual factors and development, including maternal depression, adolescent parenthood, low level of home stimulation, low maternal education, and lone-parent family structure, (Dahinten & Willms, 2002; Field, 1998; Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002; McLoyd, 1998; Resnick *et al.*, 1999). In addition, SES has been found to have a significant relationship to developmental outcomes, with children who are exposed to poverty at very young ages having lower scores on a variety of cognitive and behavioural outcomes evident as early as age 2 (Barnett, Macmann, & Carey, 1992; McLoyd, 1998; Stipek & Ryan, 1997; Vandivere et al, 2004; Zaslow, Calkins, & Halle, 2000).

Beyond parent and family level contextual variables, neighbourhood factors have also been empirically linked with poorer developmental outcomes (Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993; Caspi et al., 2000; Chase-Lansdale & Gordon, 1996; Hertzman, McLean, Kohen, Dunn, & Evans, 2002; Kershaw, Irwin, Trafford, & Hertzman). Neighbourhoods may be seen as having a logical connection to development since they often act as a societal vehicle that brings people of similar backgrounds, belief systems, and economic situations together in a common setting (Sampson, Morenoff, & Gannon-Rowley, 2002). The people that share a neighbourhood, thus also often share a culture and a set of norms that may influence parenting practices, behavioural patterns, political agency, public safety, and access to resources, such as quality schools and childcare (Sampson, 1999). In this way, neighbourhoods create a social context that directly influences development.

Although neighbourhood effects on early development are the primary focus of the current research study, the role of individual and family level variables in early development,

and their interrelationships with neighbourhood level variables should not be overlooked.

Neighbourhoods exist because of the individuals and families that inhabit them. These individuals and families have self-selected (willingly or not) into their neighbourhoods, making the features of those neighbourhoods inextricably linked to the individuals and families that live in them (Tienda, 1991). Thus, neighbourhood effects must be considered in terms of an interwoven context of individual, family, and neighbourhood level factors (Brooks-Gunn et al., 1993; Duncan, Connell, & Klebanov, 1997).

Defining Positive Social Context

The ideal environment for early development is one that provides a steady source of quality stimulation that accumulates over time to influence positive outcomes. A child's brain should be thought of as "an 'environmental organ' just like the lungs or the skin, growing and developing according to the amount and quality of stimulation in [the] immediate environment" (Hertzman, 2004, p. 4). Healthy development is facilitated by access to a variety of resources provided by parents, teachers, or other community members. Entwisle et al. (1997) detail three categories of contextual resources that promote early development. First, is the availability of sufficient expendable income to provide materials and outings that have an underlying goal of education, such as: books, games, and computers; trips to museums, zoos, science centres, historical sites, sporting events, and summer camps; and access to tutoring, musical instruments, and hobby equipment. Second, is access to the more intangible experience of positive expectations. The power of expectations from important adults in a child's life has been known for many years (Rosenthal & Jacobson, 1968). Children of parents who expect them to lead productive and successful lives may be more likely to succeed in personal and professional endeavours. Third, is a stimulating neighbourhood of residence where children have access to positive role models,

safe outdoor play spaces, libraries and other institutions, and conscientious adults who are invested in the safety and well-being of all children.

The Theoretical Underpinnings of Neighbourhood Influence on Development

Ecological Theory

Ecological theory (Bronfenbrenner, 1977, 1979, 1986, 1992) provided the foundation for the human ecological perspective of early risk. This perspective highlights the role of environmental influences in determining developmental trajectories, and takes into account: (a) the constitution of the child, (b) the interactions of the various social systems that shape the world surrounding the child, and (c) the interplay between (a) and (b) (Garbarino & Ganzel, 2000). Bronfenbrenner proposed a theory to explain this interplay. He suggested that the various influences guiding child development can be accounted for by five subsystems:

1. The microsystem represents the immediate surroundings of the child, including activities, roles, and relationships occurring in a specific concrete environment. As applied to examining the relationship between neighbourhoods and child development, the microsystem would include the direct influences within a child's daily life, such as the peers and role models within communities that encourage developmental advancement.
2. The mesosystem is the relationship among settings (microsystems) that are actively influencing an individual's development, such as school and home, or home and neighbourhood. In a neighbourhood where connections are made between home, school, and neighbourhood agencies through school parent advisory committees, neighbourhood block-watch programs, and so forth, a child will likely have access to more resources. This child will, in turn, experience more opportunity for development and growth.

3. The exosystem is a system in which the developing person does not have a direct role but which indirectly influences the environment(s) that this person actively participates in. Exosystems that impact child development may include parental workplace, school boards, religious organizations, community and neighbourhood organizations, and parental social networks. Within the domain of neighbourhoods, one strategy for indirectly encouraging healthy development of children is to transform exosystems into microsystems for the parents by, for example, having parents actively interact with the neighbourhood school or care facility (Garbarino & Ganzel, 2000).

4. The macrosystem is abstractly defined as the ideological milieu that influences the workings and interrelationships of the micro-, meso-, and exo-systems. Bronfenbrenner suggested that there is an exchange of beliefs within and between these systems. For example, the belief systems of residents in a given neighbourhood will influence and be influenced by existing neighbourhood supports (educational and law enforcement institutions, recreational facilities, care centres, etc.) which will, in turn, influence child development by either encouraging or discouraging exploration and learning.

5. The chronosystem reflects the idea that the passage of time creates a historical context. This ever-changing historical context influences the child's current development. In the case of neighbourhood research, consideration of the chronosystem via longitudinal studies is important as it allows investigation of both the point(s) of occurrence of neighbourhood deprivation and the duration of those occurrences (Jencks & Mayer, 1990; McLoyd, 1998), as well as the extenuating historical circumstances that may have precipitated an individual's change in neighbourhood of residence or a change in the status of this neighbourhood. Neighbourhood research that accounts for the chronosystem

is limited, which has contributed to a blurring of the underlying mechanisms by which this influence acts (Robert, 1999).

Bronfenbrenner's ideas and the human ecological perspective of risk are widely accepted in contemporary research on child development, and have provided a foundation for many of the theories and models that attempt to account for the relationship between neighbourhood environment and child development (Earls & Carlson, 2001).

Neighbourhood Effects Models and Mechanisms

In a series of articles published in *The Truly Disadvantaged* (1987), Wilson outlined how inner-city areas in the United States had become increasingly transformed into concentrated areas of extreme poverty. This concentration of poverty and joblessness in certain neighbourhoods, he argued, resulted in residents of those neighbourhoods having reduced access to quality educational institutions, being isolated from informal job networks, and lacking opportunities to socialize with other economically successful individuals, thereby minimizing their exposure to the norms and behaviour patterns that typically result in such success. For children, the result is a combination of factors within their neighbourhood environment that places them at a high risk for developmental problems (Coulton & Pandey, 1992). Several theoretical perspectives have since been proposed to explain how neighbourhood context influences development. These perspectives typically take two forms: those that focus solely or partially on the physical features of neighbourhoods, and those that focus on the social processes of neighbourhoods.

Physical features mechanisms. The theoretical approaches highlighting the physical features of neighbourhoods include the 'neighbourhood as site' model, where the neighbourhood is reduced to a physical site that houses buildings, parks, homes and streets (Bennett, 1993). The

underlying idea is that improvements to the physical neighbourhood result in improved lives for residents. Three other models also incorporate a physical features mechanism, but unlike the 'neighbourhood as site' model, these three models acknowledge that there are social processes tied to physical features. The first is the Neighbourhood Disorder Model, which details the manifestation of neighbourhood decline via physical (and social) incivilities (Wandersman & Nation, 1998). Second is the Environmental Stress Model, which targets both environmental stressors, such as noise, crowding, and pollution, as well as stressors in the built environment, such as high-density housing and high-rise buildings (Wandersman & Nation, 1998). Third is the Routine Activities Model, which is founded on an 'institutional mechanism,' and highlights the impact of local land use patterns and the distribution of day-to-day activities on children's development, such as access to schools and the public transportation system (Sampson et al., 2002). While these three models include physical features of neighbourhoods as the primary mechanism, it is clear that the physical features outlined are linked to social processes. For example, abandoned buildings, vandalism, litter and dilapidated housing have a social component because they arise due to peer effects and a lack of quality neighbourhood resources, institutions, and role models.

Social processes as mechanisms. In their seminal paper, Jencks and Mayer (1990) outlined six models that promote different social mechanisms for explaining how neighbourhoods influence development. These models are divided into two groups: those that suggest having affluent neighbours produces advantages for all residents, regardless of status; and those that suggest having affluent neighbours produces disadvantages for less affluent residents.

The three models that suggest having affluent neighbours is beneficial for all are: the

epidemic model, the collective socialization model (also referred to as the social isolation model), and the institutional model. The epidemic model is underscored by a peer influences mechanism, whereby the successes and positive behaviours of affluent neighbours are 'catching' amongst less affluent neighbours, creating an epidemic of positive outcomes (see also Crane, 1991; Small & Newman, 2001). The collective socialization model asserts an indigenous adult influences mechanism, whereby adults in the community have an influence on children who are not their own, and can act as role models to positively influence all children (see also Small & Newman, 2001). The institutional model is based on an outside adult influences mechanism, with adults from outside the community (such as school and law personnel) entering into the community via their corresponding institutions and positively influencing all children by acting as 'imported' role models.

The three models that suggest having affluent neighbours is a disadvantage to less affluent residents are: the relative deprivation model, the competition effects model, and the cultural conflict model. The relative deprivation model is based on the rationale that individuals evaluate their own successes and failures relative to those living in close proximity to them. Thus, less affluent neighbours are more likely to deem themselves failures relative to their affluent peers and subsequently engage in maladaptive coping mechanisms, while affluent neighbours will flourish because of their perception of being comparatively well-off (Small & Newman, 2001). The competition effects model asserts that resources are not as sought after if they are plentiful. Therefore, in a neighbourhood that has both affluent and less affluent residents, the affluent residents will dominate in terms of securing access to scarce resources, such as jobs and high-quality child care. The cultural conflict model suggests that the less affluent group who is unable to meet the expectations of the affluent norm, create a subculture

that opposes the norms and values of the greater culture (Jencks & Mayer, 1990; Massey & Denton, 1987). Thus, instead of affluent neighbours encouraging like-minded behaviour, they encourage deviant behaviour because their standards of success are deemed unattainable by the less affluent subgroup.

Empirical Support for Neighbourhood Effects Models and Mechanisms

Most neighbourhood effects research infers underlying processes rather than measuring these processes directly (McLoyd, 1998). Jencks and Mayer (1990) refer to this as the “black box model of neighbourhood ... effects” (p. 115). The black box problem stems from a reliance on census data or data from other large collection efforts that are often limited to a small number of variables and that may not include key variables required to directly measure underlying processes. Despite this, there is an emerging consensus as to which models and mechanisms account for neighbourhood effects.

Those models that strictly address the physical features of a neighbourhood, such as the ‘neighbourhood as site’ model, have not been supported. Improvement of the physical site without consideration of accompanying social issues only serves to displace less affluent residents in favour of more affluent residents and a homogenized social and physical space (Bennett, 1993). Models that promote a physical mechanism with underlying social features have received much more support (Sampson et al., 2002; Wandersman & Nation, 1998). Overall, however, it appears that models advancing a social mechanism are best able to account for outcomes, particularly child development outcomes. Among these, the collective socialization model has received considerable support in the recent literature. For instance, Chase-Lansdale and Gordon (1996) contend that more economically secure neighbourhoods have an advantage because they are endowed with positive adult role models, substantial resources, and a network

of trustworthy adults that monitor the activities of resident children and youth. Additionally, Brooks-Gunn et al. (1993) found that the presence of affluent neighbours positively affects the development of children and adolescents (more so than the presence of poor neighbours detracts from this) because affluent neighbours ensure the presence of resources and role models that afford children ample opportunity for healthy development. Entwisle and colleagues (1997) also highlight the potential positive influence of affluent neighbours with the 'faucet theory', where the neighbourhood 'faucet' turns on and replaces the school as a resource that can provide stimulation, guidance, and positive adult role models when schools are closed for summer holidays. Overall, the models advancing social processes seem to have garnered the most empirical support, and of these, the collective socialization model, with its emphasis on the role of indigenous adults as positive influences on children, has been consistently empirically supported.

The Link Between Neighbourhood Effects Models and Ecological Theory

While the preceding discussion on neighbourhood effects models and mechanisms does not directly mention ecological theory, it is clear that Bronfenbrenner's (1977, 1979, 1986, 1992) ideas are aptly applied. Each of these models involves examining the impact of nested systems that exist in neighbourhoods. For example, the Institutional Model (Jencks & Mayer, 1990) considers the influence of adults, such as teachers and school officials, who are 'imported' into the community in a professional capacity. These individuals would be guided by policy based on the ideological values of the greater society (the macrosystem). These values would then trickle down to impact the governance of school boards and parent-advisory committees (exosystems), whose purpose it is to shape and mould a vision of a school. This vision is then interpreted through the daily operations of various settings within which a given child interacts, such as how

a teacher or school structures the day (the mesosystem). Finally, the world that the child experiences is collectively defined by his/her daily encounters in each of these individual settings (microsystems).

Neighbourhood Influences on Developmental Outcomes

The various aspects of development influenced by the neighbourhood environment include cognitive and educational outcomes, socioemotional and behavioural functioning, and physical health. Much of this research has focused on the late adolescence age group because this is a pivotal transition point in development (Brooks-Gunn et al., 1993; Small & Newman, 2001). Early childhood has been focused on to a lesser extent in the neighbourhood effects literature, but is considered equally pivotal because change is very rapid and dynamic during this period, making developmental outcomes more susceptible to neighbourhood influences (Brooks-Gunn et al., 1993). The following review focuses primarily on neighbourhood effects on early development, although the impact of neighbourhood effects across other age groups is acknowledged.

Neighbourhood Influence on Cognitive Outcomes and Educational Achievement

In a review of the literature, Leventhal and Brooks-Gunn (2000) indicated that neighbourhood variables have been directly and consistently linked with cognitive outcomes for children ages 3 and up, even after accounting for individual- and family-level characteristics. Most of the literature addressing the relationship between neighbourhoods and cognitive development draws from large-scale data collection efforts that include indicators of neighbourhood context and measures of cognitive or academic outcomes. Amongst these are the Infant Health and Development Program (IHDP) and the National Longitudinal Study of Youth – Child Supplement (NLSY-CS) – both American efforts. Comparable Canadian research on

young children is now possible with the National Longitudinal Survey of Children and Youth (NLSCY; see Willms, 2002), and with the increasing use of the EDI, particularly in the provinces of BC and Ontario.

Chase-Lansdale and Gordon (1996) investigated the relationship between neighbourhood environment and the cognitive development of 5- and 6-year-old children using data from the NLSY-CS. The neighbourhood indicators in this study were SES, male joblessness, adult presence for monitoring and supervision, concentration of people, and racial similarity of neighbours to the child. Cognitive development and academic achievement were measured with the Peabody Picture Vocabulary Test, Revised Edition (PPVT-R) and the Peabody Individual Achievement Test (PIAT) respectively. Results indicated a positive and significant relationship between all neighbourhood variables (except adult presence) and PPVT-R results, and between adult presence and neighbourhood SES and PIAT results.

Using data from the IHDP, Klebanov, Brooks-Gunn, McCarton and McCormick (1998) further examined the influence of neighbourhood factors on child cognitive development. They found that neighbourhood income predicted cognitive outcomes on the Stanford-Binet Intelligence Scale Form L-M, third edition, as early as age 3. Also using data from the IHDP, Brooks-Gunn and colleagues (1993) found that additional neighbourhood variables, including racial composition, extent of female family headship, proportion of families receiving social assistance, the amount of male joblessness, and the overall concentration of poverty, were associated with 3-year-old children's cognitive outcomes as well. Further, Brooks-Gunn and colleagues' (1993) reported that improved cognitive outcomes were not related to an increased proportion of moderate-income neighbours (\$10 000 and \$30 000 per annum), but were related to an increased proportion of affluent neighbours (>\$30 000 per annum). Similarly, Duncan,

Brooks-Gunn and Klebanov (1994) found that neighbourhood SES was a significant determinant of cognitive development for 5-year-old children, and that the presence of affluent neighbours (> \$30,000 per annum) and not the absence of poor neighbours was more important. This finding has been replicated with Canadian research by Hertzman and colleagues (2002) who found that childhood vulnerability rates, as measured by the EDI, were lower in low income neighbourhoods with mixed non-market and middle class housing compared to low income neighbourhoods that did not have mixed housing, suggesting that the mix of affluent and less affluent neighbours may contribute to improved outcomes. Such results may support a collective socialization model of neighbourhood effects, with affluent families encouraging healthy development by acting as positive role models for less affluent families and their children.

Additional Canadian research on the relationship between neighbourhoods and cognitive development has been completed with data from the NLSCY. Kohen and colleagues (2002) examined the relationship between neighbourhood income (percentage of poor and affluent families, the percentage of female-headed families, and the level of unemployment), neighbourhood physical and social disorder, and neighbourhood cohesion and 4- and 5-year-old Canadian children's receptive verbal ability as measured by the PPVT-R. They found significant associations in the expected directions between verbal ability and neighbourhood poverty, the proportion of female-headed families, neighbourhood physical and social disorder, and neighbourhood cohesion. All of these effects remained statistically significant even after family level variables were accounted for. Kohen, Hertzman and Brooks-Gunn (1998) also studied the relationship between neighbourhoods and early cognitive competencies for 4- and 5-year-old Canadian children using the NLSCY. They report similar findings to Kohen et al. (2002) although they highlight an important finding – it is the proportion of affluent neighbours and not

the proportion of poorer neighbours that is key, consistent with other Canadian and American findings (e.g. Brooks-Gunn et al., 1993; Duncan et al., 1994; Hertzman et al., 2002). This suggests that a heterogeneous neighbourhood, with a mix of both affluent and less affluent residents, as compared to a homogenously less affluent neighbourhood, may better support young children's development.

Other Canadian research includes that of Kozyrskyj and colleagues (2002) who studied the relationship between neighbourhood environment and academic achievement in Manitoban children using data from the National Population Health Survey, the NLSCY, and the Department of Education, Training, and Youth. They found that children living in Winnipeg neighbourhoods with higher levels of socioeconomic risk and fewer resources, performed significantly more poorly on provincially administered standardized assessments of Grade 3 mathematics achievement than their more affluent peers. Tremblay, Ross, and Berthelot (2001) completed similar research in Ontario and found that test scores on standardized assessments of mathematics, reading and writing in Grade 3 were related to neighbourhood SES. Additional work in Manitoba by Brownell and colleagues (2004) found that children from low SES neighbourhoods are doing significantly worse on standardized tests throughout the school years. Brownell et al. suggest that these disparities appear prior to school entry, making it important that children's competencies in the early years are systematically assessed so appropriate interventions can be put in place.

Additional Canadian research has been completed by investigators using the EDI as an outcome measure. Janus (2002) and Janus, Walsh, Viveiros and Offord (2002) reported correlations for children in Ontario between the total EDI score (including measures of cognition) and several neighbourhood socioeconomic characteristics, including unemployment

rate, education level, recent immigrant status, low income rate, home ownership rate, residential mobility, knowledge of an official language, incidence of government transfer payments, and lone-parenthood. Janus, Walsh, Viveiros, Duku, and Offord (2003) used more sophisticated HLM techniques and reported that, for children in Ontario, neighbourhood-level variables including average income of residents, the proportion of low income residents, the proportion of adult residents without a high school diploma, and the proportion of residents who are lone parents were significant predictors of outcomes on the Language and Cognitive Development domain and the Communication Skills and General Knowledge domain of the EDI. Kershaw and colleagues (2005), using a sample of BC children, also linked EDI outcomes in these domains to a variety of neighbourhood characteristics via regression. Kershaw and colleagues found that EDI outcomes were correlated with a variety of neighbourhood-level characteristics, including median family income, home ownership rates, gender-income disparity, unemployment rates, proportion of females in manufacturing positions, proportion of males in management positions, proportion of males performing no unpaid childcare, proportion of adults performing no unpaid housework, proportion of lone-parent families, proportion of males who drive to work¹, proportion of first generation Canadians, proportion of residents who had lived in the neighbourhood for the past five years, proportion of aboriginal residents, proportion of non-Christians, and the proportion of residents using a foreign home language. These correlations were primarily in the expected directions. Oliver, Dunn, Kohen and Hertzman (in press) also examined neighbourhood influences using the EDI. They reported that EDI outcomes on the

¹ Kershaw et al. examined the correlation of the “males who drive to work” variable with other neighbourhood characteristics and found that it was negatively correlated with the proportion of the population that had moved in the past year and positively correlated with the proportion of the population that was married. They therefore cautiously suggested that it may be an indicator of neighbourhoods where adults are “more settled and enjoy more secure spousal relationships” (p. 63).

Communication and General Knowledge domain were associated with the proportion of residents claiming English as their mother tongue, residential stability, and the proportion of residents without a high school certificate. Oliver et al. also reported that EDI outcomes on the Language and Cognitive Development domain were associated with the proportion of lone-parents, residential stability, and median family income.

Beyond predicting cognitive outcomes and educational achievement, neighbourhood environment has also been found to predict educational attainment within the formal school years (up to grade 12), including number of years completed and likelihood of graduating from high school (Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993; Brownell et al., 2004; Duncan et al., 1994; Garfinkel & McLanahan, 1986; Garner & Raudenbush, 1991; McLoyd, 1998). Interestingly, it appears that children who live in family poverty for even one year during their formative years of development are 6% less likely than their peers who were not exposed to impoverished conditions to graduate from high school (Haveman & Wolfe, 1994). It is interesting to consider this finding in relation to the neighbourhood effects literature, with the hypothesis being that family poverty as a variable aggregated at the neighbourhood level may also predict lower graduation rates.

In summary, neighbourhood context has been shown to account for cognitive outcomes and academic success in children as young as 3, even when accounting for family- and individual-level variables. There also appears to be a relationship between neighbourhood context and educational attainment, with even short exposure to impoverished neighbourhood environments in the formative early years resulting in a decreased likelihood of high school graduation.

Neighbourhood Influence on Socioemotional and Behavioural Outcomes

Research addressing the relationship between neighbourhoods and socioemotional

outcomes typically involves middle childhood or adolescent samples, with studies of early childhood being more limited. Leventhal and Brooks-Gunn (2000) reviewed this literature and found that the relationship between neighbourhoods and socioemotional outcomes was less consistent than that for cognitive outcomes. However, many researchers have found that poverty and low neighbourhood SES are associated with increased rates of deviant behaviour, mental distress, teenage pregnancy rates, and risk-taking behaviours among adolescents (e.g. Aneshensel & Sucoff, 1996; Beyers, Bates, Pettit, & Dodge, 2003; Brody *et al.*, 2001; Brody *et al.*, 2003; Brooks-Gunn *et al.*, 1993; Colder, Mott, Levy, & Flay, 2000; Elliot, Wilson, Huizinga, & Sampson, 1996; Plybon, 2001; Sampson *et al.*, 2002). The results for younger children are less consistent, as reviewed below.

Duncan and colleagues (1994) examined the relationship between neighbourhoods and early childhood socioemotional development and found that an increased prevalence of low-income neighbours (defined as the fraction of neighbours with incomes less than \$10,000 per annum) was associated with higher levels of externalizing behaviour problems in 5-year-old children, as measured by the Revised Child Behaviour Profile. Duncan *et al.* suggest that parents in impoverished neighbourhoods may view aggressive behaviour in children as an adaptive skill because the atmosphere of the neighbourhood may require that children are better able to defend themselves.

Chase-Lansdale and Gordon (1996) found further evidence of neighbourhood effects on early behavioural functioning in 5- and 6-year-old children. However, the relationship between neighbourhood variables and behavioural outcomes was not as salient as with their concurrent analyses of cognitive outcomes. From the group of neighbourhood-level variables used in this study, which included neighbourhood SES, male joblessness, adult presence for monitoring and

supervision, concentration of people, and racial similarity of neighbours to the child, the only significant effect was that of male joblessness on internalizing behaviour problems as measured by the Behaviour Problems Index (a composite measure constructed for use in the NLSY-CS). There were no significant effects of any of the neighbourhood variables on externalizing behaviour problems.

Caspi, Taylor, Moffit and Plomin (2000) provided additional evidence that neighbourhood variables influence behavioural outcomes via a twin study design with 2-year-olds and the use of a parent-rated behaviour scale (designed for this study). Neighbourhood impoverishment was defined according to "A Classification of Residential Neighbourhoods" (ACORN), which is comprised of 79 items measuring educational qualifications of residents, unemployment, and housing types, among other things. Results indicated that neighbourhood has a small but significant effect on behavioural outcomes, and that this effect is separate from any potential genetic component.

Brooks-Gunn and colleagues (1993) also looked at the behavioural development of young children (3-year-olds) in relation to neighbourhood context. Contrary to the findings of Duncan et al. (1994), Brooks-Gunn et al. reported that the prevalence of low income neighbours (annual income less than \$10,000) did not influence childhood behavioural outcomes. However, an increased proportion of affluent families in the neighbourhood (annual income greater than \$30,000) was significantly associated with behavioural outcomes in the expected direction.

Kalff and colleagues (2001) examined the link between child problem behaviour (as measured by the Child Behaviour Checklist-Dutch Version) and neighbourhood unemployment, dependence on social welfare, tenure, and proportion of single parent families, non-voters, and foreign born residents with a sample of 5- to 7-year-old Dutch children. Results

indicated that neighbourhood SES was positively and significantly associated with child problem behaviour, and further, that this was the case even after adjustment for individual level SES.

Canadian-based research using the NLSCY has also documented the link between neighbourhood characteristics and behavioural outcomes in young children. Kohen and others (2002) found that neighbourhood affluence and neighbourhood cohesion were significantly associated with behavioural outcomes for 4- and 5-year-old children in the expected directions, even after controlling for family-level SES characteristics. However, neighbourhood physical and social disorder were not significantly associated with behavioural outcomes. Curtis, Dooley, and Phipps (2004) found that emotional problems, conduct disorder, and hyperactivity were related to neighbourhood quality for children ages 4 through 11, although the strength of this relationship was stronger for neighbourhood cohesion, while neighbourhood safety appeared to be less important. Other research using the NLSCY has been completed by Kohen, Hertzman and Brooks-Gunn (1998) who found that neighbourhood affluence, the proportion of single female-headed families, and neighbourhood unemployment are associated with behavioural outcomes for preschool aged children; and by Kohen, Dahinten and McIntosh (2003), who also suggested that there is a relationship between neighbourhood factors and behavioural outcomes for preschool aged children

There are also several additional Canadian studies reporting associations between neighbourhood characteristics and children's outcomes using the EDI. Hertzman and colleagues (2002) reported that neighbourhoods with higher levels of disadvantage (aggregated at the neighbourhood level) in terms of unemployment, low-income status, social assistance rates, low educational attainment, and high rates of lone-parenthood, also have higher levels of at-risk children, not only in regards to socioemotional and behavioural development, but across all areas

of development. Janus et al. (2003) also reported a linkage between EDI outcomes on the Social Competence and Emotional Maturity domains and neighbourhood characteristics such as average income, low income rate, proportion of adults without a high school diploma, percentage of lone-parents, and residential stability. Additional research on neighbourhood effects on socioemotional outcomes using the EDI was completed by Kershaw and colleagues (2005). They reported that EDI outcomes on the Social Competence and Emotional Maturity domains were associated with neighbourhood-level variables including median family income, employment rates, and the percentage of males in management positions, males performing no unpaid childcare, lone-parents, and males who drive to work. Oliver and colleagues (in press) also demonstrated a relationship between EDI outcomes on the Social Competence and Emotional Maturity domains and neighbourhood-level characteristics with proportion of lone-parent families being a significant predictor for both outcomes, while neighbourhood median family income was a significant predictor for only the Emotional Maturity outcome. Although results were not reported between specific EDI subscales and neighbourhood effects, Janus et al. (2002) and Janus (2002) also found significant associations between neighbourhood characteristics and the overall EDI score, as previously discussed.

Three additional studies that did not focus on early childhood but did focus on children in early elementary school report similar results for neighbourhood influences on behavioural outcomes. Attar and colleagues (1994) found that for children in the second through fourth grades, neighbourhood disadvantage, including higher levels of poverty, unemployment, limited resources, substandard housing, and high crime rates, was associated with chronic and pervasive rises in stress for all residents. This stress, in turn, was associated with an increase in teacher and peer-nominated ratings of children's aggression on the CBCL. Similarly, Dubow, Edwards, and

Ippolito (1997) found that neighbourhood disadvantage and exposure to stressful events for children in Grades 4, 5, and 6 were related to increased antisocial behaviour. Finally, Brody et al. (2001) studied neighbourhood influences on behavioural development for 10- to 12-year-old children and found that neighbourhood disadvantage was associated with deviant peer affiliation at or before the upper elementary school years.

Overall, it appears that the relationship between neighbourhood environment and socioemotional/behavioural outcomes is less consistent than for cognitive outcomes. In addition, the strength of the relationship between neighbourhood environment and socioemotional/behavioural outcomes is higher for adolescents than for young children, although a significant effect has been found in all age groups.

Neighbourhood Influence on Physical Health Outcomes

There exists a substantial body of research documenting the impact of environmental variables on health outcomes across the age spectrum. It appears that health, as with cognitive and socioemotional/behavioural outcomes, fluctuates according to a socioeconomic gradient, and in particular, is influenced by neighbourhood SES (Sampson, 2003). Shaw and McKay's (1942) research brought the neighbourhood-health relationship to the forefront of the literature with findings that highlighted a connection between impoverished urban neighbourhoods and infant mortality, low birth weight, mental illness and other health outcomes. To date, much of the existing literature on the connection between neighbourhoods and physical health has involved adult samples, with results indicating that lower neighbourhood SES is associated with lower levels of physical activity, consistent declines in perception of physical wellness, and higher levels of long-term illness, depressive symptomatology, mortality, and cardiovascular disease (Anderson et al., 1997; Bosma, Van de Mheen, Borsboom, & Mackenbach, 2001; Ellen,

Dillman, & Mijanovich, 2001; Elliott, 2000; Leventhal & Brooks Gunn, 2001; Pearl, Braveman, & Abrams, 2001; Sundquist, Malmstrom, & Johansson, 1999). Research specific to the Canadian context has also suggested a relationship between adult health and neighbourhood environment (e.g. Ross, Tremblay, & Graham, 2004).

There is also research that has looked at the relationship between neighbourhood factors and physical health in children. Overall, results suggest that poorer neighbourhood conditions, such as higher percentages of low-income households, single-parent families, people without high school degrees, and unemployment, covary with low birth weight, infant mortality, childhood injury, and allergies (Durkin, Davidson, & Kuhn, 1994; Earls & Carlson, 2001; Ellen et al., 2001; Leventhal & Brooks Gunn, 2001; Luo *et al.*, 2004; Pearl et al., 2001; Sampson et al., 2002; Soubhi, Raina, & Kohen, 2001). In addition, when children move from higher-poverty neighbourhoods to lower-poverty neighbourhoods, they experience improvements in their physical health (Leventhal & Brooks Gunn, 2001).

Canadian research that has focused specifically on the relationship between neighbourhood and physical health in children includes work done with the NLSCY. Curtis, Dooley, and Phipps (2004) found that childhood injuries in children ages 4 through 11 in the NLSCY increased as the quality of the neighbourhood (safety, cohesion, and 'problems') decreased, although this finding was not as strong as findings related to emotional problems, conduct disorder, and hyperactivity. Soubhi (2004) found similar results using data from the NLSCY, even after accounting for child age, child gender, child temperament, child behaviour, and parenting style. Soubhi's analysis also indicated that neighbourhood cohesion was more important for reducing childhood injury in early childhood, while neighbourhood SES was more important in adolescence.

Brownell, Friesen and Mayer (2002) completed additional research on Canadian children using data from the Population Health Research Data Repository. They confirmed a relationship between neighbourhood context and physical health, with poorer regions and communities having higher premature mortality rates and higher injury rates. Other research in Manitoba has indicated that, compared to children living in a poorer Winnipeg community, children living in a wealthy Winnipeg community were significantly more likely to be born at a healthy birth weight, to be breastfed, and to visit a medical specialist (paediatrician), and were much less likely to die in the first year of life, visit a physician, be admitted to hospital, or suffer from a respiratory tract infection requiring a physician or hospital visit (Martens, Brownell, & Kozyrskyj, 2002). Other Canadian research includes that of Luo and colleagues (2004) in BC, who found that, for the years 1985 to 2000, the prevalence of preterm births, low birth weight, stillbirth, and neonatal and postneonatal mortality was higher in urban neighbourhoods with lower SES.

Another series of research studies on the connection between neighbourhood context and physical health in young children has been completed by several authors who used the EDI to measure children's outcomes. Kershaw et al. (2005) report that physical health may be associated with neighbourhood-level variables including low income rate (worse outcomes), percentage of females in manufacturing positions (worse outcomes) and percentage of males in management positions (better outcomes), percentage of males performing no unpaid childcare (worse outcomes), and percentage of residents reporting aboriginal status (worse outcome). Janus and colleagues (2003) reported that physical health was associated with neighbourhood-level variables, including average income, the low income rate, the proportion of adults without a high school diploma, the proportion of lone-parents, and residential stability. Oliver et al. (in

press) also reported a significant relationship between the EDI measure of physical health and the percentage of lone-parent families within a neighbourhoods. Finally, Janus et al. (2002) and Janus (2003) reported relationships between a variety of neighbourhood characteristics (as described previously) and the overall EDI score which included a measure of physical health.

In summary, neighbourhood environment is associated with health outcomes, including mortality, injury, infant and child health, specific ailments, such as allergies or cardiovascular disease, and more general measures of physical health and well-being. This relationship is evident across the age span, although the specific neighbourhood features that contribute to health outcomes may vary with age.

CHAPTER III

Methods

In this chapter the objectives, research questions, and expectations/hypotheses are first reviewed. Sources of both the school readiness and neighbourhood data are then documented. Following this, information on participants is presented, including both children and neighbourhoods. Next, the measure used to assess school readiness – the EDI – is reviewed. Then, the selection process for individual and neighbourhood predictor variables for the HLM models, as well as neighbourhood variables for the exploratory off-diagonal analysis, is presented. Finally, the analytical approaches used to address the research questions are presented.

Objective 1

The first objective of the present study was to examine the relationship between BC kindergarten children's neighbourhood environments and their school readiness outcomes as measured by the five domains and the Total score of the EDI.

Research Question 1

To what extent are children's neighbourhood environments in BC related to their outcomes in the five domains of school readiness measured by the EDI - Physical Health and Well-Being, Social Competence, Emotional Maturity, Language and Cognitive Development, and Communication and General Knowledge?

Expectation/Hypothesis 1

Previous research (as described in the literature review) indicates that there is a small, yet significant effect of neighbourhood environment on developmental outcomes. Similar findings are expected for kindergarten children in BC using results from each of the five domains of the

EDI as the outcome variables. Although the expected trend was improved EDI outcomes with more favourable neighbourhood environments, it was also anticipated that some neighbourhoods would not conform to these patterns (i.e. children that do very well on the EDI despite residence in an impoverished neighbourhood, or vice versa).

Objective 2

The second objective of the present study was to understand more about the unique features that define “off-diagonal” neighbourhoods in BC where children are performing better or worse than expected on a measure of school readiness (the EDI), given their neighbourhood of residence.

Research Question 2

What are the unique neighbourhood-level characteristics of “off-diagonal” neighbourhoods where children are performing better or worse than expected (according to the HLM models fit as part of examining Research Question 1)?

Expectation/Hypothesis 2

The exploratory nature of this research question carried with it limited preconceived expectations regarding the unique character of off-diagonal neighbourhoods that differentiate them from neighbourhoods where children perform as expected on the EDI (given the HLM models fit in the current study). However, it was anticipated that there would be neighbourhood features, such as residential stability or heterogeneity in terms of the mix of higher and lower status characteristics, that may buffer the effects of specific neighbourhood risk factors in neighbourhoods where children perform better than expected. Likewise, the absence of such buffers, or the presence of more pervasive social risk factors at the neighbourhood level, may be found in neighbourhoods where children perform worse than expected.

Data

School Readiness

The school readiness data used in the current research study were collected by HELP using the EDI. This data set was made available to the current author for completion of this study.

Neighbourhood

The neighbourhood context data used in the current study were collected by Statistics Canada as part of the 2001 Canadian Census. These data are publicly available and were reformatted by Statistics Canada to conform to the neighbourhood boundaries used in the current study (as described below).

Participants

Children

Data collection was completed in all 59 school districts in BC, as well as in the Conseil Scolaire Francophone de la Colombie-Britannique (Francophone school district). In addition to public schools, EDI data were completed in some on-reserve schools and some independent schools. This resulted in a sample of 53 059 child participants in the present study. Data collection occurred in the school years 2000-2001 through 2004-2005 and was completed by HELP. As the EDI is designed for use with Kindergarten-aged children, the sample included only children in Kindergarten and the age range was limited to 4 years 0 months through 6 years 11 months, with the average age being 5.68 years ($SD = 0.30$). Twenty-seven children were excluded from the current study by the present author because their age was beyond this set range. The logic for limiting the age range in the current study was based on the known importance of entry into the formal schooling years as a major transition point in the life course

(Brooks-Gunn et al., 1993; National Research Council Institute of Medicine, 2000), and the existing literature that documents neighbourhood effects across ages 3 to 6 (Brooks-Gunn et al., 1993; Chase-Lansdale & Gordon, 1996; Duncan et al., 1994; Kohen et al., 2002). In addition, a focus on this young age group provides a very strict test of neighbourhood effects. While older children/adolescents are more likely to have spent a considerable amount of time interacting with peers, adults and resources in the neighbourhood due to the level of autonomy attributed to their life stage and the fact that they have lived longer (having had the chance to accumulate years of exposure to neighbourhood effects), 4- to 6-year-old children may have experienced 'neighbourhood' more indirectly through the experiences of their parents and older siblings. Thus, adolescents presumably have had a higher "dose" of good or bad neighbourhood influences than young children. Any evidence of neighbourhood effects with 4- to 6-year-old children will be in spite of the fact that their level of exposure to neighbourhood effects may have been relatively low compared to older children – hence the "strict" test of neighbourhood effects. In this way, the current study essentially examined the degree to which the neighbourhood environment contributes to children's development prior to their entry into Grade 1.

Provided in Table 1 is information on the demographics of the participants. The demographic information for participants was limited to that collected by HELP as part of the EDI data collection. Overall, there were similar numbers of male and female participants. Approximately 18% of the sample were English Language Learners (ELL) based on teacher report. In addition, approximately 7% of the sample were children identified by their teachers as having aboriginal status, while approximately 1% of the sample were identified by their teachers as children with special needs. These numbers are all comparable to provincial rates, with the

exception of the percentage of children identified as having special needs. The provincial rate for children with special needs is approximately 10% (Ministry of Education, 2006). The under-representation of children with special needs in the current sample is due to under-identification by teachers and is not the result of a systematic exclusion of children with special needs from the data collection effort (M. Wiens - HELP, personal communication, August 10, 2006).

Table 1

Participant Demographics (N = 53 059)

Demographic Variable	Count (%)
Gender	
Males	27 193 (51)
Females	25 851 (49)
Children with ELL status	9 368 (18)
Children with special needs	681 (1)
Children with aboriginal status	3 867 (7)

Neighbourhoods

One of the methodological challenges of researching neighbourhood effects is determining how to operationalize “neighbourhood” (Sampson, 1999). Previous research on neighbourhood effects has relied heavily on census tract data, and has been criticized because census tracts may not be a meaningful unit of analysis for the participants under study (Boyle & Willms, 1999; Brooks-Gunn et al., 1993; Entwisle et al., 1997; Sampson et al., 2002). In addition, census tracts are sufficiently large that the populations within them are likely to be very heterogeneous, and may essentially mask the effects of place that may be found with smaller

units of analysis (Attar et al., 1994; Boyle & Willms, 1999; Roosa, Jones, & Tein, 2003; Sampson, 1999). One of the strengths of the current study is that 'natural' neighbourhood boundaries were determined. HELP facilitated this process by consulting with local ECD coalition representatives who identified natural boundaries within their communities. Some local coalitions determined that existing census boundaries or other boundary systems were reflective of natural neighbourhood boundaries, while other local coalitions drew decidedly different boundaries. Local coalitions considered issues such as social and economic divisions, natural or other physical boundaries (major roadways, waterways, etc.), local municipal boundaries, school catchment areas, and neighbourhood association boundaries when drawing their perceptions of natural boundaries. In addition, local ECD coalitions were instructed that the resultant neighbourhoods should ideally have a minimum of 35 children and a maximum of 200 children. The neighbourhood boundaries thus established have been used in another research effort similar to the current study, with findings suggesting that this method of partitioning BC into neighbourhoods was effective and led to highly interpretable results that are much more meaningful to neighbourhood residents than if similar results had been presented using census boundaries (Kershaw et al., 2005).

The maps that resulted from the partitioning of BC into neighbourhoods by the ECD coalitions were then digitized and built into a province-wide file by HELP. The number of neighbourhood units within the province of BC as recorded by HELP regularly changes - a process guided by the desires of local coalitions. The data used in the current study included 501 neighbourhood units representing 53 110 children. For the purposes of the current study, all neighbourhoods with a sample of 10 or more children for whom the EDI had been collected were included. Twenty-five neighbourhoods, representing 51 children, had sample sizes of less than

10 children and were therefore excluded from the analyses, resulting in a final total of 476 neighbourhoods and 53 059 children. For the purposes of the off-diagonal analyses, an additional 14 neighbourhoods (representing 3 289 children) were eliminated due to missing neighbourhood data that prevented computation of predicted scores, resulting in a total of 462 neighbourhoods and 49 770 children for this portion of the study.

Measures

School Readiness

School readiness was measured using the EDI. The EDI (Janus & Offord, 2000a) was developed in response to the continuing federal and provincial agenda to monitor Canadian children's school readiness (Janus & Offord, 2000b). The EDI is grounded in a combination of Social Constructivist and Interactionist theory (Janus & Offord, 2000b; Meisels, 1999) and therefore attempts to be sensitive not only to the child-centric component of school readiness, but also to the contexts within which the child is developing.

Purpose of the EDI. The EDI is developmentally-based (versus curriculum-based)² and is meant to incorporate the following characteristics: a) it is a population level measure, and the results cannot be used to make diagnostic decisions for individual students; b) it relies on teacher judgements made after several months of observing the child in a kindergarten setting; c) it offers interpretation of both strengths and deficits within specific contexts such that involved communities are able to readily identify areas in need of further development; and d) it involves community mobilization, and is meant for use only in those locales that demonstrate both the desire and the capability to act upon the results (Janus & Offord, 2000b). Since the purpose of

² The EDI is not norm-referenced. The cut-off for children who are not school-ready is typically prescribed to be children who are in the lowest 10th percentile on one or more domains according to the results of the group of children in the neighbourhood, community, school, and/or district under study.

the EDI is to screen readiness at the population level to identify problem areas for whole groups rather than for individual children, it is differentiated from other readiness tests that are used for the purposes of identifying individual children (May & Kundert, 1997). Thus, individual children are not being identified as “at-risk” and then tracked into specialized programs. Instead, key strengths and deficits are identified for whole groups of children to empower the community within which those groups reside to work towards improving outcomes for all children, with at-risk children as well as all others benefiting (Janus & Offord, 2000b). It is important to note that although the EDI was used in the current study to predict individual children’s outcomes, this use conforms to the intended purpose of the EDI in that these outcomes are interpreted at the level of the neighbourhood and are not used for diagnostic or placement decisions, or for service allocation or intervention design for individual children.

Development of the EDI. Janus and Offord (in press) report the process involved in developing the EDI, as described here. The 104 items represented on the EDI were selected for their conceptual relationship to the five general domains of school readiness identified in the literature: physical health, social competence, emotional maturity, language development, and cognitive development (Doherty, 1997; Janus & Offord, in press; Kagan, 1992; Offord Centre for Child Studies, 2006). Approximately 60% of an initial core of 128 items were drawn from the NLSCY. These NLSCY items were themselves based on standardized instruments and consultations with experts (NLSC Project Team, 1995). However, the NLSCY had been criticized for not adequately addressing measurement of all school readiness domains (Morrongiello, 1997), and so additional items were constructed based on Doherty (1997). The final conceptualization of the items was completed in consultation with educators (including kindergarten teachers in the Toronto District School Board), and in collaboration with the Early

Years Action Group (a Toronto-based collective of consumers and organizations dedicated to meeting the needs of children in their early years) and the Parenting and Literacy Centres (sites initiated at the Toronto Board of Education in an effort to improve academic outcomes for inner-city children by teaching families literacy and numeracy skills), and resulted in the final count of 104 items (Offord Centre for Child Studies, 2006). Factor analysis of the EDI by its authors (Janus & Offord, in press) resulted in the assignment of these 104 items to five domains: Physical Health and Well-Being, Social Competence, Emotional Maturity, Language and Cognitive Development, and Communication Skills and General Knowledge. These five domains are representative of the five domains of school readiness detailed in the literature (Doherty, 1997; Kagan, 1992; Offord Centre for Child Studies, 2006). The EDI items and domains are presented in Appendix A.

Description of the EDI. The EDI is teacher completed and takes between seven and 20 minutes per child (Janus & Offord, in press). The five EDI domains are defined as follows (from Hertzman, McLean, Kohen, Dunn, & Evans, 2002):

1. Physical Health and Well-Being: A high score (as defined by the community) indicates children who are physically ready to tackle a new day at school, are generally independent, and have excellent motor skills. A low score (as defined by the community) indicates children who have average or poor fine and gross motor skills, and are sometimes tired or hungry, usually clumsy, with flagging energy levels, and average overall physical development.
2. Social Competence: A high score indicates children who never have a problem getting along, working, or playing with other children, are respectful to adults, self-confident, have no difficulty following class routines, and are capable of prosocial

behaviour. A low score indicates children who have poor overall social skills, with regular serious problems in more than one area of: getting along with other children, accepting responsibility for their own actions, following rules and class routines, respect for adults, children, and others' property, with self-confidence, self-control, adjustment to change, and ability to work independently.

3. Emotional Maturity: A high score indicates children who have almost never shown aggressive, anxious or impulsive behaviour; have good ability to concentrate, and are often helping other children. A low score indicates children who have regular problems managing aggressive behaviour, are prone to disobedience, and/or easily distractible, inattentive, impulsive, are usually unable to show helping behaviour towards other children, and are sometimes upset when left by the caregiver.
4. Language and Cognitive Development: A high score indicates children who are interested in books, reading and writing, and rudimentary math, are capable of reading and writing simple sentences and complex words, and are able to count and recognize numbers and geometric shapes. A low score indicates children who have problems in both reading/writing and numeracy, are unable to read and write simple words, are uninterested in trying and often unable to attach sounds to letters, have difficulty with remembering things, counting to 20, recognizing and comparing numbers, and are usually not interested in numbers.
5. Communication Skills and General Knowledge: A high score indicates children who have excellent communication skills, can tell a story and communicate with both children and adults, have no problems with articulation, and for whom English is their first language. A low score indicates children who have poor communication

skills and articulation, a limited command of English, difficulties in talking to others, understanding and being understood, and poor general knowledge.

EDI Scoring. The EDI items include dichotomously-scored items as well as 3-, and 5-point Likert type items. The dichotomously scored items are assigned a score of 10 for “yes” and zero for “no.” The three- and five-point Likert type items also have ten and zero assigned to their extremes. The three-point items are assigned a mid-point of five, and the five-point items have middle points of 2.5, 5.0, and 7.5. The Domain Scores were arrived at by summing the items in the domains and averaging them to yield a Mean Domain Score. The scoring range for each domain is 0 (worst) to 10 (best). The Total score was simply a sum of the Mean Domain Scores. The EDI items and descriptive statistics for these items are presented in Appendix B.

EDI psychometrics. Janus & Offord (in press) investigated the factor structure of the EDI with a confirmatory factor analysis using principal axis factoring with Promax rotation. This resulted in the assignment of the 104 items to the five domains described previously. The final solution accounted for 63.1% of the variance. Since the data were clustered within classrooms, Janus and Offord also explored the within- and between-classroom factor structure by way of a multi-level confirmatory factor analysis. Results suggested that the within- and between-classroom factor structures were very similar. Janus & Offord also evaluated teacher reliability via intraclass correlations for the five domains with results indicating that the majority of the variance came from children and not teachers. Teacher reliability was further estimated by Janus and Offord by examining teacher consistency in each domain with HLM reliabilities, which ranged from 0.76 to 0.84. The internal consistency of the domains was also investigated using Cronbach’s alpha and all showed satisfactory levels, as follows: Physical Health and Well-Being, 0.84; Social Competence, 0.96; Emotional Maturity, 0.92; Language and Cognitive

Development, 0.93; and Communication Skills and General Knowledge, 0.95. These results for internal consistency were compared to those of the current study, with the internal consistency for these domains from the current data set proving to be very similar to those reported by Janus and Offord, as follows: Physical Health and Well-Being, 0.81; Social Competence, 0.95; Emotional Maturity, 0.93; Language and Cognitive Development, 0.91; and Communication Skills and General Knowledge, 0.94.

Janus & Offord (in press) also investigated inter-rater reliability, concurrent validity and convergent validity. Inter-rater reliability between teachers and early childhood educators ranged from 0.53 to 0.80 (all significant). Inter-rater reliability between teachers and parents ranged from 0.36 to 0.64 (all significant). Concurrent validity was investigated between the Language and Cognitive Development domain and the Communication and General Knowledge domain, and the PPVT-III. Correlations were 0.31 and 0.47 respectively and met test-criterion validity established by the Joint Committee on Standards for Educational and Psychological Testing (1999). Janus and Offord also demonstrated convergent validity by examining correlations between information collected in parent-interviews, and children's EDI outcomes.

Several additional studies have been completed by the EDI authors and associated researchers to address the validity and reliability of the resulting instrument. Results from these studies suggest that the EDI test-retest reliability is excellent (correlations ranging from 0.76 to 0.96; Duku & Janus, 2004), that intra-teacher reliability is high (0.70 to 0.95; Duku & Janus, 2004), that concurrent validity of the Language and Cognitive domain and the Communication and General Knowledge domain with the PPVT-III ranged from 0.26 to 0.57 (all significant; Janus, 2001; Janus, Offord, & Walsh, 2001), that concurrent validity of the Language and Cognitive domain with a direct measure of cognitive development/non-verbal language skills

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(Who Am I?) was 0.46 (significant; Janus, Offord, & Walsh, 2001), and that EDI results significantly predict outcomes on provincially administered achievement tests in grade 3 in the areas of reading, writing, and mathematics (Janus, 2002).

Independent research has also documented the psychometric properties of the EDI. Andrich & Styles (2004) reported results from the Rasch analysis of the version of the EDI being used in Australia (with minor word/item changes to reflect cultural integrity). Their results suggested that all five scales have satisfactory psychometric properties, that the number of response categories per item is appropriate, and that the reliability of all scales are high and acceptable for distinguishing among children. Additional independent research focused on the validity of the EDI was completed by Hymel, LeMare, & McKee (2005). Their work indicated that the correlations between the EDI Total score and total scores of other readiness measures (including the Early Screening Inventory - Kindergarten and the Bracken Basic Concept Scale - School Readiness Composite) are moderate and “impressive”. Hymel et al. also investigated the discriminate validity for the EDI domains and found that these too were moderate, despite expectations that they would be higher than the correlations found for the EDI Total score and other total score readiness outcomes. Overall, in terms of the general concept of validity (Hubley & Zumbo, 1996) as well as other psychometric data reported here, the research presented suggests that the EDI is a psychometrically sound tool for the purposes for which it was designed and lends itself well to the purpose of the current study.

Predictor Variables for HLM Models

The models used in the current study consisted of variables specific to individual children and variables specific to neighbourhoods. Variables specific to individual children were labelled

“Level 1” and variables specific to neighbourhoods were labelled “Level 2”. The selection of variables for both Level 1 and Level 2 are detailed in the following two sections.

Level 1 predictor variables (individual). The decision regarding which Level 1 (individual) predictor variables to include was guided by both the literature and the availability of data at the individual level in the existing data set. Individual level data were limited to demographic information collected as part of the EDI data collection completed by HELP. Age was chosen as an individual variable because the range of four through six years may be large enough to influence outcomes, and it was necessary to hold this influence constant. Gender was chosen as an individual variable because there is evidence to suggest that teachers differentially rate boys and girls dependent on the domain of interest (Cole et al., 2001; Fergusson, Lloyd, & Horwood, 1991; Jackson & King, 2004), and that boys may lag behind girls early in their development with respect to certain domains (Locke, Ginsborg, & Peers, 2002; Luotonen, 1995). Again, it was necessary to hold any potential variation due to gender constant. The mean age of the current sample was 5.68 years, while the gender split in the current sample was 51% male/49% female.

Level 2 predictor variables (neighbourhood environment). Decisions regarding which neighbourhood variables to include in a neighbourhood effects model were based on theoretical importance and empirical findings detailed in the literature review, as well as sensitivity to specific features of the population and economy in BC. All decisions reflected the tenets of a collective socialization approach to understanding neighbourhood effects.

Many of the key indicators of neighbourhood environment that are used frequently in the neighbourhood effects literature are measures of socioeconomic status (SES) of the neighbourhood. Amongst these are education level, occupation, employment rates, the presence

of affluent neighbours, the proportion of residents falling below the Low Income Cut-Off (LICO), average or median income, and average income disparity between males and females (Brooks-Gunn et al., 1993; Kershaw et al., 2005; Kohen et al., 2002). Representative indicators of all these variables were also included in the current study. Given the BC sample, the selection of occupation variables was guided in part by the importance of the primary industries, including forestry, in the provincial economy, but also by previous research indicating the significance of the percentage of males in management (perhaps as a marker for a thriving economy; Kershaw et al. 2005) and the need to have representation of an occupation that may be considered lower in status, such as occupations in the processing industry.

In addition to variables that measure attributes of neighbourhood SES more directly, other key indicators of neighbourhood environment typically used in the neighbourhood effects research include proportion of lone-parent families (Brooks-Gunn et al., 1993; Kershaw et al., 2005; Janus et al., 2003; Oliver et al., in press), and mobility/residential stability (length of time residents have lived at current address; Kershaw et al., 2005; Kohen, Hertzman, & Wiens, 1998; Oliver et al., in press). The current study has predictor variables representative of both these variables.

Another requirement when selecting neighbourhood indicators for the current study was the high number of immigrants that live in BC. Immigrants from Asian countries comprise a large proportion of the immigrants to BC (Hiebert, 1999; Ley & Smith, 2000). The demographics of the immigrant population are highly variable, but what is consistent across all immigrant groups is the potential for language barriers to preclude possibilities of employment and engagement within the larger society (hence the inclusion of a measure of language knowledge; Oliver et al., in press). Ley and Smith reported that it is the language barrier, rather

than identification as a visible minority, that poses the greatest obstacle to successful involvement in the economy for immigrant populations. Also consistent across all immigrant groups is the breadth of cultural traditions they each hold. Since living in an extended kin arrangement is one of these cultural traditions for immigrant groups in BC, the proportion of multiple family households was included as a variable in the current study (Deepak, 2005).

Another important segment of the BC population is aboriginal individuals. Historically, colonialism and residential schooling resulted in an extreme marginalization of this BC population. Given the prominent presence of aboriginals in BC, a neighbourhood measure of aboriginal status was also included in the current study.

Indicators delineating patterns of domestic work activity were also included in the current study. Previous research has suggested that the regularity with which housework is completed is a marker for routine and structure within a home, and may be related to child outcomes when aggregated at the neighbourhood level (Burton & Jarret, 2000; Kershaw et. al, 2005). Childcare patterns aggregated at the level of the neighbourhood have also been shown to be predictive of children's outcomes, with higher proportions of males engaging in unpaid childcare predictive of better outcomes for children (Kershaw et al., 2005). Measures of male and female housework patterns and childcare patterns were therefore included in the current study.

Accompanying decisions of all the variables considered for inclusion in the final models were two other guiding themes. First, where possible and potentially relevant, the variables have been broken down by gender. Second, there were certain predictor categories that could be operationalized along a continuum. For example, the level of education category had proportion of residents with less than a grade 9 level education at one extreme and proportion of residents with a university level education at the other extreme. The affluent versus below LICO, and the

management occupation versus processing occupation were other such continuums. When these continuums existed, the extreme ends of the continuum were selected for inclusion in order to capture the most definitive trends.

All neighbourhood indicators were accessed through the 2001 Canadian Census data which was reconfigured to correspond to the neighbourhood boundaries used by HELP (described previously). In total, 27 neighbourhood predictor variables divided into 10 categories were considered for inclusion in the models. These 27 variables are presented in Table 2. Although there are specific variables that are unique to the current study given the BC context, the final selection of variables has notable similarities to two other Canadian studies that have used an HLM approach to explore the relationship between neighbourhood and school readiness using census data and the EDI (Janus et al., 2003; Oliver et al., in press). A complete list of all census variable labels, definitions, and descriptive statistics is presented in Appendix C.

Table 2

Neighbourhood Predictor Variables

Predictor category	Predictor variable (proportions)
Family structure	Male lone-parent Female lone-parent Multiple family households
Immigrant status	Immigrant
Aboriginal status	Aboriginal status
Language	No knowledge of an official language
Income	Affluent Males (>\$60 000) Affluent Females (>\$60 000) Average household income Average income disparity Below LICO
Education	Less than grade 9 University level education
Residential stability	Home owners Non movers 1 year
Occupation	Males in management Females in management Males in processing Females in processing Males in primary Females in primary
Employment	Males unemployed Females unemployed
Domestic work	Males no unpaid housework Females no unpaid housework Males no unpaid childcare Females no unpaid childcare

Given the likelihood of some of the Level 2 variables being highly correlated with one another, multicollinearity was addressed by keeping the Variance Inflation Factor (VIF) less than

or equal to 2. A higher VIF would increase the likelihood of multicollinearity effects (Neter, Wasserman, & Kutner, 1996). Since $VIF = 1/(1-R^2)$ and it was desirable to limit VIF to 2 or less for the purposes of the present analyses, the inclusion of variables was limited to those with an R^2 of less than 0.75 when correlated with one another (Allison, 2001; Neter et al., 1996). A Principle Components Analysis (PCA) of the entire list of 27 neighbourhood variables yielded two linear combinations of variables that needed to be assessed for multicollinearity. Male affluence (>\$60 000 per year) was the variable with the highest R^2 in the first grouping of highly correlated variables. The three other variables that were in this grouping were less than grade 9 education, average household income, and the average income discrepancy between males and females. Because of the high degree of interrelatedness amongst these variables, the latter three were eliminated from the final models. A second group of interrelated variables was also potentially identified. This grouping included university level education and immigrant status, with university level education having the highest R^2 . However, the immigrant status variable had an R^2 that was only two one thousandths of a point above the 0.75 R^2 cut-off. Given that the immigrant status variable was the only variable included in the list of 27 neighbourhood predictors that addressed this very important issue, and further, that it very nearly met statistical requirements for inclusion in the model, a decision was made to keep immigrant status in the model despite its grouping with university level education in the PCA. This process resulted in a final list of 24 neighbourhood variables that were included in the HLM analyses. The correlation matrix for these 24 variables is presented in Appendix D. Table 3 presents the bivariate correlations between the final list of Level 2 predictor variables and outcomes on each of the EDI domains at the neighbourhood level.

Table 3

Bivariate Correlations Between Level 2 Predictor Variables and EDI Outcomes at the Neighbourhood Level

Neighbourhood Variable	EDI domain					
	Phy	Soc	Emo	Lan	Com	Tot
No knowledge of an official language	0.045	-0.123**	-0.082	-0.138**	-0.405**	-0.200**
Non-movers 1 year	0.236**	0.251**	0.235**	0.252**	0.273**	0.299**
Immigrant	0.188**	-0.060	-0.017	-0.019	-0.244**	-0.065
Aboriginal status	-0.372**	-0.210**	-0.207**	-0.234**	-0.215**	-0.283**
University level education	0.338**	0.142**	0.121**	0.274**	0.201**	0.254**
Male unemployed	-0.436**	-0.263**	-0.334**	-0.375**	-0.315**	-0.404**
Female unemployed	-0.392**	-0.298**	-0.312**	-0.397**	-0.359**	-0.418**
Males in management	0.416**	0.274**	0.285**	0.424**	0.354**	0.420**
Males in primary	-0.213**	-0.049	-0.119**	-0.123**	-0.006	-0.108*
Males in processing	-0.143**	-0.060	-0.044	-0.218**	-0.130**	-0.150**
Females in management	0.140**	0.052	0.071	0.249**	0.241**	0.195**
Females in primary	-0.086	-0.019	-0.046	-0.071	-0.052	-0.065
Females in processing	-0.143**	-0.175**	-0.139**	-0.259**	-0.403**	-0.290**
Males no unpaid housework	-0.099*	-0.213**	-0.178**	-0.168**	-0.312**	-0.244**
Females no unpaid housework	-0.001	-0.156**	-0.144**	-0.073	-0.213**	-0.149**
Males no unpaid childcare	-0.123**	-0.130**	-0.227**	-0.070	-0.017	-0.122**
Females no unpaid childcare	-0.015	-0.064	-0.158**	0.061	0.059	-0.014
Female lone-parent	-0.377**	-0.346**	-0.316**	-0.371**	-0.394**	-0.432**

Table 3. continued

Neighbourhood Variable	EDI domain					
	Phy	Soc	Emo	Lan	Com	Tot
Male lone-parent	-0.294**	-0.229**	-0.181**	-0.276**	-0.248**	-0.289**
Below LICO	-0.272**	-0.341**	-0.333**	-0.343**	-0.491**	-0.437**
Multiple family households	0.071	-0.026	0.065	-0.125**	-0.273**	-0.099*
Home owners	0.258**	0.325**	0.308**	0.332**	0.409**	0.398**
Affluent males (\$60 000)	0.400**	0.343**	0.338**	0.428**	0.477**	0.481**
Affluent females (\$60 000)	0.346**	0.209**	0.189**	0.359**	0.349**	0.352**

* $p < 0.05$. ** $p < 0.01$.

Variables for off-diagonal/Janus neighbourhood analyses. A portion of this study was allocated to investigating the unique characteristics of neighbourhoods where children performed better or worse than expected on the EDI, given the HLM models. These neighbourhoods were labelled off-diagonal or Janus neighbourhoods. All neighbourhood context variables included in the off-diagonal analyses were derived from the 2001 Canadian Census. In total, 97 neighbourhood variables were investigated for the off-diagonal analyses (see Appendix C).

Analyses

Research Question 1

To examine the relationship between neighbourhood context and school readiness outcomes, an HLM approach to data analysis was used. This approach accounts for the nested nature of the data (children within neighbourhoods), essentially allowing the researcher to include children's shared neighbourhood experiences as part of the model. This was key since the EDI outcomes of individual children residing in the same neighbourhoods could not be assumed to be independent of one another due to the shared neighbourhood environment, thereby violating one of the basic assumptions of traditional regression. This type of multi-level

analysis has become increasingly prevalent in the literature exploring neighbourhood effects on children's outcomes (Raudenbush & Bryk, 2002).

Separate HLM analyses were completed for each of the five EDI domains, as well as for the EDI Total score, to determine the relationship between neighbourhood environment (measured by 24 Level-2 predictor variables) and school readiness. The equations for the all models were as follows³:

Model 1

$$Y_{ij} = \beta_{0j} + r_{ij}$$

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

Model 2

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{age}) + \beta_{2j}(\text{gender}) + r_{ij}$$

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

$$\beta_{2j} = \gamma_{20}$$

Model 3

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{age}) + \beta_{2j}(\text{gender}) + r_{ij}$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{NH}_1) + \gamma_{02}(\text{NH}_2) + \dots + \gamma_{0j}(\text{NH}_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

$$\beta_{2j} = \gamma_{20}$$

Individual children are denoted by “i” and neighbourhoods are denoted by “j”. Model 1, the unconditional model, serves as a baseline comparison, and as such, had no predictors at either Level 1 (children) or Level 2 (neighbourhoods). Model 2 had predictors at Level 1 (age

³ To conserve space, the Level 2 neighbourhood variables are not listed as part of these models. Instead, they are identified with the abbreviation NH_i for “Neighbourhood Predictor 1”, etc.

and gender for individual children) but none at Level 2 (neighbourhood). The purpose of Model 2 was to determine whether the individual-level variables (for children) were related to the outcome variable (in this case, school readiness as measured by the EDI). Model 3 had predictors at both Level 1 (age and gender for individual children) and Level 2 (neighbourhood predictor variables). The Level 2 predictors in Model 3 were not for the slopes, but for the intercept only. Raudenbush and Bryk (2002; see p. 25) liken this type of model to a one-way random-effects ANCOVA model. In essence, the neighbourhood context variables are used to predict an EDI score, adjusting for age and gender. The Level 2 predictors were not for the slopes because the interest was not to examine interactions between age and the EDI outcomes or gender and the EDI outcomes across neighbourhoods. Modeling neighbourhood predictors in the slope for age (β_{1j}) was not of interest because, as an outcome variable, the small amount of variance due to age (83% of the sample were five-year-olds) makes interpretation of an age-neighbourhood interaction mute. Modeling neighbourhood predictors in the slope for gender (β_{2j}) was considered, given some evidence in the literature which suggests that gender may moderate the relationship between neighbourhood context and various outcomes, including achievement and socio-emotional outcomes (e.g. Browning, Leventhal & Brooks-Gunn, 2005; Leventhal & Brooks-Gunn, 2003, 2004; Xue, Leventhal, & Brooks-Gunn, 2005). However, as shown in Table 4, the mean gender differences on EDI outcomes and the associated effect sizes were very small, resulting in the decision to not include neighbourhood predictors for the interaction between gender and EDI outcomes. Therefore, the overall focus, as indicated in the final models, was to examine the relationship between neighbourhood context and school readiness, holding age and gender constant.

Table 4

Descriptive Statistics and Effects Sizes for Gender Differences on EDI Outcomes

		EDI Outcomes					
Group		Phy ^a	Soc ^b	Emo ^c	Lan ^d	Com ^e	Tot ^f
Sample	<i>N</i>	52 290	52 391	51 749	51 804	52 411	52 247
	<i>M</i>	8.58	8.23	7.98	8.13	7.42	40.34
	<i>SD</i>	1.19	1.80	1.56	1.92	2.18	7.06
Boys	<i>n</i>	26 794	26 840	26 427	26 517	26 849	26 747
	<i>M</i>	8.42	7.86	7.60	7.86	7.13	38.86
	<i>SD</i>	1.24	1.93	1.66	2.02	2.23	7.38
Girls	<i>n</i>	25 485	25 540	25 311	25 276	25 551	25 489
	<i>M</i>	8.76	8.62	8.38	8.41	7.73	41.89
	<i>SD</i>	1.10	1.56	1.34	1.76	2.08	6.35
Partial η^2							
for gender differences	-	0.021	0.045	0.062	0.021	0.019	0.046

^aPhysical Health and Well-Being domain. ^bSocial Competence domain. ^cEmotional Maturity domain. ^dLanguage and Cognitive Development domain. ^eCommunication and General Knowledge domain. ^fTotal EDI Score.

Child age was centered to the grand mean for interpretation purposes. The slope for child age was not fixed in the final models. Initially, the slope for child gender was not fixed either. However, the models did not reach convergence with gender as a random variable suggesting a mis-specified model. Therefore, the slope for gender was fixed for Model 2 and Model 3 so its

effect was constrained to be constant across neighbourhoods. Females were coded “1” while males were coded “0”. Given that all dependent variables (EDI outcomes) were continuous, HLM analyses were completed using the mixed effects module of SPSS 13.0 for Windows (SPSS, 2004).

Initially, all of the Level 2 predictors were included in Model 3 for each of the six EDI outcomes. The strategy for building Model 3 for each of the six EDI outcomes was to methodically remove statistically non-significant predictors until the remaining set of Level 2 predictor variables were all significant ($p \leq .05$). These remaining variables constituted the Level 2 predictors.

Deviance statistics were computed to measure the improvement in the model fit between Model 1 and Model 2, and Model 2 and Model 3. Neighbourhood variables found to be significant predictors for each of the six EDI outcomes were identified. The proportion reduction in variance (PRV) statistic, which indicates the reduction in variance once individual (Model 2) and then neighbourhood (Model 3) effects are included in the model, was calculated. The number of significant neighbourhood variables per EDI outcome was examined as an indicator of the strength of the relationship between neighbourhood and specific domains of school readiness. The significant neighbourhood predictor variables were then correlated with the complete list of census variables available to better understand the neighbourhood context that one might find each of the significant predictor variables immersed in.

Research Question 2

The HLM analyses were designed to facilitate an understanding of the relationship between neighbourhoods and school readiness, as measured by the EDI. The final models therefore provided a formula for predicting children’s outcomes on the EDI given the child’s

age, gender, and characteristics of their neighbourhood of residence. As with any predictive formula, these models were anticipated to accurately predict outcomes for the majority of the children in the present sample. However, it was also anticipated that there would be some neighbourhoods for whom the HLM models from the current study did not accurately predict outcomes. These neighbourhoods, where children performed better or worse than expected on the EDI given their neighbourhood context, constituted the off-diagonal or Janus neighbourhoods. It is important to note that the derivation of off-diagonal neighbourhoods in the current study is a product of how neighbourhood context was operationalized in Model 3 of the HLM models. The results and discussion that stem from these analyses are therefore conditional on the models that were fit in the HLM analyses.

Fourteen neighbourhoods were excluded from this analysis due to missing neighbourhood data that prevented computation of a difference score, resulting in a final count of 462 neighbourhoods and 49 770 children. The EDI difference score outcomes were averaged for each neighbourhood. In order to capture neighbourhoods that were operating differently than expected for the purpose of these analyses, those neighbourhoods where the difference between actual and predicted scores for each of the EDI outcomes exceeded 1.5 standard deviations were further explored. Thus, this analysis attempted to characterize the actual (versus predicted) scores at the outermost 16% of each normal curve tail for the entire group of neighbourhoods.

Understanding why Janus neighbourhoods do not perform as predicted on the EDI according to the models arrived at in this study required further analyses of the characteristics of these neighbourhoods. For each of the six EDI outcomes, a list of neighbourhoods was produced that met the criteria of being 1.5 standard deviations above or below the mean on one or more EDI outcomes. Thus, there were twelve different lists of neighbourhoods identified as Janus

neighbourhoods – six lists of neighbourhoods that performed worse than expected on each of the EDI outcomes (the five domains plus the total EDI score) and six lists of neighbourhoods that performed better than expected on each of the EDI outcomes. Then, for each of the census variables, a sample mean and standard deviation were calculated based on the entire sample of neighbourhoods included in the off-diagonal analysis. The value for each of these census variables for each Janus neighbourhood was then subtracted from the sample mean. If the difference was equal to or greater than 1 standard deviation (according to the entire sample of neighbourhoods), this census variable was flagged for that neighbourhood as being significantly different from the sample mean. The criteria of one standard deviation was selected for this exploratory analysis as it was deemed stringent enough to capture potential trends, and relaxed enough to avoid masking emerging trends by requiring a too large deviation from the mean. Differences that were 1 standard deviation above the mean were differentially flagged from those that were 1 standard deviation below the mean. Within each list of Janus neighbourhoods, the number of times each census variable was at least 1 standard deviation different from the mean value of that census variable for the entire sample was counted and then converted to a percentage. The results were examined to determine if there were notable patterns for any of the census variables across EDI outcomes.

The locations of Janus neighbourhoods in selected areas of BC were mapped using geographic mapping technology. The purpose of mapping Janus neighbourhoods was to provide a visual account of the variability within a region regarding existence of advantaged and disadvantaged neighbourhoods, as well as to highlight cases where advantaged and disadvantaged neighbourhoods are located side-by-side. Advantaged Janus neighbourhoods with one higher than expected EDI outcome were differentially labelled from those with two, three,

and four or more EDI outcomes higher than expected. The same was done for disadvantaged neighbourhoods. These maps do not necessarily represent neighbourhoods where children are performing well on the EDI or neighbourhoods where children are performing poorly on the EDI. Instead, they represent neighbourhoods where children are performing better than expected or worse than expected on the EDI given their neighbourhood context.

CHAPTER IV

Results

Item Descriptives

The item means and standard deviations for the EDI are presented in Appendix B.

Domain Descriptives

The means and standard deviations of the five EDI domains and the Total score were presented in Table 4.

Results for Research Question 1(HLM)

Deviance statistics were computed to determine the significance of improvements in the Goodness-of-fit between Model 1 and Model 2, and between Model 2 and Model 3. Summarized in Table 5 are the deduction in deviance statistics for each of the six analyses by comparing the likelihood ratios of the simpler and more complex model.

Table 5

Summary of Deviance Statistics for EDI Outcomes (N = 53 059)

EDI domain	Model 1	Model 2	Model 3	Reduced-deviance (Model 1 – Model 2)	Reduced-deviance (Model 2 – Model 3)
Phy	162 550	135 768	126 243	26 781***	9 526***
Soc	206 947	171 976	160 616	34 971***	11 360***
Emo	189 443	156 239	145 538	33 204***	10 701***
Lan	210 272	174 536	163 357	35 736***	11 179***
Com	224 573	187 380	174 987	37 193***	12 393***
Total	346 636	288 804	269 478	57 832***	19 326***

*** $p < .001$.

For all six EDI outcomes, with the inclusion of student-level variables in Model 2, the model Goodness-of-fit had a large magnitude of improvement compared to Model 1 (unconditional model). The difference of deviance statistics from Model 1 to Model 2 far exceeded the critical value of likelihood ratios, with all differences significant at $p < .001$. Similarly, the inclusion of neighbourhood-level variables in Model 3 resulted in a significant improvement in the model Goodness-of-fit compared to Model 2 for all six EDI outcome scores, with all differences significant at $p < .001$.

In total, 13 variables representing characteristics of neighbourhoods were identified as significant Level 2 predictors of EDI outcomes in the HLM analyses. The specific Level 2 variables that were significant for each EDI outcome are detailed in Table 6 and Table 7. These tables include results from the final models where all remaining Level 2 predictors were significant and are structured in accordance with suggestions outlined by Raudenbush and Bryk (2002). These 13 variables are conceptually grouped into eight categories: family structure, aboriginal status, language, income, education, occupation, employment rates, and domestic work. Presented in Table 8 is a summary of Tables 6 and 7 that includes only those neighbourhood predictor variables that were significant thereby providing a more condensed synopsis of the HLM results.

Table 6

Neighbourhood Predictors of Physical Health & Well-Being, Social Competence, and Emotional Maturity EDI Outcomes (N=53 059)

Fixed Effects	Domain								
	Physical Health and Well-Being			Social Competence			Emotional Maturity		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept, γ_{00}	8.584***	8.431***	8.224***	8.234***	7.865***	7.655***	8.012***	7.635***	7.217***
Age (centered)		0.483***	0.484***		0.630***	0.642***		0.411***	0.415***
Gender		0.337***	0.338***		0.763***	0.761***		0.773***	0.767***
Family Structure									
Male lone-parent									
Female lone-parent									
Multiple family households									2.011***
Immigrant status									
Immigrant									
Aboriginal status									
Aboriginal status			-1.068***			-0.645**			
Language									
No knowledge of official language			2.502***						
Income									
Affluent males (\$60 000)									1.638***

table continues

Table 6. continued

Fixed Effects	Domain								
	Physical Health and Well-Being			Social Competence			Emotional Maturity		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Affluent females (\$60 000)									
Below LICO			-0.013***						
Education									
University			0.951***						
Residential Stability									
Home owners									
Non movers 1 year									
Occupation									
Males in management ^a			1.506***			1.965***			0.940*
Females in management									
Males in processing			1.024**						
Females in processing									
Males in primary			0.887**						

table continues

Table 6. Continued

Fixed Effects	Domain								
	Physical Health and Well-Being			Social Competence			Emotional Maturity		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Females in primary			-1.457**						
Employment									
Males unemployed									
Females unemployed									
Domestic Work									
Males no unpaid housework									
Females no unpaid housework									
Males no unpaid childcare									
Females no unpaid childcare									
Random Effects									
Level-1 Effect, r_{ij}	1.323***	1.273***	1.267***	3.104***	2.898***	2.915***	2.316***	2.124***	2.120***
Intercept, u_{0j}	0.093***	0.098***	0.061***	0.142***	0.140***	0.127***	0.118***	0.118***	0.097***
Age (centered), u_{1j}		0.043***	0.045***		0.126***	0.124***		0.066***	0.065**
								0.083	
Level 1 PRV	-	0.038	0.0005	-	0.066	-0.006	-		0.002

table continues

Table 6. Continued

Fixed Effects	Domain								
	Physical Health and Well-Being			Social Competence			Emotional Maturity		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Level 2 Intercept									
PRV	-	-0.054	0.378	-	0.014	0.093	-	0.000	0.178

^a All occupational classifications in the 2001 census were in accordance with the 2001 National Occupational Classification for Statistics (Statistics Canada, 2001). * $p < 0.05$. ** $p < .01$. *** $p < .001$.

Table 7

Neighbourhood Predictors of Language and Cognitive Development, Communication and General Knowledge and Total Score EDI Outcome (N = 53 059)

	Domain								
	Language and Cognitive Development			Communication and General Knowledge			Total EDI Score		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Fixed Effects									
Intercept, γ_{00}	8.113***	7.851***	8.926***	7.477***	7.208***	7.129***	40.417***	38.988***	37.531***
Age (centered)		0.930***	0.946***		0.834***	0.847***		3.304***	3.348***
Gender		0.570***	0.569***		0.602***	0.595***		3.041***	3.026***
Family Structure									
Male lone-parent									
Female lone-parent									
Multiple family households									
Immigrant status									
Immigrant									
Aboriginal status									
Aboriginal status						-0.725*			
Language									
No knowledge of an official language			-1.704**			-8.882***			

Income

table continues

Table 7. Continued

Fixed Effects	Domain								
	Language and Cognitive Development			Communication and General Knowledge			Total EDI Score		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Affluent males (\$60 000)									
Affluent females (\$60 000)									
Below LICO									
Education									
University						2.437***			
Residential Stability									
Home owners									
Non movers 1 year									
Occupation									
Males in management ^a									15.779***
Females in management									
Males in processing						2.160***			6.200**
Females in processing									

table continues

Table 7. Continued

Fixed Effects	Domain								
	Language and Cognitive Development			Communication and General Knowledge			Total EDI Score		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Males in primary						1.260**			7.235***
Females in primary									-6.451*
Employment									
Males unemployed			-3.135***			-3.404***			-
Females unemployed									13.735***
Domestic Work									
Males no unpaid housework									
Females no unpaid housework									
Males no unpaid childcare			-4.084***						
Females no unpaid childcare			3.357***						
Random Effects									
Level-1 Effect, r_{ij}	3.447***	3.195***	3.258***	4.335***	4.098***	4.138***	46.450***	42.335***	42.661***
Intercept, u_{0j}	0.228***	0.222***	0.172***	0.319***	0.319***	0.193***	3.107***	3.021***	2.079***
Age (centered), u_{1j}		0.158***	0.164***		0.153***	0.159***		2.193***	2.275***

table continues

Table 7. Continued

	Domain								
	Language and Cognitive Development			Communication and General Knowledge			Total EDI Score		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Fixed Effects									
Level 1 PRV	-	0.073	-0.020	-	0.055	-0.010	-	0.089	-0.008
Level 2 Intercept									
PRV	-	0.026	0.225	-	0.000	0.395	-	0.028	0.312

^a All occupational classifications in the 2001 census were in accordance with the 2001 National Occupational Classification for Statistics (Statistics Canada, 2001). * $p < 0.05$. ** $p < .01$. *** $p < .001$.

Table 8

Summary of HLM Results

Neighbourhood Variable	EDI Domain					
	Phy	Soc	Emo	Lan	Com	Tot
Multiple family households			2.011***			
Aboriginal status	-1.068***	-0.645**			-0.725	
No knowledge of an official language	2.502***			-1.704**	-8.882***	
Affluent males (>\$60 000)			1.638***			
Below LICO	-0.013***					
University	0.951***				2.437***	
Males in management	1.506***	1.965***	0.940*			15.779***
Males in processing	1.024**				2.160***	6.200**
Males in primary	0.887**				1.260**	7.235***
Females in primary	-1.457**					-6.451*
Males unemployed				-3.135***	-3.404***	-13.735***
Males no unpaid childcare				-4.084***		
Females no unpaid childcare				3.357***		

* $p < 0.05$. ** $p < .01$. *** $p < .001$.

The final 2 rows in both Table 6 and Table 7 show the PRV statistics which indicate the reduction in variance once individual and then neighbourhood effects are controlled for. The Level 1 variance remained the same from Model 2 to Model 3 for all EDI outcomes (with values approximately equal to zero) because the Level 1 predictor variables were the same for Model 2 and Model 3. Given that neighbourhood predictors were modeled in the intercept only, the Level 2 Intercept PRV is the value of interest. The Level 2 Intercept PRV from Model 1 to Model 2 was approximately equal zero for all EDI outcomes because no neighbourhood predictor variables were modeled in the intercept in Models 1 and 2. By examining the Level 2 Intercept PRV for all Model 3's, it can be seen that the final models including neighbourhood characteristics accounted for an increased proportion of variance (intercept variance, u_{0j}) for all six EDI outcomes compared to the former models. The PRV was greatest for the Communication and General Knowledge outcome (40%), followed by Physical Health and Well-Being (38%), Total score (31%), Language and Cognitive Development (23%), Emotional Maturity (18%), and Social Competence (9%).

By EDI domain, the Language and Cognitive Development domain had four neighbourhood predictor variables significant at the $p < .01$ to $p < .001$ level: no knowledge of an official language, male unemployment, males performing zero hours of unpaid childcare in a week, and females performing zero hours of unpaid childcare in a week. The Communication and General Knowledge domain had six neighbourhood predictor variables significant at the $p < 0.05$ to $p < 0.001$ level. There was a positive relationship found between outcomes on this domain and university level education, males in processing occupations, and males in primary occupations, while negative relationships were found for immigrant status, no knowledge of an official language, and male unemployment. The Physical Health and Well-Being domain had

eight significant neighbourhood predictor variables at the $p < .01$ to $p < .001$ level – the greatest number for any of the EDI outcomes. Negative relationships were found for aboriginal status, proportion below LICO, and females in primary occupations. Positive relationships were found for no knowledge of an official language, university level education, males in management occupations, males in processing occupations, and males in primary occupations. The Social Competence domain had two significant neighbourhood predictor variables at the $p < .01$ to $p < .001$ level – the lowest number for any of the EDI outcomes. A negative relationship was found for aboriginal status while a positive relationship was found for males in management occupations. The Emotional Maturity domain had three significant neighbourhood predictor variables at the $p < .05$ to $p < .001$ level. All were positive and involved multiple family households, affluent males, and males in management. The Total EDI score had five significant neighbourhood predictor variables at the $p < .05$ to $p < .001$ level. Positive relationships were found for males in management, processing, and primary occupations, while negative relationships were found for females in primary occupations and male unemployment.

After identifying the significant Level 2 variables, these variables were then correlated with the complete list of census variables available. The purpose of this correlation was to better understand the neighbourhood context in which one might find each of the significant predictor variables immersed. The following sections highlight the significant predictor variables from the HLM analyses and the census variables they were correlated with ($r = > .40$).

Family structure. The proportion of multiple family households was a significant predictor for one EDI outcome - Emotional Maturity. As the proportion of multiple family households within a neighbourhood increased, a child's Emotional Maturity outcomes also increased. The prevalence of multiple family households carried with it an increased likelihood

that the neighbourhood would have more residents who did not speak or have knowledge of an official language, spoke a non-official language at home, were first generation Canadians or immigrants, had less than a grade nine level education, had more females employed in occupations unique to processing, manufacturing and utilities, more residents doing no unpaid housework, more persons per family, and more children under the age of six.

Income. The low-income rate refers to the proportion of the population where the household income is below LICO. LICO is representative of families that spend 55% or more of their income on basic necessities and as such, serves as a measure of poverty. The low-income rate was significant for one EDI outcome – Physical Health and Well-Being. As the low income rate increased, children's scores on the Physical Health and Well-Being outcomes decreased. A higher low income rate was correlated with more residents without knowledge of or the ability to speak an official language, who use a non-official language in the home, who are immigrants, who have less than a grade 9 education, who are female lone-parents, and who have lower household and family incomes.

The proportion of affluent males (with annual incomes equal to or greater than \$60 000), but not the proportion of affluent females, was a significant predictor of one EDI outcome - Emotional Maturity, with the relationship between affluent males and Emotional Maturity outcomes being positive. Living in a neighbourhood with more affluent males was associated with a higher home ownership rate, more affluent females, higher income overall, higher levels of education (college or university) and residents employed in more prestigious occupations and industries (management and social science occupations, as well as the educational services industry). Neighbourhoods with more affluent males also had fewer people who do not speak or have knowledge of an official language, have less than a grade 9 education, are unemployed, are

female lone-parents, fall below LICO, and work in less desirable occupations or industries (such as the administrative support industry, or females in processing occupations).

Occupation. The proportion of males in management occupations was a significant predictor of four EDI outcomes – the largest number for any of the significant predictor variables. As the proportion of males in management positions increased, the Physical Health and Well-Being, Social Competence, Emotional Maturity, and Total score outcomes on the EDI also increased. Living in a neighbourhood where the number of males in management was higher was commensurate with living in a neighbourhood where incomes were higher, residents had a university level education, and people were employed in desirable industries/occupations (such as more females in management, and a greater representation of other lucrative industries, such as: real estate and rental and leasing; finance and insurance; and professional, scientific and technical services). Neighbourhoods with higher levels of males in management also had lower unemployment rates, fewer residents with less than a grade 9 education, fewer lone-parents (especially female lone-parents), and fewer individuals employed in less prestigious occupations (such as females in sales and service occupations, and males in processing, manufacturing and utilities).

The proportion of males in processing occupations was a significant predictor of three EDI outcomes. As the proportion of males employed in occupations unique to processing, manufacturing and utilities increased, so too did children's outcomes on the Communication and General Knowledge, Physical Health and Well-Being, and Total EDI scores. Increases in the proportion of males employed in processing in a neighbourhood were accompanied by increases in the proportion of residents with less than a grade 9 education and working in the manufacturing industry. These neighbourhoods also had fewer affluent females, fewer residents

with a university level education, and fewer residents employed in desirable occupations such as management, business, applied science, health, information, finance, real estate and professional occupations.

The proportion of males in primary occupations was a significant predictor of three EDI outcomes. As the proportion of males employed in occupations unique to primary industry increased, outcomes on the Communication and General Knowledge, Physical Health and Well-Being and Total EDI scores also increased. Neighbourhoods with higher proportions of males in primary occupations were less likely to have residents who were first generation Canadian, immigrant, or aboriginal. Residents were also less likely to have a university education, to be unemployed males, or to be employed in more prestigious occupations (applied sciences, management, sales, business) and industries (whole sale industry, information, finance, real estate, professional). These neighbourhoods were more likely to have residents that were Canadian citizens, had a trades level education, and were employed in the agricultural industries.

The proportion of females in primary occupations was a significant predictor of two EDI outcomes. As the proportion of females employed in occupations unique to primary industry increased, outcomes on the Physical Health and Well-Being and Total EDI scores decreased. This result was opposite to the effect of males employed in processing occupations. Neighbourhoods with more females employed in occupations unique to the primary industries were also more likely to have male and female residents working in the agricultural industry, and to have fewer residents employed in business, applied sciences, or information occupations.

Employment. The proportion of unemployed males was a significant predictor of three EDI outcomes. As the male unemployment rate increased, outcomes on the Language and Cognitive Development domain, Communication and General Knowledge domain, and the Total

score decreased. Living in a neighbourhood with a high male unemployment rate was correlated with lower rates of female affluence and males in management, lower prevalence of whole-sale trade and finance industries, lower household incomes, and higher proportions of aboriginal residents and lone-parents.

Domestic work. The proportion of females performing zero hours of unpaid childcare in a typical week was a significant predictor of one EDI outcome. As the proportion of females who performed zero hours of unpaid childcare per week increased, so too did the performance of children on the Language and Cognitive Development domain. Living in a neighbourhood with more females who are performing zero hours of unpaid childcare per week was associated with lower rates of home ownership, lower household incomes, lower male/female median income discrepancy, more males and females working in occupations in art, culture, recreation and sport, and a higher presence of the real estate and professional industries. More females performing zero unpaid hours of childcare was also associated with fewer children under 6 years, fewer persons per family, more residents over 65 years of age, more males doing zero hours of unpaid childcare, and a higher low income rate.

The proportion of males performing zero hours of unpaid childcare in a typical week was a significant predictor of one EDI outcome. As the proportion of males performing zero weekly hours of unpaid childcare increased, children's performance on the Language and Cognitive Development domain decreased. This result was opposite to that found for females performing no unpaid childcare. Neighbourhoods with a higher proportion of males performing no unpaid childcare were also more likely to have fewer home owners, persons who had moved in the past year, persons per family, children under 6, and residents who drive to work. These neighbourhoods were more likely to have residents who were senior citizens, more females

doing no unpaid childcare, a higher low income rate, a lower median income discrepancy, a lower household income, and more residents working in occupations in art, culture, recreation and sport.

Aboriginal status. The proportion of residents with aboriginal status was a significant predictor of three EDI outcomes. As the proportion of residents with aboriginal status increased, children's outcomes on the Communication and General Knowledge, Physical Health and Well-Being and Social Competence domains decreased. Living in a neighbourhood with a higher proportion of aboriginal residents was likely to carry with it a very high unemployment rate, more males working in primary occupations and the agricultural industry, and more male lone-parents. These neighbourhoods were also less likely to have residents who were first generation Canadians or immigrants or who were employed in business occupations, and a lower presence of the whole sale trade and finance industries.

Language. The proportion of residents with no knowledge of an official language was a significant predictor of two EDI outcomes. As the proportion of residents with no knowledge of an official language increased, children's performance on the Physical Health and Well-Being domain also increased. However, increases in the proportion of residents with no knowledge of an official language were also predictive of lower scores on the Language and Cognitive Development domain and the Communication and General Knowledge domain. Neighbourhoods with higher proportions of residents who had no knowledge of an official language also had fewer home owners, fewer affluent males, fewer Canadian citizens, less residents with either trades or college education, fewer females who drive to work, and a lower male/female income discrepancy. These neighbourhoods also had more residents speaking a non-official language in the home, who were first generation Canadians or immigrants, and who had less than a grade 9

education. Residents in these neighbourhoods were more likely to be males employed in a sales occupation or females employed in a processing occupation. Additionally, there were higher rates of individuals performing no unpaid housework, more multiple family households, and more low income households.

Education. The proportion of residents with a university level education was a significant predictor of two EDI outcomes. As the proportion of residents with a university level education increased, so too did outcomes on the Physical Health and Well-Being domain, and the Communication and General Knowledge domain. Neighbourhoods with higher proportions of residents with a university level education also had more affluent residents (especially females), fewer Canadian citizens, more first generation Canadians, more immigrants, more residents employed in desirable occupations, a higher median family income, a higher average and median household income, and fewer residents with a trades level education or working in the primary and processing industries.

Results for Research Question 2 (Off-Diagonal/Janus Neighbourhoods)

The HLM analyses were designed to facilitate an understanding of how neighbourhoods typically influence school readiness, as measured by the EDI. The final models therefore provided a formula for predicting children's outcomes on the EDI given the child's age, gender, and characteristics of his or her neighbourhood of residence. As with any predictive formula, these models were anticipated to accurately predict outcomes for the majority of the children in the sample. However, it was also anticipated that there would be some neighbourhoods for whom the HLM models from the current study did not accurately predict outcomes. These neighbourhoods, where children performed better or worse than expected on the EDI given their neighbourhood context, constitute the off-diagonal/Janus neighbourhoods.

Understanding why Janus neighbourhoods do not perform as predicted on the EDI according to the models arrived at in this study required further analyses of the characteristics of these neighbourhoods. In order to capture neighbourhoods that were operating differently than expected for the purpose of these analyses, those neighbourhoods where the difference between actual and predicted scores for each of the EDI outcomes exceeded 1.5 standard deviations were further explored. Thus, this analysis attempted to characterize the actual (versus predicted) scores at the outermost 16% of each normal curve tail for the entire group of neighbourhoods included in the original analysis. Fourteen neighbourhoods were excluded from this analysis due to missing data that prevented computation of a difference score resulting in a final count of 462 neighbourhoods for this analysis. Presented in Table 9 are the descriptive statistics of the difference scores for each of the EDI outcomes.

Table 9

Descriptive Statistics for Actual Minus Predicted Differences Scores for Each EDI Outcome

EDI Outcome	<i>M</i>	Minimum	Maximum	<i>SD</i>
Com (<i>N</i> = 40 899)	0.007	-8.81	5.80	2.085
Emo (<i>N</i> = 40 325)	-0.014	-7.47	2.80	1.490
Lan (<i>N</i> = 40 425)	0.011	-9.27	3.34	1.854
Phy (<i>N</i> = 40 787)	0.033	-7.77	3.28	1.154
Soc (<i>N</i> = 40 891)	-0.011	-8.76	3.00	1.747
Tot (<i>N</i> = 40 754)	-0.030	-36.84	14.39	6.703

The EDI difference score outcomes were averaged for each neighbourhood. Janus neighbourhoods were then identified for each EDI outcome as those that were either above or

below the difference score mean by at least 1.5 standard deviations. Identified in Table 10 are the advantaged and disadvantaged Janus neighbourhoods.

Table 10

Advantaged and Disadvantaged Janus Neighbourhoods by EDI Outcome (N=462)

Neighbourhood		Disadvantaged Janus Neighbourhoods							Advantaged Janus Neighbourhoods						
Code	Name	Com	Emo	Lan	Phy	Soc	Tot	Total worse scores	Com	Emo	Lan	Phy	Soc	Tot	Total better scores
20.03	Trail							0		*	*				2
20.04	Robson / Thrums							0						*	1
20.05	Castlegar							0	*	*	*	*	*	*	6
22.03	Vernon - West							0				*	*		2
22.08	Kalmalka Lake							0	*					*	2
22.09	Lumby - Cherryville							0	*			*	*	*	4
22.12	Vernon - Central		*					1		*	*				2
23.61	Peachland			*				1							0
23.64	Lower Boucherie/Mission Hills		*	*		*		3							0
23.66	West Kelowna Estates							0		*	*				2
23.69	West Winfield		*	*			*	3			*				1
23.71	North Glenmore/McKinley			*			*	2		*	*				2
23.72	Ellison			*			*	2							0
23.77	North Kelowna							0	*						1
23.78	Central Kelowna	*	*		*			3							0
23.79	Springvalley			*				1							0
23.81	South/East Kelowna							0				*	*		2
23.82	Hospital/South Pandosy		*					1							0
23.83	KLO/Casorso		*					1							0
23.84	Lower Misson							0	*						1
23.85	Black Mountain	*		*	*	*	*	5							0

Neighbourhood		Disadvantaged Janus Neighbourhoods							Advantaged Janus Neighbourhoods						
Code	Name	Com	Emo	Lan	Phy	Soc	Tot	Total worse scores	Com	Emo	Lan	Phy	Soc	Tot	Total better scores
28.01	Nazko / Blackwater							0						*	1
28.02	Quesnel West		*			*		2							0
33.01	Chilliwack - Downtown	*		*	*	*	*	5							0
33.02	Chilliwack - West	*	*		*	*		4							0
33.03	Chilliwack - South	*	*		*	*	*	5							0
33.05	Yarrow/Cultus Lake							0	*	*	*			*	4
33.06	Rosedale					*	*	2							0
33.07	Chilliwack - Fairfield		*	*		*	*	4							0
33.08	Promontory/Chilliwack Valley							0	*			*	*		3
34.16	Babich	*		*	*	*		4							0
35.04	Rural South Langley		*			*		2							0
35.06	Fort Langley							0		*	*				2
35.10	Langley City North							0	*			*	*		3
35.11	Langley City South							0	*			*	*	*	4
36.01	White Rock							0		*	*				2
36.13	Fleetwood South			*				1							0
36.20	Strawberry Hill South							0	*	*	*				3
36.21	Beaver Creek	*		*	*			3							0
36.22	Strawberry Hill West						*	1							0
36.23	Strawberry Hill		*					1							0
36.25	Newton North		*		*			2							0
36.28	Kennedy Trail			*	*	*		3							0
36.29	Kirkbride							0	*						1
36.30	Cindrich		*					1							0
36.32	Whalley South							0		*	*				2
36.36	Whalley							0				*	*		2
36.37	Gateway							0				*	*		2

Neighbourhood		Disadvantaged Janus Neighbourhoods							Advantaged Janus Neighbourhoods						
Code	Name	Com	Emo	Lan	Phy	Soc	Tot	Total worse scores	Com	Emo	Lan	Phy	Soc	Tot	Total better scores
36.41	Whalley East							0		*	*	*	*	*	5
36.42	Guildford West							0		*	*				2
36.46	Guildford							0		*	*				2
37.44	Ladner Centre			*				1							0
37.45	Ladner East							0	*						1
37.46	Sunshine Hills			*				1							0
37.50	Kennedy		*					1							0
37.52	Delta Rural			*				1							0
38.04	Thompson				*			1							0
38.07	Bridgeport / Sea Island	*			*	*		3							0
38.08	Cambie	*			*	*		3							0
38.10	East Richmond				*	*		2							0
39.01	University Lands							0						*	1
39.03	Kitsilano							0	*			*	*	*	4
39.04	Mount Pleasant	*			*	*	*	4							0
39.05	Strathcona	*			*	*	*	4							0
39.07	Hastings - Sunrise							0	*						1
39.10	Riley Park	*		*				2							0
39.12	Shaughnessy	*		*	*			3							0
39.20	Fairview	*						1							0
40.01	Uptown						*	1							0
40.03	Downtown - Stewardson	*		*	*	*	*	5							0
40.04	Sapperton							0				*	*		2
40.06	Queensborough						*	1							0
41.03	Burnaby Mountain		*		*			2							0
41.10	Stoney Creek		*					1							0
41.17	Middlegate						*	1							0
41.19	Edmonds/12 th Avenue		*					1							0

Neighbourhood		Disadvantaged Janus Neighbourhoods							Advantaged Janus Neighbourhoods						
Code	Name	Com	Emo	Lan	Phy	Soc	Tot	Total worse scores	Com	Emo	Lan	Phy	Soc	Tot	Total better scores
44.01	Grand Boulevard							0	*			*	*	*	4
44.05	Norgate							0				*	*		2
44.10	Upper Lonsdale	*			*	*	*	4							0
44.13	Blueridge			*				1							0
44.14	Deep Cove	*						1							0
44.18	Canyon Heights	*						1							0
45.03	Ambleside - British Properties	*						1							0
46.01	Gibsons / Langdale							0		*	*				2
47.01	Cranberry Lake							0	*					*	2
47.04	Westview Centre		*				*	2							0
47.05	Westview South / Texada		*				*	2							0
49.01	Central Coast						*	1							0
50.01	Haida Gwaii	*						1							0
52.01	Prince Rupert - Centre					*	*	2							0
52.04	Prince Rupert - Seal Cove	*			*	*	*	4							0
53.04	Keremeos/Cawston					*	*	2							0
54.01	Houston							0				*	*		2
54.03	Smithers - Telkwa			*			*	2							0
57.05	South Fort George			*	*	*	*	4							0
57.07	Peden Hill			*			*	2							0
57.09	Pineview / Hixon	*						1	*			*	*		3
58.02	Princeton		*					1							0
59.05	Chetwynd / Tumbler Ridge	*						1							0
60.05	Fort St John - West							0	*						1
61.01	Thetis Lake							0		*	*				2

Neighbourhood		Disadvantaged Janus Neighbourhoods							Advantaged Janus Neighbourhoods						
Code	Name	Com	Emo	Lan	Phy	Soc	Tot	Total worse scores	Com	Emo	Lan	Phy	Soc	Tot	Total better scores
61.07	Victoria West	*						1							0
61.13	Victoria - Downtown							0		*	*				2
61.16	Esquimalt	*	*	*	*	*	*	6							0
61.17	Strawberry Vale							0		*	*			*	3
62.02	Lagoon							0	*			*	*		3
62.05	Colwood		*					1							0
62.07	Atkins							0		*	*				2
62.08	Millstream							0						*	1
63.02	Sidney				*			1							0
63.06	Elk Lake		*					1							0
64.01	Saltspring Island			*			*	2							0
67.02	South West			*			*	2							0
68.03	Long Lake							0		*	*			*	3
68.05	Newcastle - Townsite			*			*	2							0
68.09	South Nanaimo	*			*	*		3							0
68.12	Westwood			*			*	2							0
68.13	Cinnabar - Extension						*	1							0
68.15	Gabriola		*					1							0
69.05	Northwest / Lasqueti					*		1							0
70.04	Cherry Creek							0	*						1
70.05	Beaver Creek Rd		*					1							0
70.07	Tofino - Ahousat							0				*	*		2
70.08	Ucluelet							0		*	*	*	*		4
70.09	Bamfield - Alberni Canal	*	*	*	*	*	*	6							0
71.01	Glacierview / Vanier	*	*		*	*	*	5							0
71.02	South Valley / Islands	*						1							0
71.04	South Courtenay		*		*			2							0
71.05	Comox West							0	*			*	*	*	4

Neighbourhood		Disadvantaged Janus Neighbourhoods							Advantaged Janus Neighbourhoods						
Code	Name	Com	Emo	Lan	Phy	Soc	Tot	Total worse scores	Com	Emo	Lan	Phy	Soc	Tot	Total better scores
71.07	Lazo							0	*	*	*			*	4
71.08	Valleyview							0		*	*				2
72.01	Campbell River - Centre							0				*	*		2
72.05	Rockland							0	*						1
72.06	Shelter Point							0	*	*	*			*	4
72.12	Quinsam - Strathcona							0				*	*	*	3
73.04	Logan Lake / Savona							0	*						1
73.05	Brocklehurst							0		*	*				2
73.06	Aberdeen							0		*	*				2
74.02	Lillooet / Clinton							0				*	*		2
75.03	Mission - West Heights		*					1							0
75.04	Mission - North		*					1							0
75.05	Upper West Heights		*	*				2							0
75.07	Mission - Northeast		*					1							0
78.01	Agassiz - Harrison							0				*	*		2
78.02	Hope					*		1							0
79.44	Shawnigan Lake							0	*	*	*				3
79.50	Lakes Road							0	*	*	*	*	*	*	6
79.51	Crofton / North Cowichan							0		*	*				2
79.53	Cowichan Bay / Glenora						*	1							0
82.06	Terrace - Thornhill		*			*		2							0
82.10	Snow Country				*			1							0
83.01	Armstrong / Spallumcheen							0		*	*			*	3
83.02	Enderby			*		*		2							0

Neighbourhood		Disadvantaged Janus Neighbourhoods							Advantaged Janus Neighbourhoods						
Code	Name	Com	Emo	Lan	Phy	Soc	Tot	Total worse scores	Com	Emo	Lan	Phy	Soc	Tot	Total better scores
83.05	Shuswap			*				1							0
84.01	Island West	*						1							0
85.01	Port McNeill							0	*			*	*		3
85.02	Port Hardy	*			*	*	*	4							0
87.01	Stikine							0	*			*	*		3
91.03	Fort St James	*				*		2							0
92.01	Nisga'a							0	*			*	*	*	4

Note. The “*” symbol indicates when a neighbourhood was 1.5 standard deviations above (advantaged) or below (disadvantaged) the mean difference score on a particular EDI outcome.

Characteristics of Janus neighbourhoods. Janus neighbourhoods that met the criteria of being 1.5 standard deviations above or below the mean on one or more EDI outcomes were explored to provide some insight into what sets these neighbourhoods apart from other neighbourhoods where children performed as expected. This exploration utilized data from the 2001 Canadian Census. Indicated in Table 11 is the percentage of Janus neighbourhoods that were above or below the mean with respect to the listed neighbourhood census variables. Information in Table 11, therefore, highlights the neighbourhood census indicators that may be “unique” to the Janus neighbourhoods, thus giving some insight into how these Janus neighbourhoods might be different from the general group of neighbourhoods. It may be that these differences are contributing to why these neighbourhoods are functioning differently than expected on EDI outcomes (according to HLM analysis).

Table 11

Proportion of Advantaged and Disadvantaged Janus Communities with Census Indicator Prevalence Rates ± 1 Standard Deviation from the Mean

Census Indicator	Advantaged Janus Communities						Disadvantaged Janus Communities					
	Com (n=44)	Emo (n=44)	Lan (n=38)	Phy (n=42)	Soc (n=35)	Tot (n=36)	Com (n=35)	Emo (n=32)	Lan (n=34)	Phy (n=32)	Soc (n=29)	Tot (n=32)
% non movers 1yr							↓0.31	↓0.38			↓0.38	↓0.34
% non movers 5yrs	↑0.32		↑0.34		↑0.31	↑0.33		↓0.34			↓0.38	↓0.31
% non migrant movers 1yr								↑0.41			↑0.41	↑0.38
% non migrant movers 5yrs	↓0.36		↓0.39		↓0.31	↓0.36		↑0.34		↑0.31	↑0.41	↑0.34
% first generation Canadian	↓0.32		↓0.37	↓0.31	↓0.43	↓0.39						
% Canadian Citizen												
% immigrant					↓0.34	↓0.31						
% trades	↑0.39	↑0.34	↑0.39	↑0.31	↑0.57	↑0.42	↑0.31	↓0.31				
% college												↓0.31

Census Indicator	Advantaged Janus Communities						Disadvantaged Janus Communities					
	Com (n=44)	Emo (n=44)	Lan (n=38)	Phy (n=42)	Soc (n=35)	Tot (n=36)	Com (n=35)	Emo (n=32)	Lan (n=34)	Phy (n=32)	Soc (n=29)	Tot (n=32)
% unemployed												↑0.31
% males unemployed												↑0.34
% females unemployed				↑0.33				↑0.31			↑0.38	↑0.38
% males in management									↓0.32			
% males in business	↓0.45	↓0.41	↓0.58	↓0.55	↓0.54	↓0.53	↓0.37	↓0.31				↓0.38
% males in applied sciences												↓0.34
% males in health					↓0.31							
% males in sales			↓0.32		↓0.34	↓0.33						
% males in trades											↓0.31	
% males in primary				↑0.38	↑0.31	↑0.33						
% females in business							↓0.31					

Census Indicator	Advantaged Janus Communities						Disadvantaged Janus Communities					
	Com (n=44)	Emo (n=44)	Lan (n=38)	Phy (n=42)	Soc (n=35)	Tot (n=36)	Com (n=35)	Emo (n=32)	Lan (n=34)	Phy (n=32)	Soc (n=29)	Tot (n=32)
% females in health					↑0.31			↓0.31				
% females in art								↑0.34				
% females in sales									↑0.32			↑0.31
% agriculture				↑0.33								
% utilities								↓0.34			↓0.31	↓0.38
% whole sale	↓0.32	↓0.36	↓0.45	↓0.38	↓0.43	↓0.42	↓0.31					
% retail								↓0.34				
% information	↓0.39		↓0.32	↓0.36	↓0.31	↓0.42						↓0.38
% finance	↓0.39		↓0.39	↓0.45	↓0.40	↓0.39	↓0.37	↓0.31				↓0.34
% professional												↓0.31
% administrative support					↓0.37				↑0.35		↑0.31	
% other industry				↓0.31								
% males who drive to work				↓0.33				↓0.34			↓0.31	

Census Indicator	Advantaged Janus Communities						Disadvantaged Janus Communities					
	Com (n=44)	Emo (n=44)	Lan (n=38)	Phy (n=42)	Soc (n=35)	Tot (n=36)	Com (n=35)	Emo (n=32)	Lan (n=34)	Phy (n=32)	Soc (n=29)	Tot (n=32)
% females who drive to work					↑0.34	↑0.31						
% population no unpaid housework	↓0.32				↓0.40	↓0.31						
% males no unpaid housework	↓0.32				↓0.40							
% females no unpaid housework					↓0.31	↓0.31				↓0.34		↓0.31
% females no unpaid childcare								↑0.31				
% population no unpaid seniors care	↓0.32											
Median income discrepancy	↑0.34		↑0.32		↑0.37							
% population unemployed with children under 6	↑0.34			↑0.31		↑0.31						↑0.34
% population unemployed with children all ages			↑0.32	↑0.33	↓0.34	↑0.31						

Census Indicator	Advantaged Janus Communities						Disadvantaged Janus Communities					
	Com (n=44)	Emo (n=44)	Lan (n=38)	Phy (n=42)	Soc (n=35)	Tot (n=36)	Com (n=35)	Emo (n=32)	Lan (n=34)	Phy (n=32)	Soc (n=29)	Tot (n=32)
% males unemployed with children all ages						↑0.31						
% females unemployed with children under 6									↓0.32			↑0.31
% females unemployed with children all ages	↓0.39	↓0.48	↓0.37	↑0.43	↑0.31/ ↓0.37	↑0.33/ ↓0.39	↓0.34	↓0.44	↓0.41	↓0.31		↓0.31
% lone parent							↑0.34				↑0.38	↑0.34
% female lone- parent							↑0.31				↑0.45	↑0.34
% male lone-parent												↑0.31
Average children under 6 per family										↓0.31		
Average seniors per family								↑0.35				
Median family income											↓0.34	↓0.41

Census Indicator	Advantaged Janus Communities						Disadvantaged Janus Communities					
	Com (n=44)	Emo (n=44)	Lan (n=38)	Phy (n=42)	Soc (n=35)	Tot (n=36)	Com (n=35)	Emo (n=32)	Lan (n=34)	Phy (n=32)	Soc (n=29)	Tot (n=32)
Average household income							↓0.31				↓0.38	↓0.41
Median household income							↓0.37				↓0.38	↓0.47
Home owner							↓0.31	↓0.31			↓0.34	
% affluent male (\$50 000)							↓0.37	↓0.31			↓0.34	↓0.34
% affluent males (\$60 000)												↓0.31
% affluent residents (\$50 000)											↓0.34	↓0.34

Note. The arrows indicate whether the variable was found to be “above” the sample mean (up arrow) or “below” the sample mean (down arrow). The numbers are the proportion of Janus neighbourhoods for each EDI outcome that performed above or below the sample mean for that census variable. This table only included those proportions that were greater than or equal to .30 for ease of presentation. In addition, those census variables that were not above or below the mean for at least 30% of the neighbourhoods for any of the 12 groups of neighbourhoods were not included in this table.

To explore the characteristics of the Janus neighbourhoods, Table 11 was examined to determine if there were notable patterns for any of the census variables across EDI outcomes, as well as looking at those census variables that were specifically highlighted in relation to the Total score because all EDI outcome are related to the Total score. Of particular interest were patterns that were opposite in nature (i.e. endorsement of a census variable being above the mean for more advantaged neighbourhoods and endorsement of that same variable being below the mean for more disadvantaged neighbourhoods). These patterns are described below.

Residential stability. The residential stability of neighbourhoods was above the mean more often for advantaged Janus neighbourhoods and below the mean more often for disadvantaged Janus neighbourhoods. That is, advantaged Janus neighbourhoods had residents who were more often in their same homes for at least 5 years (more non movers over the past 5 years and fewer non-migrant movers over the past 5 years), compared to disadvantaged Janus neighbourhoods that had more residents moving (either to another home in the same neighbourhood (non-migrant) or out of the neighbourhood entirely) within the past one year and the past five years. Consistent with this result was the finding that disadvantaged Janus neighbourhoods were more often below the mean in terms of home ownership on three EDI outcomes. While home ownership is partially a measure of SES, it also functions as an indicator of stability because the investment of home ownership presumably brings with it longer tenancy periods.

New or recent immigrants. The advantaged Janus neighbourhoods regularly had fewer first generation Canadians, and for the EDI Total score and the Social Competence domain, advantaged Janus neighbourhoods had fewer immigrants.

Employment rates. Although employment rates were not endorsed with consistency

across the advantaged Janus neighbourhoods, they were endorsed as being above the mean more often for disadvantaged neighbourhoods on the EDI the Total score, with female unemployment rates specifically endorsed as being above the mean more often for disadvantaged Janus neighbourhoods on three EDI outcomes, including the Total score.

When employment rates were examined in terms of the population with children under six years of age and those with children of any age, further patterns were noticed. The proportion of the population with children under six years of age that is unemployed was above the mean more often for advantaged Janus neighbourhoods on three EDI outcomes (including the Total score). The proportion of the population with children of any age that is unemployed was also above the mean more often for advantaged Janus neighbourhoods on three EDI outcomes (including Total score).

Male and female occupations. Advantaged Janus neighbourhoods appear to differ from disadvantaged neighbourhoods with respect to a select number of male and female occupations. Advantaged Janus neighbourhoods were below the mean regarding proportion of males in sales positions and above the mean regarding proportion of males in primary occupations across three EDI outcomes, including the Total score. Disadvantaged Janus neighbourhoods were also above the mean regarding proportion of females in sales occupations on two EDI outcomes, including the Total score.

Prevalence of industry. The prevalence of specific industries in terms of the proportion of the population employed within a given industry also highlighted specific patterns. Disadvantaged Janus neighbourhoods were below the mean more often in terms of the proportion of the labour force employed in the utilities industry (three EDI outcomes including the Total score) and above the mean more often regarding the proportion of the labour force

employed in the administrative support industry (two EDI outcomes). Advantaged Janus neighbourhoods were below the mean more often in terms of the proportion of the labour force employed in the whole sale industry (all six EDI outcomes), the information industry (five EDI outcomes including the Total score), and the finance industry (five EDI outcomes including the Total score).

Males and females who drive to work. Disadvantaged Janus neighbourhoods were below the mean more often in terms of the proportion of males who drive to work (two EDI outcomes), while advantaged Janus neighbourhoods were above the mean in terms of the proportion of females who drive to work (two EDI outcomes including the Total score).

Domestic work. Advantaged Janus neighbourhoods were below the mean on three EDI outcomes (including the Total score) for the proportion of the population that does zero hours of unpaid housework in a week. This pattern also held when broken down into males and females. The same pattern did not hold for disadvantaged Janus neighbourhoods although the proportion of females doing zero hours of unpaid housework was below the mean for two EDI outcomes (including the Total score).

Income discrepancy between males and females. The median income discrepancy between males and females was above the mean more often for advantaged Janus neighbourhoods on three EDI outcomes.

Lone-parent status. Disadvantaged Janus neighbourhoods were above the mean more often in terms of the proportion of female-lone parents for three EDI outcomes (including the Total score). Thirty percent or more of disadvantaged Janus neighbourhoods were also above the mean in terms of the proportion of male lone-parents, although this result held only for the Total score.

Income. While none of the income variables were endorsed by 30 percent or more of the advantaged Janus neighbourhoods, they were regularly endorsed as being below the mean more often for disadvantaged Janus neighbourhoods across several EDI outcomes. Median family income, and average and median household income were below the mean more often for disadvantaged Janus neighbourhoods for between two and three EDI outcomes (including the Total score). Male affluence (males earning >\$50 000 per year) was also below the mean more often for disadvantaged Janus neighbourhoods on four EDI outcomes (including the Total score) while overall affluence (males or females earning >\$50 000) was below the mean more often for disadvantaged Janus neighbourhoods on two EDI outcomes (including the Total score).

Clustered examples of Janus neighbourhoods. As listed in Table 10, advantaged and disadvantaged Janus neighbourhoods can be found across the province of BC. With the use of geographic mapping technology, it was possible to map the location of these advantaged and disadvantaged Janus neighbourhoods. Presenting maps for results from the entire province of BC in the current study is made difficult due to the large amount of space required to map such a large geographic area. Instead, two regions of the province were selected for mapping that contained an interesting mix of both advantaged and disadvantaged Janus neighbourhoods. These two regions were Southwestern BC and the Port Alberni-Comox Valley area. These maps are presented in Figures 1 and 2. It should be noted that these maps do not necessarily represent neighbourhoods where children are performing well on the EDI or neighbourhoods where children are performing poorly on the EDI. Instead, these figures map neighbourhoods where children are performing better than expected or worse than expected on the EDI given their neighbourhood context.

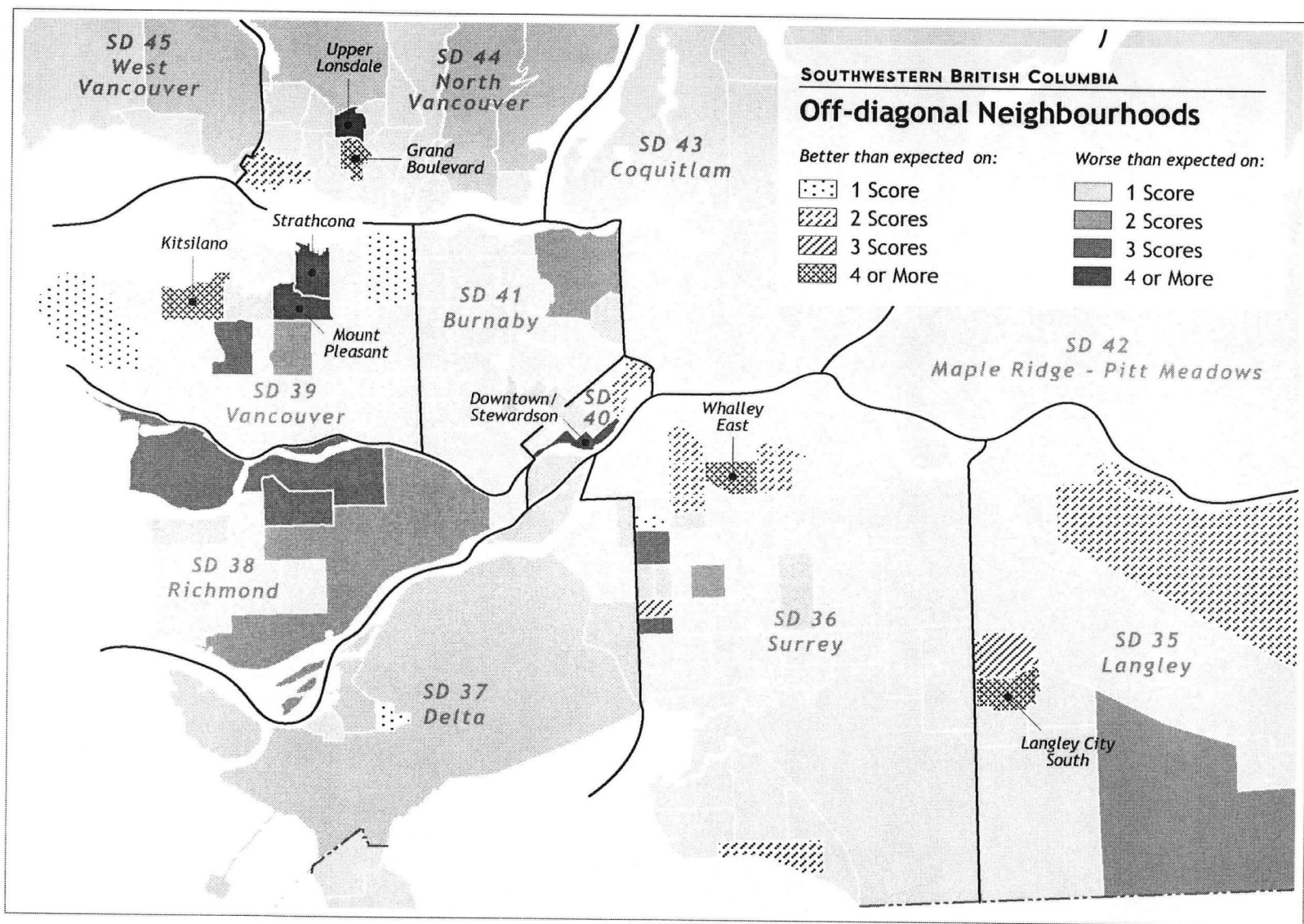


Figure 1. Geographic map of advantaged and disadvantaged Janus neighbourhoods in Southwestern BC.

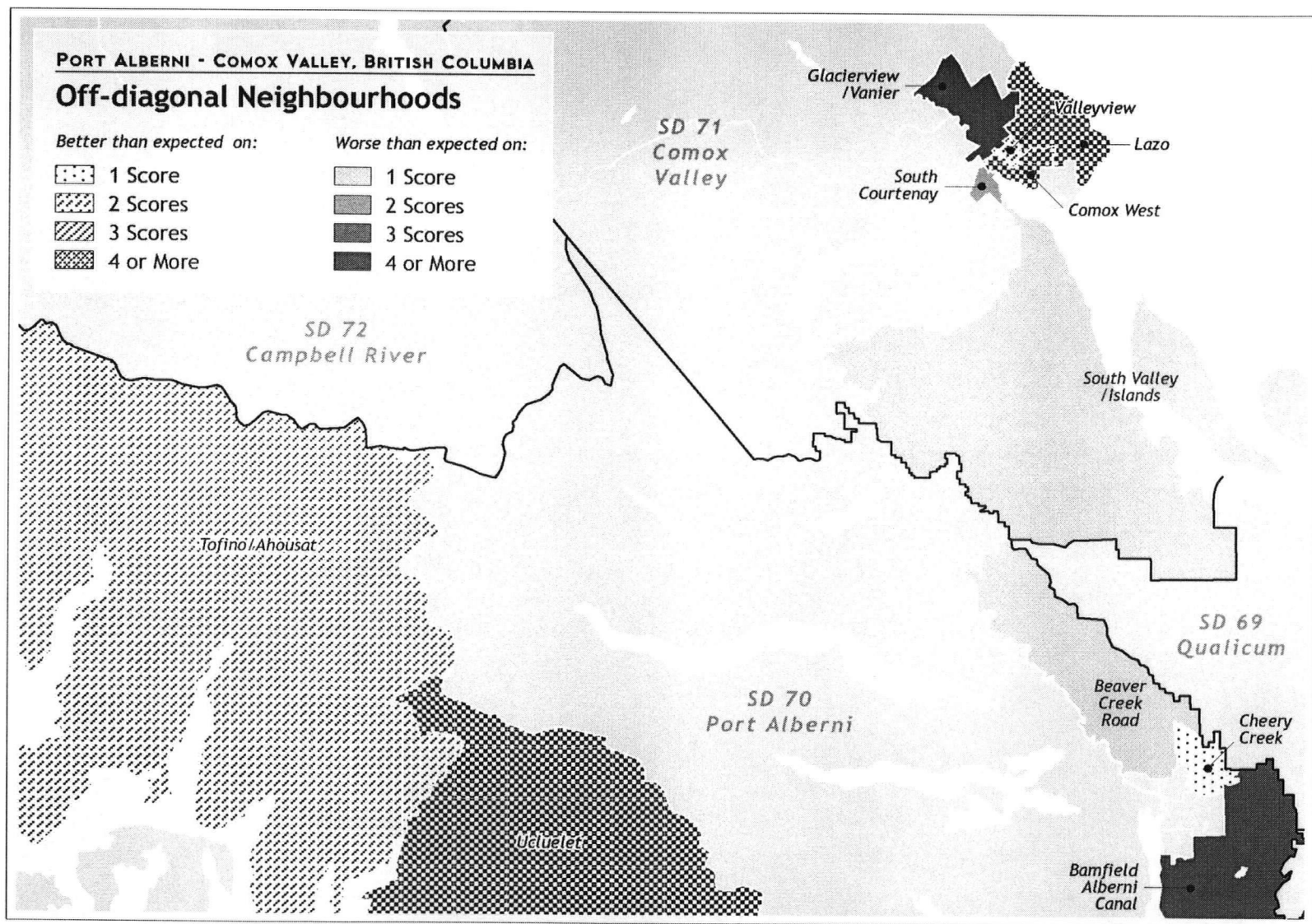


Figure 2. Geographic map of advantaged and disadvantaged Janus neighbourhoods in Port Alberni - Comox Valley, BC.

This mapping of children's outcomes by neighbourhood boundaries permits a visual of the gradients that exist within specific geographic regions in terms of whether or not children are performing as expected on the EDI given their neighbourhood context. In Figures 1 and 2, it is very apparent that across a geographic region, there can exist substantial variation in terms of the degree to which neighbourhoods perform as expected or not on the EDI. Also apparent from Figures 1 and 2, are some striking examples of how very advantaged (four or more EDI outcomes better than expected) and very disadvantaged (four or more EDI outcomes worse than expected) neighbourhoods can be located side-by-side. For instance, in Figure 1, consider the example of Grand Boulevard, a highly advantaged Janus neighbourhood, and Upper Lonsdale, a highly disadvantaged Janus neighbourhood. In Figure 2, consider the example of Lazo, a highly advantaged Janus neighbourhood, and Glacierview/Vanier, a highly disadvantaged Janus neighbourhood.

CHAPTER V

Discussion

Previous research has indicated that neighbourhoods can exert a lasting influence on early child development (Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993; Caspi, Taylor, Moffitt, & Plomin, 2000; Chase-Lansdale & Gordon, 1996; Hertzman, McLean, Kohen, Dunn, & Evans, 2002). The findings from the current study provide additional evidence of the relationship between neighbourhood context and development in the early years. Specifically, children's outcomes on the EDI, a measure of school readiness, were significantly predicted by 13 neighbourhood variables using an HLM approach to data analysis. The correlation of significant neighbourhood predictors with other census variables was also examined to further explore their relevance. An exploratory analysis of the unique features of neighbourhoods where children performed better or worse than expected given their neighbourhood environment was then completed. The following discussion focuses first on the role of significant neighbourhood variables in predicting school readiness. Second, key neighbourhood variables that appeared to be influencing the performance of Janus neighbourhoods are discussed. Third, the discussion shifts to explore specific themes that emerged from these findings.

Neighbourhood Predictors of School Readiness

The findings of the current study suggest that neighbourhood contextual factors have a relationship to the school readiness of young children when accounting for individual children's age and gender. In general, results of the current study are similar to findings reported in other Canadian and US studies, suggesting that, although Canadian neighbourhoods may not be as ghettoized as those in the US, the significance of neighbourhood context to early development is not unique to American neighbourhoods. In addition, since the current study included both rural

and urban neighbourhoods, with effect sizes similar to those from research conducted solely with urban samples (e.g., Oliver et al., in press), the current results suggest that the importance of neighbourhood context is not confined to larger urban centres.

The salience of the relationship between neighbourhood contextual factors and school readiness may vary dependent on the domain being measured. Results from the current study suggest that neighbourhood contextual factors are most important to outcomes on the Physical Health and Well-Being domain and the Communication and General Knowledge domain, slightly less important to outcomes on the Language and Cognitive Development domain and the Total score, and least important to the Emotional Maturity and Social Competence domains. These results are consistent with a recent Canadian study conducted by Oliver and colleagues (in press) and with previous neighbourhood effects research (Leventhal & Brooks-Gunn, 2000). However, much caution should be exercised in interpreting these outcomes as absolutes in terms of the relevance of neighbourhood context to certain domains. Use of different variables for operationalizing neighbourhood context that are more easily linked to the mechanisms by which neighbourhood effects act may change the noted patterns. If neighbourhood context were to be operationalized through neighbourhood observations or via ethnographic approaches, it is possible that neighbourhood predictors would be more strongly related to social competence and emotional maturity outcomes. In addition, while the Social Competence and Emotional Maturity domains had the least number of significant neighbourhood predictors, they are also difficult constructs to operationalize (Merrell, 1999), and this must be considered in interpreting the current results.

The 13 variables highlighted in the current study as significant neighbourhood predictor variables were conceptually grouped into eight categories accounting for family structure,

income, education, aboriginal status, language, labour force occupations, employment rates, and domestic work.

Family structure. The proportion of multiple family homes within a neighbourhood was directly related to outcomes on the Emotional Maturity domain of the EDI – this despite the fact that increases in multiple family homes also brought with it increases in residents who had no knowledge of or ability to speak an official language, were first generation Canadians or immigrants, had less than a grade 9 level of education, and were employed in lower status occupations. From this preliminary analysis of neighbourhoods with higher proportions of multiple family homes, it may be surmised that multiple family homes have a buffer effect on the development of young children's emotional maturity. While it is not possible to know how many of these multiple family homes are intergenerational homes or homes with extended family members co-residing, the correlation of this variable with being a first generation Canadian or immigrant, as well as the immigration patterns in BC suggest that this may be so. In BC, approximately one in every six residents has a Chinese or South Asian heritage, and the larger urban centres have a very high proportion of visible minority residents (approximately 50 percent) with approximately ten percent of these individuals being recent immigrants (Kershaw et al., 2005). Thus, it may be reasonable to assume that many of the multiple family homes in BC are intergenerational Chinese or South Asian homes. Within these homes, the traditional family hierarchy assigns set roles and duties to the various family members (Deepak, 2005). This often includes a dispersion of the responsibility for childcare across the family unit, with grandparents, aunts, and other extended family members taking on caregiving roles as an expectation rather than an option (Kurrien & Vo, 2004). This dispersion of caregiving responsibility has a number of documented effects. Amongst these, it lessens the demands child-rearing places on

birthparents and provides an increased “sense of security regarding children’s health and safety” (p. 595, Deepak, 2005). Brody, Flor and Neubaum (1998) suggested that the extended kin approach to childrearing actually equips children who live in adverse circumstances, including poverty, to develop into “emotionally healthy, competent people” (p. 232). Others have also found that immigrant children have better mental health than their US-born counterparts at transition to kindergarten (Crosnoe, 2006). The underlying assumption is that children who are immersed in an extended family environment during their early years are better supported towards healthy socioemotional development (Fuligni, 1998; Hackett & Hackett, 1993; Kurrien & Vo, 2004). These effects have been shown to hold even after the effects of parental education and income are accounted for, and well into the adolescent years (Fuligni, 1998; Harris, 1999). Further information on the composition of multiple family homes in BC would be required to ascertain if it is the cultural approach to family living and childrearing that has resulted in the proportion of multiple family homes within a neighbourhood being a direct and significant predictor of children’s outcomes on the emotional maturity domain. However, given the related literature and the importance of support networks in the collective socialization approach to understanding neighbourhood effects, it seems reasonable to suggest that growing up in a multiple family home is a protective factor for children living in neighbourhoods where adults are less educated, do not know/speak an official language, and are employed in less desirable jobs. Further qualitative research on how the increased presence of multiple family homes impacts the neighbourhood environment is needed to better understand its relationship to EDI outcomes. It is possible that this aggregated effect is found in the form of a community that has the emotional and social resources to collectively mobilize around supporting young children.

Income. The low income rate and the proportion of affluent males (>\$60 000/year) were

both significant neighbourhood predictors of children's EDI outcomes. The low income rate was significant for the Physical Health and Well-Being domain, with higher rates of low income predictive of lower scores. Since the low income rate is a direct measure of SES, this result was anticipated. The social and economic deprivation that may accompany having a lower income have resulted in the frequent citation of low income as predictive of poorer child development outcomes at the neighbourhood level (Brooks-Gunn et al., 1993; Brownell et al., 2004; Chase-Lansdale & Gordon, 1996; Duncan, Brooks-Gunn, & Klebanov, 1994; Janus et al., 2003; Klebanov, Brooks-Gunn, McCarton, & McCormick, 1998; Kohen et al., 2002; Kohen, Hertzman, & Brooks Gunn, 1998). In the current sample, the low income rate was significantly associated with more adults who: do not have knowledge of/use an official language, have immigrant status, have less than grade 9 education, have lone-parent status, and have lower household and family incomes. Taken together, these variables are indicative of the social and economic conditions that define deprivation. Thus, while the low income rate literally refers to a measure of poverty, considered in a more general sense, it is an indicator of deprivation (Townsend, 1987) and its implication in child development as highlighted by the current study is not unprecedented.

The proportion of affluent males was also a significant neighbourhood predictor in the income category. As the proportion of affluent males increased, children's outcomes on the Emotional Maturity domain also increased. This result was anticipated for two reasons. First, as the income level of individual families rises, the developmental outcomes of children also increase (Brooks-Gunn & Duncan, 1997; Jencks & Mayer, 1990; Willms, 2002b), with this effect extending to the level of the neighbourhood (Brooks-Gunn, 1995; Brooks-Gunn et al., 1993). Second, it is not the presence of poor residents that defines the relationship between

neighbourhoods and children's development but the presence of affluent residents (Brooks-Gunn et al., 1993; Duncan et al., 1994; Hertzman et al., 2002). With the presence of affluent residents come adults who can model approaches to encouraging healthy development, as per a collective socialization model of understanding neighbourhood effects (Jencks & Mayer, 1990). The results from the HLM analyses in the current study suggest that affluence is key for at least one EDI domain (Emotional Maturity). What is not evident from these analyses is the extent to which affluence ameliorated risk for poorer children living in economically heterogeneous neighbourhoods or whether this effect was born of trends in neighbourhoods that were more homogeneously affluent.

Occupation. Occupation was also implicated in child development outcomes on the EDI. Three different occupations were chosen for inclusion in the HLM models. Occupations were deemed important variables because of the connectedness to social and networking opportunities that employment presents, and the link between these networks and a collective socialization approach to understanding the relationship between neighbourhoods and children's development (Jencks & Mayer, 1990; Wilson, 1987). In total, four occupation variables accounted for performance on between two and four EDI outcomes: proportion of males in management occupations; proportion of males in processing industry occupations; proportion of males in primary industry occupations, and proportion of females in primary industry occupations. It is notable that three of four significant occupation variables were for males.

The influence of males in management occupations was positive, bringing with it increased scores on the Physical Health and Well-Being, Social Competence, Emotional Maturity, and Total score outcomes. This result was expected given the social and material advantages afforded by employment in a high status managerial position. Neighbourhoods with

higher proportions of males in management also had higher overall levels of education, fewer lone-parents, and fewer individuals employed in less prestigious occupations. It is reasonable to assume that individuals in managerial positions will have a certain aptitude to act as leaders and change agents. Accompanying these traits is presumably an increased capacity for activating around early child development at the neighbourhood level, including pursuing and securing good housing conditions, schools, and childcare. Thus, in a neighbourhood with a solid representation of successful adults who are actively engaged in the economy, there is a ready source of models for children and less affluent adults to emulate in the pursuit of a neighbourhood environment that supports healthy early childhood development. This logic is consistent with the collective socialization approach to understanding neighbourhood effects and with previous research indicating the positive effect of affluent neighbours in mixed/heterogeneous neighbourhoods (Hertzman et al., 2002; Jencks & Mayer, 1990), as well as with previous research highlighting the males in management variable specifically as a proxy for the presence of highly able and effective individuals within a neighbourhood (Kershaw et al., 2005).

What was not expected was the positive effect of being a male in a processing or primary occupation. Both of these predictor variables were directly associated with children's outcomes on the Communication and General Knowledge, Physical Health and Well-Being, and Total EDI scores. Both of these occupations were anticipated to be of lower status. Indeed, as the proportion of males employed in either of these occupations increased, so too did the proportion of residents in the neighbourhood with lower levels of education, those with aboriginal status, and those employed in other less desirable occupations. However, it is possible that many of the males working in these occupations are enjoying the high wages associated with more senior

positions within these industries, as well as the wage and benefits security offered by the unions that typically govern these industries. Thus, although males working in these occupations tend to live in neighbourhoods with higher levels of less advantageous characteristics, they may actually serve as the source of heterogeneity within these neighbourhoods that improves children's outcomes. This heterogeneity would be akin to that highlighted by Brooks-Gunn and colleagues (1993), Duncan and colleagues (1994), and Hertzman and colleagues (2002). That is, it may be the presence of some males in these neighbourhoods who are earning higher wages and who are exposed to the professional networks that afford the skills essential to the collective socialization mechanism that is buffering the impact of other challenging neighbourhood characteristics.

The proportion of females in primary occupations was a significant inverse predictor of the Physical Health and Well-Being and the Total EDI scores. This result was in line with hypotheses about primary occupations being lower in status. This result also underscores that primary occupations may be lower in status for females, but not for males. Indeed, the proportion of females in primary occupations was correlated with decreased proportions of residents employed in higher status occupations. The finding that females in lower status positions may relate negatively to children's outcomes was also reported by Kershaw and colleagues (2005) who found that the percentage of females in manufacturing occupations, which were disproportionately filled by marginalized women, was strongly correlated with children's outcomes on the Physical Health and Well-Being domain of the EDI.

Employment. The employment rate among men was found to be predictive of EDI outcomes on the Language and Cognitive Development domain, the Communication and General Knowledge domain, and the Total score. The logic in this connection may again be found by referring to the collective socialization model for understanding neighbourhood effects.

Wilson (1987) provided an exemplary account of the relationship between joblessness and the ability to collectively mobilize. Unemployed adults, argued Wilson, do not have the same access to quality educational institutions, are isolated from informal job networks, and lack opportunities to socialize with other economically successful individuals. Indeed, as the rate of male unemployment increased for neighbourhoods in the current study, the presence of other adults in the neighbourhood employed in desirable occupations or those earning higher incomes decreased. These conditions result in jobless individuals having minimal exposure to peers that might model the norms and behaviour patterns that lead to more successful outcomes.

Aggregated at the neighbourhood level, unemployment results in a high concentration of individuals who will be less able to collectively mobilize around the goal of healthy early development. When combined with other risk factors correlated with high neighbourhood rates of male unemployment in the current study, such as more low income households, aboriginal residents and lone-parents, the result for children is a combination of factors within their neighbourhood environment that place them at a higher risk for poor developmental outcomes (Coulton & Pandey, 1992). The finding that neighbourhood employment rates have a relationship to child outcomes is consistent across the neighbourhood effects literature (Janus et al., 2003; Leventhal & Brooks-Gunn, 2000).

Domestic activity. The proportion of males and the proportion of females doing zero hours of unpaid childcare in a typical week were both significant predictors of EDI outcomes, albeit with opposite effects. As the proportion of females who performed zero hours of unpaid childcare in a week increased, so too did children's scores on the Language and Cognitive Development domain. Conversely, as the proportion of males who performed zero hours of unpaid childcare in a week increased, children's scores on the Language and Cognitive

Development domain decreased. The proportion of men and women doing zero unpaid hours of childcare was more strongly correlated with some less desirable neighbourhood traits such as lower rates of home ownership, lower household incomes, and higher rates of low income. Interestingly, as both male and female rates of zero hours of unpaid childcare per week increased, the proportion of residents who were senior citizens also increased while the number of persons per family and the number of children under age six per family decreased. In these ways, the character of neighbourhoods where more female and male residents perform zero unpaid hours of childcare per week were quite similar. However, the neighbourhoods where the proportion of females performing zero unpaid hours of childcare per week were greater differed from their male counterparts in one important way – they had a somewhat higher presence of the labour force working in real estate and professional occupations – both higher status occupations. These occupations, in turn, are strongly correlated with higher levels of affluence, especially for females, higher education levels, and a greater presence of residents employed in higher status occupations and industries. Thus, while both males and females performing zero hours of unpaid childcare were also more likely to have already raised their children (being over 65 years), or to have no children (fewer persons per family and fewer children under six per family), females performing zero hours of unpaid childcare were more likely to live in neighbourhoods where some of the residents were employed in a higher status occupation. Therefore, the opposite results for males and females performing no unpaid childcare may speak to the heterogeneous neighbourhood environment where some of the population may be lower income earners but where there were also fragments of the population who were employed in desirable occupations. Again, reflecting back on the foundations of the collective socialization approach to understanding neighbourhood effects, this speaks to the presence of key adults that

have the capacity to act as role models in mobilizing neighbourhoods around supporting young children. Additionally, this underscores the notion of heterogeneity in supporting young children in terms of a mix of high and low income earners (Brooks-Gunn et al., 1993).

Aboriginal status. As the proportion of residents with aboriginal status increased, children's outcomes on the Communication and General Knowledge, Physical Health and Well-Being, and Social Competence domains decreased. There is a long history of oppression of aboriginal people in Canada that has had a devastating impact on the capacity of aboriginal communities to support their young children because the foundation of their cultural practices and traditions was severely undermined. These communities have since faced ongoing social challenges that are certain to impact child development. Interestingly, although neighbourhoods with higher proportions of residents claiming aboriginal status in the current study also had very high levels of unemployment, they were not strongly correlated with lower levels of income. Thus, even when a neighbourhood is not characterized by measures of low income, children can still be adversely impacted. There must, then, be some other intangible feature of these neighbourhoods that negatively impacts children. Townsend (1987) speaks of deprivation as being material or social in nature. Thus, even if material deprivation is not as pronounced, the impact of social deprivation can have effects as detrimental as those of material deprivation. In the case of communities with a higher proportion of aboriginal status residents, this social deprivation may be driven by the aforementioned undermining of culture and tradition. While aboriginal communities work to rebuild these cultures and traditions, and further, to understand their impact on parenting and caregiving, there are questions to be answered around how policy can promote the use of culture in supporting young children. Reframed from a collective socialization perspective, the question becomes one of enabling diverse communities and

neighbourhoods to create a cultural milieu that promotes reliance on cultural beliefs and practices in creating an atmosphere that is mobilized around the well-being of young children.

Language. As the proportion of residents without knowledge of an official language increased, children's performance on the Physical Health and Well-Being domain also increased, while their performance on the Language and Cognitive Development and Communication and General Knowledge domains decreased. These neighbourhoods also had relatively fewer home owners, fewer affluent males, more immigrants or first generation Canadians, and more residents with lower education levels. Thus, children in these neighbourhoods would appear to be at greater risk for developmental challenges. While this held for the Language and Cognitive Development and Communication and General Knowledge domains (consistent with Oliver et al., in press), it did not hold for the Physical Health and Well-Being domain. The inverse relationship between proportion of residents with no knowledge of an official language and children's outcomes on measures of language and communication is self-explanatory. It is, however, important to track this over time, since there is evidence to suggest that although children who are raised in multilingual environments, or environments where a non-official language is spoken may struggle early on, if supported in the full development of their native and non-native languages, these children will approach native fluency by the middle school years (Cummins, 1984; Gopaul-McNicol & Thomas-Presswood, 1998). Indeed, research on the adjustment of immigrant children suggests that they will often go on to equal or outperform students with US-born parents (Fuligni, 1998; Kao & Tienda, 1995).

While the inverse relationship between knowledge of an official language at the neighbourhood level and children's outcomes on measures of language and communication was self-explanatory, the direct relationship between the proportion of residents with no knowledge

of an official language and physical health was less so. Based on the correlation of higher proportions of residents with no knowledge of an official language with higher proportions of residents who are immigrants, the literature on this population was consulted. Contrary to the current finding, there is some evidence in the related literature to suggest that Latino/a and Asian immigrant children in the US have much poorer physical health than their American peers (Fuligni, 1998). However, more consistent with the current finding is evidence that indicates Chinese immigrant children actually have better physical health outcomes (Harris, 1999). Given the immigration patterns in BC, this latter finding may be more relevant to the outcomes of BC children. However, it would be important to examine the aggregated effect of having no knowledge of an official language at the neighbourhood level and improved physical health outcomes to better understand this relationship. It may be that this relationship is more aptly accounted for by other variables, such as those related to culture (activity level, diet, etc.).

Education. There was a direct relationship between the proportion of adults in a neighbourhood with a university level education, and the performance of children on the Physical Health and Well-Being and the Communication and General Knowledge domains. There is a significant research literature documenting the positive effects of higher levels of parental education (Dahinten & Willms, 2002; Furstenberg, Brooks Gunn, & Morgan, 1987; Hortacsu, 1995; Janus et al., 2003; Rowe, Jacobson, & Van den Oord, 1999). However, when the demographics of neighbourhoods with higher levels of education in the current study were reviewed, an interesting pattern emerged. While residents in these neighbourhoods were more likely to be affluent, employed in desirable occupations, and have higher incomes, they were also more likely to be immigrants or first generation Canadians and less likely to be Canadian citizens. Although immigrant status was not a significant neighbourhood predictor variable in the

current study, identification as an immigrant or first generation Canadian has been identified consistently in the larger literature, as being associated with neighbourhood characteristics that govern less favourable outcomes for children (McCloskey, Southwick, Fernandez-Esquer, & Locke, 1995; Moro, 2003). Thus, this finding was unexpected. It suggests a bimodal distribution of immigrant and/or first generation Canadians, with a certain segment of this population doing very well from an SES perspective. As Fuligni (1998) suggests, many immigrant or first generation children may come from relatively advantaged backgrounds, with parents who received advanced education in their native countries prior to immigrating. Indeed, Deepak (2005) reports that, when compared to the national average, Asian Indians in the US are 2.5 times more likely to have a bachelor of arts degree, 3.5 times more likely to have master's degrees, and 4.75 times more likely to have a doctorate, with their median household income also being considerably above the national median (\$61 322 compared to \$41 994). Deepak concludes that while poverty does exist within immigrant populations, there are also segments that enjoy relative wealth and prestige.

Unique Characteristics of Janus Neighbourhoods

The exploratory analysis of off-diagonal or Janus neighbourhoods allowed a unique and initial glimpse into how advantaged and disadvantaged Janus neighbourhoods differ from other neighbourhoods. It is important to note that the identification of Janus neighbourhoods in the current study was conditional on the HLM models that were fit. Thus, with different models and/or different operationalizations of neighbourhood context, the neighbourhoods that would be identified as Janus neighbourhoods would change. It is interesting, however, that when the neighbourhoods identified as off-diagonal in the current study were compared to the top 25 advantaged and disadvantaged Janus neighbourhoods identified by Kershaw et al. (2005) for

each EDI domain (using linear regression analyses to predict outcomes), there was considerable overlap, particularly in terms of identifying disadvantaged neighbourhoods. Ten of Kershaw et al.'s 25 most advantaged neighbourhoods on any EDI outcome were also found to be advantaged neighbourhoods on at least one EDI domain in the current study, while fifteen of Kershaw et al.'s 25 most disadvantaged neighbourhoods on any EDI outcome were also found to be disadvantaged neighbourhoods on at least one EDI domain in the current study. When broken down by EDI domain, between eight and 12 of Kershaw et al.'s 25 most advantaged neighbourhoods were also found to be advantaged neighbourhoods in the current study, while between 11 and 21 of Kershaw et al.'s 25 most disadvantaged neighbourhoods were also found to be disadvantaged neighbourhoods in the current study. The similarities between the current study and the work of Kershaw et al. in terms of identifying off-diagonals according to EDI domain are reported in Appendix E. Overall, given the methodological differences between the current study and Kershaw et al., the considerable overlap in identification of Janus neighbourhoods provides some evidence of the utility of the current approach in identifying Janus neighbourhoods. Further, this comparison between the two studies highlights specific neighbourhoods in BC that can be more confidently described as "off-diagonal" (beyond the models fit in the current study), and therefore, that are key neighbourhoods to select for further investigation to explain their off-diagonal character.

Understanding the unique attributes of the Janus neighbourhoods identified in the current study is an important step towards further qualitative and quantitative research that may allow insight into what promotes or detracts from resilience for children living in a variety of neighbourhood environments. Of particular interest were those variables that did not factor into the HLM analyses because it is presumably these variables that are, in part, accounting for the

unexpected performance of Janus neighbourhoods. Also of interest were variables that were significant in the HLM analyses but that were endorsed in patterns opposite to those expected given the HLM results (e.g. an advantaged Janus community, where children perform better than expected given their neighbourhood context (high unemployment, etc.) and where a positive neighbourhood attribute exists in more abundance, such as relatively more adults employed in high-status positions). From this analysis, it was apparent that advantaged Janus neighbourhoods had higher rates of residential stability (families were staying in their homes and neighbourhoods for longer periods of time), more unemployed residents, fewer first generation Canadians/immigrants, more males employed in high-status positions, more females driving to work, more adults performing unpaid housework, and a higher male-female income discrepancy. Alternatively, disadvantaged Janus neighbourhoods had less residential stability, higher rates of unemployment (particularly for females), more adults employed in lower-wage positions, fewer males who drive to work, more lone-parents, lower incomes, and fewer affluent residents.

Several key points from these patterns are noteworthy. First, a better understanding of what contributes to residential stability and the protective effect of neighbourhood-level residential stability on children is required. There is a growing research literature that suggests residential instability is predictive of worse outcomes for children even after accounting for the effects of other variables that can contribute to instability, such as family demographics and quality of environment (Adam, 2004; Scanlon & Devine, 2001). Children who live in their homes and neighbourhoods for longer periods of time have the opportunity to develop meaningful social support networks and a connectedness to their physical surroundings (Adam, 2004). When these social support networks and the sense of connectedness to place are disrupted, children experience poorer outcomes (Adam, 2004; Adam & Chase-Lansdale, 2002;

Pribesh & Downey, 1999; Simmons, Burgeson, Carlton-Ford, & Blyth, 1987). In the current study, advantaged Janus neighbourhoods had higher rates of residential stability compared to disadvantaged Janus neighbourhoods, despite both advantaged and disadvantaged neighbourhoods having higher unemployment rates (which were found in the overall sample of neighbourhoods to be predictive of poorer outcomes). To better understand how residential stability might be contributing to the relative success of advantaged neighbourhoods, it would be important to understand the longitudinal impact of instability, the role of quality of environment, and the physiological effects of instability in terms of impact on the development of children's stress and coping systems (Adam, 2004).

Second, an improved understanding of the impact of being a first generation Canadian or an immigrant to Canada is required. While the first generation Canadian variable was not included in the HLM analyses in the current study, status as an immigrant (at the neighbourhood level) was included and did not significantly predict any of the EDI outcomes. Yet, advantaged Janus neighbourhoods consistently had fewer first generation Canadians and immigrants. When correlated with other census variables, being a first generation Canadian or immigrant is associated with a variety of traits, some that are positive (more professionals, higher education) and others that are negative (higher low income rate, more females in processing, no knowledge/ability to use an official language). The current results suggest that in the absence of the constellation of negative factors that often accompany being a first generation Canadian or immigrant, children's scores on the EDI are better than expected. A consideration of the HLM results where a variable highly correlated with being a first generation Canadian or immigrant – specifically no knowledge of an official language – is predictive of worse outcomes on measures of language and communication (as expected) partially explains this outcome. However, no

knowledge of an official language was also found in the HLM results to predict better outcomes in terms of physical health. This contradictory combination of positive and negative outcomes for immigrant and first generation Canadian populations is mirrored in the literature (Crosnoe, 2006; Fuligni, 1998) and a deeper understanding of the lived experience of immigrant and first generation children in the BC context is required to truly understand the impact of this neighbourhood variable on children's school readiness.

Third, there is sufficient information gleaned from the analysis of Janus neighbourhoods to highlight the protective benefits of living in a more heterogeneous neighbourhood, even if that neighbourhood is characterized by several less favourable traits. There is empirical evidence that suggests it is the presence of affluent neighbours, rather than poor neighbours, that is most predictive of children's outcomes (Brooks-Gunn et al., 1993; Duncan et al., 1994; Hertzman et al., 2002). Thus, heterogeneous neighbourhoods, with both affluent and less affluent residents, will govern more positive outcomes for children. The current investigation of off-diagonal neighbourhoods suggests an expansion of the definition of heterogeneous from pertaining only to affluence, to including other measures of socioeconomic status. In this investigation, advantaged Janus neighbourhoods more often had males employed in potentially high earning positions, females who drive to work, and a higher male-female income discrepancy, while disadvantaged Janus neighbourhoods had more adults employed in lower wage positions, had lower incomes, and were less affluent. Thus, even though both advantaged and disadvantaged Janus neighbourhoods may have negative attributes, the character of advantaged Janus neighbourhoods was improved by the presence of some positive SES characteristics that made advantaged neighbourhoods more heterogeneous. That is, these positive attributes acted to break up the homogeneity of an otherwise challenged neighbourhood context.

Fourth, a better understanding of why advantaged Janus neighbourhoods had greater proportions of their populations performing unpaid housework is needed. Initially, it may be easy to conceptualize amount of unpaid housework as a measure of affluence – the assumption being that individuals who are not performing unpaid housework have the financial capacity to pay others to do this work for them. Kershaw and colleagues (2005) found lower rates of this domestic variable at the neighbourhood level to be predictive of poorer child outcomes and proposed that this variable may be acting as a proxy for the stresses associated with subsistence living. Burton and Jarrett (2000) and Wilson (1987) present a similar hypothesis. It appears that individuals living in impoverished homes are not as likely to adhere to the same standards of their affluent counterparts in terms of household cleanliness and other indicators of domestic orderliness (Burton & Jarrett, 2000; Wilson, 1987). Thus, the proportion of the population who does not perform housework is not an indicator of wealth, but instead, an indicator of poverty. In the current sample, performing no unpaid housework aggregated at the neighbourhood level was related to having less than a grade 9 education, higher rates of low income, less likelihood of being a home owner, reduced knowledge/use of an official language, being first generation Canadian, and having immigrant status. Thus, the hypothesis that reduced levels of unpaid housework is a proxy for lower SES appears to hold in the current sample. Given the well established relationship between neighbourhood SES and child development outcomes, particularly with collective socialization as an interpretive lens, it is not surprising that higher rates of the population performing unpaid housework could be seen as a protective feature of advantaged Janus neighbourhoods.

Fifth, the finding that the median income discrepancy between males and females was above the mean more often for advantaged Janus neighbourhoods needs further investigation.

This result suggests that either more men are working outside the home than woman and/or that the gender-based wage inequities are especially pronounced in advantaged Janus communities. If indeed it is the situation that more women are not working outside the home in these neighbourhoods, this finding is counterintuitive given what is known about the hardship that relegation to traditional gender roles creates for women and the potential negative relationship between this and child outcomes (Kershaw et al., 2005). However, considering that advantaged neighbourhoods are defined as neighbourhoods where children are performing better than expected given their neighbourhood environment, it may be that this variable is somehow related to the protective influence of having more adult care-providers available in a higher-risk neighbourhood on a daily basis to provide supervision and stimulation to resident young children. However, this interpretation is only speculative and this finding requires further investigation. Indeed, given the exploratory nature of the off-diagonal analysis, it may be that this finding is merely an artefact of the data and would be not replicated in future studies.

Sixth and finally, consideration must be given to the role of lone-parents, particularly as they influence the outcomes of disadvantaged Janus neighbourhoods. Lone-parent status has been found to consistently predict lower childhood outcomes in a variety of domains at the level of individual families (Cowen, 1999; Jackson, Brooks Gunn, Huang, & Glassman, 2000; Jackson & Scheines, 2005). Studies investigating the collective impact of lone-parent status at the neighbourhood level have also indicated a significant influence on outcomes such as verbal ability (Kohen, et al., 2002) and behavioural problems (Boyle & Lipman, 2002) in the expected directions, although the HLM results from the current study did not support lone-parent status as a significant neighbourhood predictor variable. However, as concerns the analysis of Janus neighbourhoods, it is important to question whether it is the actual impact of “lone-parent” that is

key, or the many adverse social factors that often coexist with the status of lone-parent that are important. Lone-parent families typically have lower incomes, do not benefit from the positive impact of having an emotionally supportive partner, and experience increased levels of stress and depression (Jackson et al., 2000; Jackson & Scheines, 2005; Youngblut, Brady, Brooten, & Thomas, 2000). The families residing in the neighbourhoods included in the current study followed this pattern with the status of lone-parent being moderately to strongly correlated with income, home ownership, residential instability, and the low-income rate in the expected directions, especially for female lone-parents. This constellation of factors has been associated with lower levels of parenting ability and higher rates of neglect (Cowen, 1999; Jackson et al., 2000). Indeed, Kesner and McKenry (2001) and Ricciuti (1999) both suggested that once SES, parental ability level, and parental educational background are controlled for, the influence of lone-parent status as an indicator of early development is no longer significant. Thus, rather than highlighting the beneficial effect of being a child in a two-parent family, it may be more reasonable to acknowledge that lone-parenthood brings with it a series of additional challenges. By making employment more accessible to lone-parents through the provision of parental educational opportunities and quality subsidized childcare, and by increasing the social supports available to lone-parents through neighbourhood house programs, recreational programs, and a general shift in the societal stereotype of "lone-parent", it may be that the power of lone-parent status to negatively influence child outcomes would be lessened. Through these types of supports and changes, neighbourhoods with higher proportions of lone parents might be better able to engage in the collective socialization process around healthy early development.

Emerging Themes

Using HLM approaches to data analyses and exploring the characteristics of off-line

neighbourhoods, several important themes emerged from the current study. Amongst these is the need to more fully appreciate the difference between social and material deprivation (Townsend, 1987). While many of the neighbourhood variables highlighted in the HLM analyses as significant predictors of school readiness are directly related to material wealth (such as male affluence, low income rates, and unemployment rates), there were several significant neighbourhood predictor variables that were more directly focused on barriers to the collective socialization process (multiple family households, aboriginal status, knowledge of an official language, education levels, employment levels in high- versus low-status occupations, male/female childcare patterns and unemployment rates). Although income inequities are somewhat influenced by social policy, the complete obliteration of such inequities may be an unreachable goal. Therefore, the distinction between material and social wealth becomes central. That is, although the equal redistribution of material wealth may not be possible, the redistribution of social wealth is an approachable goal. In order to define this goal, the intangible social benefits afforded by material prestige need to be disentangled. Once disentangled, methods for making these social benefits accessible to higher risk populations should become the focus.

The current study serves to highlight three potential sources of social wealth in the BC population: stability, culture, and heterogeneity. Stability as a facet of social wealth emerged from the current HLM analyses that documented the positive effects of multiple family homes, as well as from the analyses of off-diagonal characteristics where residential stability and home orderliness were endorsed more frequently in advantaged Janus neighbourhoods.

Interpretation of the multiple family home environment as being more stable comes from the assumption that multiple family homes are more predominant in immigrant or first

generation Canadian families, where the dispersion of familial responsibilities across the extended family unit creates a stable and secure environment for young children, both within the home and within the neighbourhood. Aggregated at the level of the neighbourhood, this environment seems to support healthy outcomes in children. Indeed, this pattern has been documented in the related literature to hold despite the presence of other adverse factors, such as poverty (Brody et al., 1998; Deepak, 2005; Harris, 1999; Kurrien & Vo, 2004). The inclusion of residential stability in the more general notion of stability as social wealth arose from the finding that children performed better than expected when neighbourhoods had higher rates of residential stability. Residential instability has been shown to be predictive of poorer outcomes in young children (Adam, 2004; Adam & Chase-Lansdale, 2002; Pribesh & Downey, 1999; Simmons et al., 1987). These findings have been explained by the loss of children's and parents' social support networks, as well as a disruption in the familiarity with their physical environment when families move (Adam, 2004). The inclusion of home orderliness as representative of stability came out of the off-diagonal analyses which suggested higher rates of unpaid housework and the domestic orderliness that accompanies such activity may act protectively for children in advantaged Janus neighbourhoods (although, it is important to note that this variable may actually be acting as a proxy for neighbourhood SES). Considering stability in more global terms, residential stability, the multiple family home environment, and domestic orderliness may offer children similar protective advantages – a distributed support system that, because of the integrity of the inherent relationships and the security and predictability that is born of a stable environment, holds children's development and well-being as a central priority.

An additional potential contributor to social wealth highlighted by the current study is the notion that the cultural roots and traditions of BC's immigrant and aboriginal people may

function in optimal conditions to support young children. This suggestion arises from three key findings. First, the protective factors inherent to the multiple family homes of many of BC's culturally diverse families underscore the importance of maintaining cultural integrity in diverse communities. With the foundation of culture and tradition supporting them, these communities are better able to foster healthy outcomes in young children. Second, no knowledge of an official language predicted positive physical health outcomes for children despite being associated with a myriad of other neighbourhood traits known to place children at higher risk. Since immigrant and first generation Canadians are highly represented in neighbourhoods where more residents do not have knowledge of an official language, it is possible that something about the cultural heritage of these neighbourhoods is succeeding in supporting children's physical health outcomes. Of note, however, is the fact that the no knowledge of an official language variable also predicted negative outcomes for children on measures of language and communication, but it is not known if these predictions would hold across time when children will have had more opportunities to learn the official language(s) in which they are educated. Third, this study also proffers an unfortunate example of the deleterious consequences suffered by children when cultural values and traditions are not supported, as is the case with the aboriginal population of BC. Proportion of residents with aboriginal status was a significant negative predictor of three EDI outcomes. It is no longer debatable that aboriginal peoples have faced extreme pressure to forfeit culture and tradition under the regimes of colonialism and residential schooling. The aboriginal peoples' approaches to parenting and childrearing are among those key components of tradition that were lost. In the absence of their cultural foundation, the capacity of aboriginal people to support their children in healthy development has been compromised. It is from these three findings involving multiple family households, no knowledge of an official language, and

aboriginal status that the suggestion is made for culture and tradition to be considered a component of social wealth.

A third contributor to social wealth highlighted by the current study is the idea that neighbourhood heterogeneity can underscore positive outcomes for children. Not only did rates of male affluence significantly and directly predict children's outcomes according to the HLM analyses, but disadvantaged Janus neighbourhoods consistently had lower rates of affluent males (perhaps contributing to the underperformance of children in these neighbourhoods compared to predicted outcomes). In addition, the mix of residents employed in higher status occupations with other neighbourhood risk factors, the mix of residentially stable residents with other neighbourhood risk factors, and the mix of residents more committed to the establishment of home routines and orderliness with other neighbourhood risk factors resulted in the identification of some higher-challenge neighbourhoods as advantaged Janus neighbourhoods. That is, it may be something about this mixture of positive and negative neighbourhood traits that acts as a buffer in promoting resilience and positive outcomes in young children when those outcomes would not otherwise have been predicted.

These three contributors to social wealth – stability, culture, and heterogeneity – can be reframed within the collective socialization approach to understanding how neighbourhoods are related to child outcomes. The basic premise of the collective socialization approach is that child development is influenced by the capacity of indigenous adults to act as positive role models and to secure resources - both tangible and intangible - important to child development (Jencks & Mayer, 1990). By embracing stability, culture and heterogeneity, neighbourhoods are ideally aligned to have strong support systems, substantial social resources, and the presence of a diverse group of role models. These forces then converge to guide both children and adults in the

creation of a neighbourhood context that is able to collectively mobilize in promoting the school readiness of young children.

The Role of the School Psychologist in Understanding the Relationship Between Neighbourhood Environment and School Readiness

The National Association for School Psychologists (NASP) suggests that the role of the school psychologist is to “work to find the best solution for each student and situation, and use different strategies to address student needs and to improve school and district-wide support systems” (NASP, 2006). Use of words like “student” and the focus on the school setting may mislead many to believe that the role of a school psychologist is limited to working with student populations within the school system. The unfortunate implication is that young children who are not yet in the formal school system may not have their needs and support systems addressed. By not addressing the needs and support systems of young children, school psychologists may inadvertently neglect a population of learners who are arguably in the midst of one of the most critical learning periods - the early years. Given the unique perspective school psychologists have in understanding the complex needs of children, they are in an ideal position to address the needs of all children, regardless of age.

Part of understanding the needs of young learners that have not yet entered the formal school system is understanding the influences the various contexts of their daily lives have on their ability to develop and learn. The current study focused on examining specifically the relationship between neighbourhood context and school readiness. By the time children arrive in Grade 1, they have had between five and six years of exposure to neighbourhood environments that will either support or hinder their development. By understanding the “risk” associated with specific neighbourhood contexts, school psychologists will be better able to accommodate the

needs of learners coming from diverse neighbourhood environments. This accommodation could be in the form of special Grade 1 programming to address weak areas of school readiness for whole populations of children. Use of the EDI, in particular, would allow data collection on the school readiness of large groups of children that would be available in time to plan for the educational needs of these students as they transition into Grade 1.

The school psychologist might also use the information presented in the current study to advocate for early prevention and intervention in neighbourhoods known to be at higher risk for low levels of school readiness. One could look at the characteristics of a neighbourhood based on the HLM and off-diagonal results from the current study and other similar studies (Janus et al., 2003; and Oliver et al., in press) to ascertain risk status. Many communities in BC have now established ECD committees. These committees have considerable power in the allocation of funding for early years programming within neighbourhoods. School psychologists could use the ECD table within their community as a platform for advocating for systemic prevention and intervention programs for whole groups of children who are potentially at risk given their neighbourhood environment. With the addition of data from the EDI, these programs could be targeted at specific domains of weakness in terms of school readiness so that children have exposure to learning opportunities prior to kindergarten (such as language and literacy programs, physical activity and nutrition programs, etc.). It, however, is important to note that vulnerable children can also live in neighbourhoods that are not “high-risk” and these children would also benefit from similar stimulation. Thus, while focused interventions in higher-risk neighbourhoods are necessary, the needs of vulnerable children in other neighbourhoods should not be forgotten.

Finally, the current study is relevant to the school psychologist as it highlights the utility

of population-based measures, such as the EDI, in documenting school readiness outcomes for large groups of children and then working towards the systematic improvement of outcomes across populations both in high-risk neighbourhoods as well as more advantaged neighbourhoods. Compared to direct, individual assessments of children, this type of population-based assessment and its ability to direct prevention/intervention is markedly more efficient and effective. Obviously, targeted assessments for individual children requiring diagnostic decisions around placement, intervention, and programming will always be required. The argument made here is that population-level assessments provide the necessary information to direct systemic change that may benefit all children.

NASP (2006) also suggests that “school psychologists help children and youth succeed academically, socially, and emotionally.” If the school psychologist is to fulfill his or her mandate in helping children succeed academically, socially, and emotionally, an understanding of the relationship between contextual factors and learning in the early years is critical. With this understanding comes the ability to advocate for assessments of school readiness that will support system-wide prevention/intervention, and that will allow for appropriate programming around the crucial transition from kindergarten to Grade 1.

Strengths, Limitations, and Future Directions

The current study involved an investigation of the relationship between neighbourhood context and children’s outcomes on the EDI – a measure of school readiness. The methodological approach and the results obtained point towards some specific strengths, as well as limitations, and contribute to ideas for future research directions in the literature examining neighbourhood effects on children’s school readiness.

Limitations

The current study was limited by its reliance on data from a large national collection effort (the 2001 Canadian Census). While useful in delineating overall patterns and providing a starting place for qualitative research, this approach to studying neighbourhood effects does not allow for an investigation of the underlying mechanisms – a limitation labelled the “black box” approach to understanding neighbourhood effects by Jencks and Mayer (1990, p. 115). Given that mechanisms are not being accounted for, it is probable that neighbourhood effects are underestimated in the current study.

The availability of a limited number of individual level predictor variables as part of a pre-existing data set defines another limitation of the current study. Only age and gender were included as individual level variables. Individual level measures of socioeconomic status including income, parental occupation, and/or parental employment, as well as individual measures of family structure, including lone parent status, would result in more accurate estimates of neighbourhood versus individual effects. Leventhal and Brooks-Gunn (2000) suggested that there are several other individual level variables which may be important to include in neighbourhood effects research, including parental anxiety, depression, maternal age at birth, coping, motivation, social-support, self-efficacy, literacy, quality of the home environment, childcare, and preschool arrangements. Thus, future research efforts could involve the collection of data to augment that available through the EDI and the Canadian Census.

An additional potential limitation of the current study is its reliance on census data that were collected in 2001. The collection of EDI data utilised in the current study occurred between the school years 2000/2001 and 2004/2005. Thus, dependent on the year of EDI data collection, 7% of participants had a one year lag between census and EDI data collection, 42% had a two

year lag, 17% a three year lag, and 10% a four year lag. Only 7% of the EDI data in the current study was collected in the same year as the census data. This has the potential to be problematic in situations where specific neighbourhoods may have transformed from highly challenged neighbourhoods to less challenged neighbourhoods during the “lag time”. However, as described previously, the issue of “dose” re-emerges in relation to this potential limitation. The issue of dose was first discussed in the current study as an explanation for why much of the neighbourhood effects research has involved adolescents. The rationale was that adolescents had more years of exposure to their neighbourhood environments, and thus a higher “dosage” of neighbourhood context, making neighbourhood context more salient for older children. The current study, as well as others, have now documented that by the time children enter school, they have accumulated an adequate dose of neighbourhood effects to have it impact their school readiness. Thus, although there is a potential lag between neighbourhood context and school readiness data collection efforts, it could be argued that this lag is key as it may allow for the majority of study participants to have an accumulated dose of their particular neighbourhood environments. A related limitation is that this study does not document the movement patterns of children within the lag time. This makes it difficult to know how many children whose neighbourhood of residence at the time of EDI data collection was different from their neighbourhood(s) of residence during the first four or five years of their lives. In this way, the assignment of neighbourhood features to specific children according to their neighbourhood of residence at the time of EDI data collection may be misleading.

The current study was also limited by the cross-sectional nature of the EDI data. That is, EDI data were collected from each neighbourhood at only one point in time. Therefore, the results of the current study do not account for change or stability of EDI outcomes within

neighbourhoods over time. As EDI data collection continues under HELP's guidance, it will be important to establish patterns of change and stability on EDI outcomes for individual neighbourhoods, and to use these patterns to augment the current understanding of how neighbourhood environment is related to school readiness outcomes. For example, an exploration of which neighbourhood characteristics are associated with stability or change in EDI outcomes might yield useful information for examining how neighbourhoods can promote change on EDI outcomes in a positive direction or can maintain strong EDI outcomes over time.

Another limitation of the current study is that the identification of off-diagonal/Janus neighbourhoods is conditional on the HLM models fit. While the exploration of Janus neighbourhoods according to the HLM models in the current study yields useful information in terms of highlighting some areas for further investigation into the unique attributes of off-diagonal neighbourhoods, it is important to note that the identification of Janus neighbourhoods in the current study would need to be corroborated via different operationalizations of neighbourhood context, via different models, and over time. Some of this corroborative evidence is found in Kershaw et al. (2005) as is detailed in Appendix E. A comparison between the work by Kershaw and colleagues and that in the current study suggests that there is considerable overlap in terms of the identified Janus neighbourhoods. With the release of the 2006 Canadian census and the repeat collection of EDI data in neighbourhoods across BC, it would be possible to explore the "stability" of identifying Janus neighbourhoods over time. Those neighbourhoods that are repeatedly identified as off-diagonal across studies and over time would arguably be the most ideal neighbourhoods in which to focus further research on understanding the unique characteristics of Janus neighbourhoods.

Strengths

A definite strength of the current study is its focus on young children in kindergarten. While other neighbourhood effects studies have also focused on younger children (e.g. Brooks-Gunn, et al., 1993; Oliver et al., in press), the more common approach has been to study school-age children (e.g. Kozyrskyj et al., 2002). This focus on older children may be linked, in part, to the supposition that the neighbourhood context is more relevant to older children by virtue of their developmental stage and the increasing interactions they have outside their family homes because of this. However, by measuring the significance of the neighbourhood context for young children, this study provides another account of the contribution of the neighbourhood environment prior to the start of formal schooling.

A second strength comes from having included measures of neighbourhood context that were sensitive to unique features of the geographic setting of the study, as well as important subgroups that reside within this setting. Given the setting of BC, one of the important features of the economy is the reliance of specific pockets of the province on primary industry, such as agriculture and forestry. By including measures of male and female engagement in those industries, it was documented that an increased presence of the primary industry may actually link to social processes that, in turn, impact school readiness outcomes in young children. Another uniqueness of the BC setting is that the immigration rate is relatively high, resulting in a large group of immigrant and first generation Canadians who live in BC. With the inclusion of a measure of multiple family homes as a proxy for the extended kin living arrangements more prevalent among highly represented immigrant populations in BC, the design of the current study incorporated a key component of culture for specific groups of BC immigrants. Also included was a measure of knowledge of an official language, which is highly related to the proportion of

immigrants and first generation Canadians. To the current author's knowledge, there is only one other published HLM study that reports on language as an aggregated neighbourhood variable with specific regard for its relationship to school readiness outcomes (Oliver et al., in press) despite the fact that language has the potential to significantly undermine the collective socialization mechanism (Jencks and Mayer, 1990; Ley & Smith, 2000). Another key subgroup of the BC population is those residents with aboriginal status. Given the prominence of the aboriginal community in BC, and the known challenges faced by this community as its members continue to re-establish lost cultures and values, the inclusion of aboriginal status as a neighbourhood predictor variable provides an additional example of the current study's sensitivity to setting and place. Through the inclusion of predictor variables related to the presence of immigrant and aboriginal populations in BC, issues related to cultural integrity as an aggregated effect were addressed.

Third, by focusing on not only a Canadian sample, but more specifically, a province-wide BC sample, the finding of significant results for neighbourhood effects provides additional support for the salience of these effects across national and provincial boundaries, as well as rural and urban boundaries. These are important findings because they underscore the idea that it is not necessarily the ghettoized character of poor urban American neighbourhoods that is solely responsible for the impact of neighbourhood context on child outcomes. Instead, as the current study documents, even in Canadian cities, which are arguably less ghettoized than American cities, and even in smaller urban and rural centres, which may also lack extreme ghettoization, neighbourhood effects exist with effect sizes mirroring those found in studies focused solely on urban (e.g. Oliver et al., in press) and American (e.g. Brooks-Gunn et al., 1993; Chase-Lansdale & Gordon, 1996) samples. It should be noted that although these effect sizes are small, they are

statistically and practically significant (Caspi et al., 2000; Oliver, et al., in press; Prentice & Miller, 1992), and given the sole reliance on census data and quantitative techniques for measuring neighbourhood context in the current study, these effects are likely an underestimate of the true effect of neighbourhood context.

A fourth strength involves the strategy for defining the neighbourhood boundaries used in the current study. The debate about how to define neighbourhood boundaries pits the lure of convenience attached to using census tract boundaries against the challenges of creating locally prescribed, and perhaps more meaningful, neighbourhood boundaries. An oft criticised feature of many neighbourhood effects studies is their reliance on census tract boundaries which may not be a meaningful unit of analysis for the participants and further, which may mask the effects of place found with smaller units of analysis because census tracts tend to be large and very heterogeneous (Attar et al., 1994; Boyle & Willms, 1999; Brooks-Gunn et al., 1993; Entwisle et al., 1997; Roosa, Jones, & Tein, 2003; Sampson, 1999; Sampson et al., 2002). In the current study, 'natural' neighbourhood boundaries were determined through consultation with local ECD coalition representatives. These representatives considered existing census boundaries and issues such as social, and economic divisions, physical boundaries (major roadways, waterways, etc.), local municipal boundaries, school catchment areas, and neighbourhood association boundaries when establishing their neighbourhood boundaries. The result is a meaningful partitioning of the province into 476 neighbourhoods that are typically smaller than census tracts and more relevant to participants.

The HLM approach to examining neighbourhood effects constitutes a fifth strength of the current study. The use of HLM accounts for the interdependence of children within neighbourhoods. The children under study cannot be assumed to be independent of one another

because they reside in the same neighbourhoods and are exposed to much of the same daily environmental milieu that influences their development. Interestingly, Kershaw et al. (2005) also examined neighbourhood effects across the province of BC, although using stepwise and backward regressions in multiple linear regression analyses to create models documenting neighbourhood effects on children's outcomes as measured by the EDI. Since Kershaw et al. (2005) did not account for the nested nature of the data, it is reasonable to assume that their analyses are more likely to yield biased estimates. Indeed, the final count of 13 influential neighbourhood variables in the current study is somewhat less than the count of 19 variables reported by Kershaw et al.. However, despite the differences in approach, Kershaw et al.'s findings overlap considerably with the current findings. Both the results of the current study and those of Kershaw et al. highlight neighbourhood measures of aboriginal status, a measure of language use, specific occupation variables, employment rates, the low-income rate, and childcare patterns as related in some way to children's school readiness outcomes. Together, these two studies begin to paint a picture of key neighbourhood contextual variables within the BC setting. Of particular importance is that two of the three measures included in the current study addressing cultural diversity (aboriginal status and language) also emerged in the work of Kershaw and colleagues. Additionally, although residential stability and immigrant status were not found in the current HLM analyses to be significant predictors of neighbourhood context, these two variables did emerge for Kershaw et al. as predictive of children's overall EDI outcomes and as part of the off-diagonal exploratory analyses in the current study. This would suggest that although HLM is key for establishing overall patterns of neighbourhood effects, there may be something about how Janus neighbourhoods perform that the Kershaw et al. work

accounted for, and further, that it is necessary to go beyond HLM approaches to fully appreciate the significance of the neighbourhood context, particularly in off-diagonal neighbourhoods.

Future Directions

The need to expand the neighbourhood effects literature to include more qualitative approaches to inquiry is an essential future direction. Although there is some literature addressing the need for more ecologically valid observation and survey systems of collecting neighbourhood data (Raudenbush & Sampson, 1999), as well as empirical findings detailing a connection between quantitative and qualitative approaches to neighbourhood effects research (Perkins & Ralph, 2002), the neighbourhood effects literature is dominated by studies relying on large national data sets for measures of neighbourhood context. In addition to observational and survey data, ethnographic approaches to data collection would provide more direct access to information about the mechanisms by which neighbourhood effects are acting. An ideal extension of the current research, would be to use the findings from the HLM and off-diagonal analyses to inform design of qualitative approaches to understanding neighbourhood effects on young children's school readiness. This would be particularly useful in BC since the current study, the work of Oliver et al. (in press) and the work of Kershaw et al. (2005) all involved BC samples and have converged on similar findings, thereby providing an empirically defensible foundation for ethnographic investigations. These investigations should involve both "typical" neighbourhoods where children are performing as expected, as well as advantaged and disadvantaged Janus neighbourhoods to delineate similarities and differences between neighbourhoods with various profiles in terms of children's outcomes. Maps similar to those presented in Figures 1 and 2 would be useful in selecting specific Janus neighbourhoods for ethnographic follow-up studies by visually guiding investigators to areas of interest, such as

examples where highly advantaged Janus neighbourhoods exist directly beside highly disadvantaged Janus neighbourhoods. Also, useful in selecting specific Janus neighbourhoods for further study would be the comparison between the current study and that of Kershaw et al. detailed in Appendix E, since the neighbourhoods identified as off-diagonal in both of these studies can perhaps be more confidently described as “off-diagonal” (beyond the HLM models fit in the current study).

The results of the current study suggest specific foci for further ethnographic investigations. Amongst these is the need to more fully understand and appreciate the role of culture at the NH level as a social advantage that acts protectively for young children. Included in this would be disentangling the components of culture that are key to young children’s development, such as the underlying values that guide approaches to parenting and childcare, as well as exploring how culture as an aggregated variable contributes to the collective socialization mechanism. Another focus for ethnographic investigations would be to explore the role of “stability” as a protective feature of neighbourhoods. This may include a more complete understanding of how residential stability, as well as stabilizing factors within the child’s home (such as extended kin living arrangements and the promotion of an orderly home environment) combine to create a more supportive neighbourhood environment. The concept of heterogeneity within neighbourhoods should be another focus of ethnographic research, including an extension of findings that document heterogeneity in terms of affluent versus non-affluent neighbours (e.g. Brooks-Gunn, et al., 1993), to defining heterogeneity more diffusely in terms of, for example, the presence of different cultures, residents employed in various occupations, and families with and without children. Also interesting to explore would be defining heterogeneous versus homogeneous neighbourhoods, with an aim towards determining when it is that a neighbourhood

is adequately diverse so as to be classified as “heterogeneous” in terms of its protective effect on child outcomes. Finally, another potential focus of ethnographic research would be examining issues around gender role division (particularly as concerns childcare), and how the belief systems that guide gender role division aggregate at the neighbourhood level to affect children’s outcomes. This suggestion comes from findings in the current study that document improved outcomes for children in neighbourhoods where fewer women are performing unpaid childcare and worse outcomes for children in neighbourhoods where fewer men are performing unpaid childcare, as well as findings by Kershaw et al. (2005) which also suggest that as the rate of men performing unpaid childcare increases, so too do children’s outcomes. The suggestion of further study on gender role division was also motivated by the finding in the off-diagonal analyses that the male-female income discrepancy was higher for advantaged Janus neighbourhoods – a counterintuitive findings. Further information is needed to determine the neighbourhood context that arises from gender role division, as well as how gender role division intersects with neighbourhood dynamics, including the decreased presence of young children and lower incomes (Kershaw et al.), or the increased presence of adult caregivers to provide supervision and guidance in the context of a high-risk neighbourhood environment.

Together, these suggested foci for future ethnographic studies would yield three notable outcomes. First, ethnographic investigations would provide an improved understanding of the mechanisms underlying neighbourhood effects. Second, these investigations would provide a more complete account of how neighbourhoods are related to outcomes across domains. The current study found that there might be a stronger connection between neighbourhood and outcomes as regards physical health and well-being, language and cognitive development, and communication and general knowledge compared to the development of social competence and

emotional maturity (this finding is consistent with findings presented by Oliver et al., in press). However, by better accounting for mechanisms and the role of culture, among other things, ethnographic approaches to neighbourhood effects may yield results that suggest such effects are equally important across all domains. Third, with an improved understanding of the mechanisms by which neighbourhood effects act, the direction of the relationship between neighbourhood context and child outcomes could be more confidently articulated. An HLM approach to understanding neighbourhood effects is useful in that it allows for a delineation of specific relationships. However, the assignment of direction or causality to these relationships needs to be approached very cautiously in the absence of data on mechanisms. Although more information about mechanisms would not directly account for causality, it would provide additional information on which to form hypotheses about the direction of the neighbourhood context and child outcomes relationship.

Neighbourhood effects as they impact children longitudinally is also a fertile area for future research. Several unanswered questions may be addressed through longitudinal analyses. First, the finding in the current study that an increased prevalence of no knowledge of an official language significantly predicts worse outcomes for children on the Language and Cognitive Development and the Communication and General Knowledge domains of the EDI may not hold over time. There is evidence that children with ELL status will develop language and communication skills on par with native English speakers if supported in the right environment (Cummins, 1984; Gopaul-McNicol & Thomas-Presswood, 1998), and when supported, may go on to outperform native English students on measures of academic achievement (Fuligni, 1998; Kao & Tienda, 1995). Second, a better understanding of significant neighbourhood predictor variables in accordance with the life stage of the child is needed. It may be that there is an

interaction between life stage and the relevance of certain features of the neighbourhood environment. Third, there is literature indicating that the impact of living in a more stressed and impoverished environment changes over time (e.g. Lupien et al., 2001), suggesting that the outcome measures neighbourhood effects researchers employ may need to be sensitive to the life stage of the child. Longitudinal research could address these changes in life stage as they relate to outcome variables. Fourth, the issue of dosage and exposure could be more thoroughly examined with longitudinal data that accounted for transience and the length of time children are exposed to specific neighbourhood environments. Investigations of this nature would permit a better understanding of critical periods in terms of the internalization of the neighbourhood environment, as well as the capacity for changes in the neighbourhood environment to alter developmental trajectories. There is some scholarship addressing change in the neighbourhood environment, although the notions of critical periods and dosage are not directly addressed (see Sampson, 2003 for a discussion of the Moving to Opportunity program and its impact on health outcomes). Finally, longitudinal research may provide some clarification on the role of culture as a protective factor, especially for diverse populations. Findings from the current study suggest that culture may be a social benefit that acts to promote better outcomes for children. Longitudinal research designs could implement explorations of cultural integrity within diverse populations. In this way, longitudinal approaches would allow for an analysis of the implications accompanying dilution or promotion of culturally prescribed values and traditions as an aggregated variable.

Summary

The current research project investigated the relationship between neighbourhood environment and school readiness. To support this investigation, the literature on the importance

of school readiness, definitions of school readiness, and issues surrounding the measurement of school readiness was reviewed. Also reviewed was the role of social context in development, the theoretical underpinnings of neighbourhood influences on early development, and the relationship between neighbourhood environment and cognitive, socioemotional, and physical health outcomes. The information gleaned from this review was used to formulate the current study which involved an examination of the relationship between neighbourhood environment, measured with 2001 Canadian Census data, and school readiness, measured by data collected on the EDI for kindergarten children across BC in the school years 2000-2001 through 2004-2005 by HELP. HLM results from the first portion of the current study suggest that the neighbourhood environment is important to children's school readiness outcomes. Specifically, all five EDI domains and the EDI Total score were significantly predicted by between two and eight of 13 neighbourhood variables. These 13 neighbourhood variables (all proportions) were: multiple family households, aboriginal status, no knowledge of an official language, affluent males (>\$60 000), below LICO, university level education, males in management, processing, or primary occupations, females in primary occupations, males unemployed, and males and females performing zero hours of unpaid childcare per week. Following the HLM analyses, exploratory analyses of neighbourhoods where children performed better or worse than expected were conducted. Important patterns included differences in residential stability, proportion of immigrants and lone-parents, employment rates, types of occupations and industries, amount of domestic work, male-female income discrepancy, and income levels. Overall, three themes emerged from this study that suggest neighbourhood-level sources of social wealth: the importance of culture, stability, and heterogeneity in promoting better school readiness outcomes for children. The emergence of these themes coupled with the finding that neighbourhood

context is significantly related to children's school readiness outcomes suggest that the "readiness to learn" approach to understanding school readiness is more appropriate than the traditional "readiness for school" approach (Kagan, 1992). The readiness to learn definition of school readiness directly implicates the role of a child's environment in supporting that child towards the goal of being school ready. As the current results suggest, neighbourhood context is one component of a child's environment that needs to be considered when addressing the promotion of school readiness in young children. The strengths and limitations of the current research project were discussed, and formulations regarding areas for future research were presented.

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APPENDIX A
Domains and Items of the EDI

<i>Domain: Physical Health</i>	Item	Description
	QA2	Over or underdressed for school-related activities
	QA3	Too tired/sick to do school work
	QA4	Late
	QA5	Hungry
	QA6	Is independent in washroom activities most of the time
	QA7	Shows an established hand preference (right vs. left or vice versa)
	QA8	Is well coordinated (moves without running into things or tripping over things)
	QC58	Sucks a thumb or a finger
	QA9	Proficiency at holding pen, crayons, or brush
	QA10	Ability to manipulate objects
	QA11	Ability to climb stairs
	QA12	Level of energy throughout the school day
	QA13	Overall physical development

<i>Domain: Social Competence</i>	Item	Description
	QC5	Follows rules and instructions
	QC6	Respects the property of others
	QC7	Demonstrates self-control
	QC9	Demonstrates respect for adults
	QC10	Demonstrates respect for other children
	QC11	Accepts responsibility for actions
	QC16	Takes care of school materials
	QC27	Shows tolerance to someone who made a mistake (e.g. when a child gives a wrong answer to question posted by the teacher)
	QC12	Listens attentively
	QC13	Follows direction
	QC14	Completes work on time
	QC15	Works independently
	QC17	Works neatly and carefully
	QC22	Is able to solve day-to-day problems by him/herself
	QC23	Is able to follow one-step instructions
	QC24	Is able to follow class routines without reminders
	QC25	Is able to adjust to changes in routine
	QC1	Overall social/emotional development
	QC2	Ability to get along with peers

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<i>Domain: Social Competence</i>	Item	Description
	QC3	Plays and works cooperatively with other children at the level appropriate for his/her age
	QC4	Is able to play with various children
	QC8	Shows self-confidence
	QC18	Is curious about the world
	QC19	Is eager to play with a new toy
	QC20	Is eager to play with a new game
	QC21	Is eager to play with/read a new book
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<i>Domain: Emotional Maturity</i>	Item	Description
	QC28	Will try to help someone who has been hurt
	QC29	Volunteers to help clear up a mess someone else has made
	QC30	If there is a quarrel or dispute will try to stop it
	QC31	Offers to help other children who have difficulty with a task
	QC32	Comforts a child who is crying or upset
	QC33	Spontaneously helps to pick up objects which another child has drops
	QC34	Will invite bystanders to join in a game
	QC35	Helps other children who are feeling sick
	QC42	Can't sit still, is restless
	QC43	Is distractible, has trouble sticking to any activity
	QC44	Fidgets
	QC47	Is impulsive, acts without thinking
	QC48	Has difficulty awaiting turn in games or groups
	QC49	Cannot settle to anything for more than a few moments
	QC50	Is inattentive
	QC36	Is upset when left by parent/guardian
	QC51	Seems to be un happy, sad or depressed
	QC52	Appears fearful or anxious

<i>Domain: Emotional Maturity</i>	Item	Description
	QC53	Appears worried
	QC54	Cries a lot
	QC55	Is nervous, high-strung, or tense
	QC56	Is incapable of making decisions
	QC57	Is shy
	QC37	Gets into physical fights
	QC38	Bullies or is mean to others
	QC39	Kicks, bites, hits other children or adults
	QC40	Takes things that do not belong to him/her
	QC41	Laughs at other children's discomfort
	QC45	Is disobedient
	QC46	Has temper tantrums

<i>Domain: Language and Cognitive Development</i>	Item	Description
	QB27	Is able to sort and classify objects by a common characteristic (e.g. shape, color, size)
	QB28	I able to use one-to-one correspondence
	QB29	Is able to count to 20
	QB30	Is able to recognize 1-10
	QB31	Is able to say which number is bigger of the two
	QB32	Is able to recognize geometric shapes (triangle, circle, square)
	QB33	Understands simple time concepts (e.g. today, summer, bedtime)
	QB15	Is able to read simple words
	QB16	I able to read complex words
	QB17	Is able to read simple sentences
	QB20	Is interested in writing voluntarily (and not only under the teacher's discretion)
	QB22	Is able to write simple words
	QB23	Is able to write simple sentences
	QB9	Is generally interested in books (pictures and print)
	QB10	Is interested in reading (inquisitive/curious about the meaning of printed material)
	QB24	Is able to remember things easily
	QB25	Is interested in mathematics
	QB26	Is interested in games involving numbers

<i>Domain: Language and Cognitive Development</i>		Item	Description
		QB8	Knows how to handle a book (e.g. turn a page)
		QB11	Is able to identify at least 10 letters of the alphabet
		QB12	Is able to attach sounds to letters
		QB13	Is showing awareness of rhyming words
		QB14	Is able to participate in group reading activities
		QB18	Is experimenting with writing tools
		QB19	Is aware of writing directions in English (left to right, top to bottom)
		QB21	Is able to write his/her own name in English

<i>Domain: Communication and General Knowledge</i>	Item	Description
	QB1	Ability to use language effectively in English
	QB2	Ability to listen in English
	QB3	Ability to tell a story
	QB4	Ability to take part in imaginative play
	QB5	Ability to communicate own needs in a way understandable to adults and peers
	QB6	Ability to understand on first try what is being said to him/her
	QB7	Ability to articulate clearly, without sound substitution
	QC26	Answers questions showing knowledge about the world

APPENDIX B

Descriptive Statistics of EDI Items

Item	Number of Points on Likert Scale	Mean	Standard Deviation
qa2 dressed inappropriately	5	9.19	1.97
qa3 too tired	5	8.78	2.22
qa4 late	5	8.23	2.77
qa5 hungry	5	9.53	1.53
qa6 washroom	2	9.91	0.95
qa7 hand preference	2	9.81	1.38
qa8 well coordinated	2	9.36	2.45
qa9 proficient at holding pen	5	7.33	2.64
qa10 manipulates objects	5	7.68	2.31
qa11 climbs stairs	5	7.85	2.20
qa12 level of energy	5	7.64	2.31
qa13 overall physical	5	7.69	2.19
qb1 effective use - English	5	7.15	2.82
qb2 listens - English	5	7.51	2.54
qb3 tells a story	5	6.87	2.85
qb4 imaginative play	5	7.50	2.44
qb5 communicates needs	5	7.25	2.70
qb6 understands	5	7.36	2.64
qb7 articulates clearly	5	6.99	2.88

Item	Number of Points on Likert Scale	Mean	Standard Deviation
qb8 handles a book	2	9.95	0.67
qb9 interested in books	2	9.68	1.77
qb10 interested in reading	2	9.13	2.82
qb11 identifies letters	2	9.17	2.75
qb12 sounds to letters	2	7.81	4.13
qb13 rhyming awareness	2	8.24	3.81
qb14 group reading	2	9.18	2.75
qb15 reads simple words	2	7.10	4.54
qb16 reads complex words	2	2.27	4.19
qb17 reads sentences	2	4.19	4.93
qb18 experiments writing	2	8.90	3.13
qb19 writing directions	2	9.28	2.58
qb20 writing voluntarily	2	6.20	4.85
qb21 write own name	2	9.72	1.66
qb22 write simple words	2	8.13	3.90
qb23 write simple sentences	2	5.54	4.97
qb24 remembers things	2	8.51	3.56
qb25 interested in maths	2	8.94	3.07
qb26 interested in number games	2	8.95	3.06
qb27 sorts and classifies	2	9.60	1.97
qb28 1 to 1 correspondence	2	9.42	2.35

Item	Number of Points on Likert Scale	Mean	Standard Deviation
qb29 counts to 20	2	8.84	3.20
qb30 recognizes 1-10	2	8.78	3.28
qb31 compares numbers	2	8.73	3.33
qb32 recognizes shapes	2	9.43	2.31
qb33 time concepts	2	9.31	2.54
qc1 overall soc/emotional	5	7.14	2.54
qc2 gets along with peers	5	7.30	2.48
qc3 cooperative	3	8.38	2.57
qc4 plays with various children	3	8.31	2.66
qc5 follows rules	3	8.53	2.47
qc6 respects property	3	9.00	2.19
qc7 self-control	3	8.30	2.69
qc8 self-confidence	3	7.91	2.84
qc9 respect for adults	3	9.11	2.05
qc10 respect for children	3	8.62	2.42
qc11 accept responsibility	3	8.36	2.75
qc12 listens	3	7.82	2.88
qc13 follows directions	3	8.32	2.62
qc14 completes work on time	3	8.27	2.82
qc15 independent	3	8.34	2.78
qc16 takes care of materials	3	8.98	2.19

Item	Number of Points on Likert Scale	Mean	Standard Deviation
qc17 works neatly	3	7.93	2.96
qc18 curious	3	9.07	2.11
qc19 eager new toy	3	9.35	1.78
qc20 eager new game	3	9.19	2.01
qc21 eager new book	3	8.85	2.38
qc22 independent solve problems	3	7.30	3.04
qc23 follow simple instructions	3	9.03	2.12
qc24 follow class routines	3	8.35	2.67
qc25 adjust to change	3	8.66	2.46
qc26 knowledge about world	3	8.71	2.57
qc27 tolerance for mistake	3	8.32	2.67
qc28 help hurt	3	7.43	3.17
qc29 clear up mess	3	6.21	3.61
qc30 stop quarrel	3	5.20	3.68
qc31 offers help	3	6.06	3.63
qc32 comforts upset	3	6.18	3.58
qc33 spontaneously helps	3	5.66	3.63
qc34 invite bystanders	3	5.37	3.52
qc35 helps sick	3	5.78	3.61
qc36 upset when left	3	8.86	2.46
qc37 gets into fights	3	9.28	1.98

Item	Number of Points on Likert Scale	Mean	Standard Deviation
qc38 bullies or mean	3	9.07	2.21
qc39 kicks etc.	3	9.43	1.81
qc40 takes things	3	9.48	1.72
qc41 laughs at others	3	9.12	2.08
qc42 restless	3	8.28	2.96
qc43 distractible	3	8.37	2.93
qc44 fidgets	3	8.12	3.03
qc45 disobedient	3	8.99	2.29
qc46 temper tantrums	3	9.39	1.84
qc47 impulsive	3	8.29	2.84
qc48 difficulty awaiting turns	3	8.40	2.79
qc49 can't settle	3	9.03	2.31
qc50 inattentive	3	7.93	2.95
qc51 seems unhappy	3	8.96	2.26
qc52 fearful	3	8.99	2.24
qc53 worried	3	8.73	2.39
qc54 cries a lot	3	9.41	1.82
qc55 nervous	3	9.16	2.12
qc56 indecisive	3	9.00	2.21
qc57 shy	3	8.58	2.69
qc58 sucks thumb	3	9.82	1.14

APPENDIX C

Names, Definitions, and Descriptive Statistics for Neighbourhood Variables (N=476)

Variable Label	Definition	<i>M</i>	<i>SD</i>
Aboriginal origins	Proportion of the population who are Aboriginal persons (i.e. North American Indian, Métis, or Inuit (Eskimo))	6.08	7.53
Aboriginal status	Proportion of the population who are Treaty Indians or Registered Indians as defined by the Indian Act of Canada	4.89	7.46
Accommodation	Total labour force 15 years and older by accommodation and food services industries	8.16	3.14
Administrative support	Total labour force 15 years and older by administrative and support, waste management and remediation services industries	3.88	1.30
Affluent females (\$50 000)	The Proportion of females 15 years and older with an income of at least \$50 000 per year	7.71	3.96
Affluent females (\$60 000)	The Proportion of females 15 years and older with an income of at least \$60 000 per year	4.01	2.79
Affluent males (\$50 000)	The Proportion of males 15 years and older with an income of at least \$50 000 per year	23.38	9.26
Affluent males (\$60 000)	The Proportion of males 15 years and older with an income of at least \$60 000 per year	15.12	7.49
Affluent residents (\$50 000)	The Proportion of the population 15 years and older with an income of at least \$50 000 per year	15.43	6.10
Affluent residents (\$60 000)	The Proportion of the population 15 years and older with an income of at least \$60 000 per year	9.48	4.80
Agriculture	Total labour force 15 years and older by agriculture, forestry, fishing and hunting industries	4.56	5.75

Variable Label	Definition	<i>M</i>	<i>SD</i>
Arts	Total labour force 15 years and older by arts, entertainment and recreation industries	2.06	1.07
Average children under 6 per family	Average number of children per census family who are under 6 years of age living in the home	0.07	0.02
Average household income	Average household income	\$58 783	\$15 512
Average income discrepancy	Average income of males 15 years and older minus average female income	\$13 123	\$6 423
Average persons per family	Average number of persons per census family	2.97	0.20
Average seniors per family	Average number of family persons 65 years and older per census family	0.08	0.04
Below LICO	The Proportion of the population with household income levels below the Low Income Cut-Off	17.47	8.52
Canadian citizen	Proportion of the population with Canadian citizenship	92.36	5.68
College level education	Proportion of the population who have completed a non-university certificate or diploma	16.34	3.09
Construction	Total labour force 15 years and older by construction industry	5.90	2.15
Do not speak official language	Proportion of the population whose first official spoken language is neither French nor English	2.97	4.23
Educational services	Total labour force 15 years and older by educational services industry	6.57	2.75
Female lone-parent	The Proportion of females who are lone parents	12.91	4.42
Females drive	Total employed female labour force 15 years and older who drive to work	72.78	12.82

Variable Label	Definition	<i>M</i>	<i>SD</i>
Females in applied sciences	See males in applied sciences	2.24	1.34
Females in art	See males in art	3.25	1.97
Females in business	See males in business	27.09	5.16
Females in health	See males in health	8.42	2.33
Females in management	See males in management	7.77	2.52
Females in primary	See males in primary	2.77	4.16
Females in processing	See males in processing	3.07	2.89
Females in sales	See males in sales	32.68	6.04
Females in social sciences	See males in social sciences	10.76	3.43
Females in trades	See males in trades	1.96	1.11
Females no unpaid childcare	Females 15 years and older performing no hours of unpaid childcare	57.49	7.89
Females no unpaid housework	Females 15 years and older performing no hours of unpaid housework	7.49	2.25
Females no unpaid seniors care	Females 15 years and older performing no hours of unpaid childcare	79.26	3.41
Females unemployed	Proportion of females 15 years and older who are unemployed	8.45	3.07
Females unemployed with children all ages	The Proportion of the females 15 years and over in private households with children under 6 years as well as children 6 years and over	6.23	6.21
Females unemployed with children under 6	The Proportion of the females 15 years and over in private households with children under 6 years only who are unemployed	7.36	5.57
Finance	Total labour force 15 years and older by finance and insurance industries	3.70	1.71

Variable Label	Definition	<i>M</i>	<i>SD</i>
First generation Canadian	Proportion of the population 15 years and older who identified themselves as being first generation Canadian	31.37	18.68
Healthcare	Total labour force 15 years and older by healthcare and social assistance industries	9.63	2.19
Home owner	Proportion of residents who are home owners	69.68	14.96
Immigrant	Proportion of the population who are landed immigrants	25.90	16.15
Information	Total labour force 15 years and older by information and cultural industries	2.75	1.58
Less than grade 9	Proportion of the population who have completed nine years or less of formal education	7.34	4.51
Lone-parent	The Proportion of the population who are lone parents	15.98	4.97
Male lone-parent	The Proportion of males who are lone parents	3.06	1.27
Males drive	Total employed male labour force 15 years and older who drive to work	80.19	9.27
Males in applied sciences	Proportion of the male labour force employed in natural and applied sciences and related occupations (professional occupations in natural and applied sciences, technical occupations related to natural and applied sciences)	8.73	3.37
Males in art	Proportion of the male labour force employed in occupations in art, culture, recreation and sport (professional occupations in art and culture, technical occupations in art, culture, recreation and sport)	2.61	2.11
Males in business	Proportion of the male labour force employed in business, finance and	8.12	3.33

Variable Label	Definition	<i>M</i>	<i>SD</i>
	administration occupations (professional occupations in business and finance, finance and insurance administration occupations, secretaries, administrative and regulatory occupations, clerical supervisors, clerical occupations)		
Males in health	Proportion of the male labour force employed in health occupations (professional occupations in health, nurse supervisors and registered nurses, technical and related occupations in health, assisting occupations in support of health services)	2.10	1.42
Males in management	Proportion of the male labour force employed in a management occupation (senior management occupations, specialist managers, managers in retail trade, food and accommodation services, other managers)	12.36	4.91
Males in primary	Proportion of the male labour force employed in occupations unique to primary industry (occupations unique to agriculture, excluding labourers; occupations unique to forestry operations, mining, oil and gas extraction and fishing, excluding labourers; primary production labourers)	6.51	6.76
Males in processing	Proportion of the male labour force employed in occupations unique to processing, manufacturing and utilities (supervisors in manufacturing, machine operators in manufacturing, assemblers in manufacturing, labourers in processing, manufacturing and utilities)	7.60	4.53
Males in sales	Proportion of the male labour force employed in sales and service occupations (sales and service supervisors; wholesale, technical, insurance, real estate sales specialists, and retail, wholesale and grain buyers; retail salespersons and sales clerks; cashiers; chefs and cooks; occupations in food and beverage service; occupations in protective services; occupations in travel	20.32	5.47

Variable Label	Definition	<i>M</i>	<i>SD</i>
	and accommodation, including attendants in recreation and sport; child care and home support workers; sales and service occupations)		
Males in social sciences	Proportion of the male labour force employed in occupations in social science, education, government service and religion (judges, lawyers, psychologists, social workers, ministers of religion, and policy and program officers, teachers and professors, paralegals, social services workers and occupations in education and religion)	4.96	2.83
Males in trades	Proportion of the male labour force employed in trades, transport and equipment operators and related occupations (contractors and supervisors in trades and transportation; construction trades; stationary engineers, power station operators and electrical trades and telecommunications occupations; machinists, metal forming, shaping and erecting occupations; mechanics; other trades; heavy equipment and crane operators, including drillers; transportation equipment operators and related workers, excluding labourers; trades helpers, construction and transportation labourers and related occupations)	1.28	0.84
Males no unpaid childcare	Males 15 years and older performing no hours of unpaid childcare	65.36	6.69
Males no unpaid housework	Males 15 years and older performing no hours of unpaid housework	12.66	2.68
Males no unpaid seniors care	Males 15 years and older performing no hours of unpaid seniors care	84.86	3.15
Males unemployed	Proportion of males 15 years and older who are unemployed	9.38	4.62
Males unemployed with	The Proportion of the males 15 years and	6.17	7.58

Variable Label	Definition	<i>M</i>	<i>SD</i>
children all ages	over in private households with children under 6 years as well as children 6 years and over		
Males unemployed with children under 6	The Proportion of the males 15 years and over in private households with children under 6 years only who are unemployed	6.88	7.40
Management	Total labour force 15 years and older by management of companies and enterprises	0.06	0.12
Manufacturing	Total labour force 15 years and older by manufacturing industry	10.29	4.66
Median family income	Median family income	\$55 064	\$12 519
Median household income	Median household income	\$50 057	\$12 940
Median income discrepancy	Median male income minus median female income	\$11 749	\$5 717
Mining	Total labour force 15 years and older by mining and oil and gas extraction industries	0.57	1.47
Multiple family households	Proportion of private households in which two or more census families (with or without additional non-family persons) occupy the same private dwelling	3.01	3.15
No knowledge of an official language	Proportion of the population that does not have knowledge of either official language (English or French)	3.04	4.28
Non migrant movers 1 yr	Proportion of the population that changed residences within the past year but continued to live in the same neighbourhood	9.26	3.66
Non migrant movers 5 yrs	Proportion of the population that changed residences within the past five years but continued to live in the same neighbourhood	23.45	6.24
Non movers 1 yr	Proportion of the population who did not move within the past year	83.95	4.81
Non movers 5 yrs	Proportion of the population who did not	54.28	8.82

Variable Label	Definition	<i>M</i>	<i>SD</i>
	move within the past five years		
Non-official home language	Proportion of total population speaking a non-official language (neither French nor English) at home	9.33	11.04
Other industry	Total labour force 15 years and older by other services (except public administration)	4.87	1.17
Population no unpaid childcare	Population 15 years and older performing no hours of unpaid childcare	61.37	7.13
Population no unpaid housework	Population 15 years and older performing no hours of unpaid housework	10.03	2.25
Population no unpaid seniors care	Population 15 years and older performing no hours of unpaid seniors care	82.01	3.11
Population unemployed with children all ages	The Proportion of the population 15 years and over in private households with children under 6 years as well as children 6 years and over	6.24	5.37
Population unemployed with children under 6	The Proportion of the population 15 years and over in private households with children under 6 years only who are unemployed	7.11	5.04
Professional	Total labour force 15 years and older by professional, scientific and technical services industries	5.88	3.18
Public administration	Total labour force 15 years and older by public administration industry	5.30	3.31
Real estate	Total labour force 15 years and older by real estate and rental and leasing industry	1.86	0.93
Reporting no religion	Proportion of the population describing themselves as having no religion	34.79	7.86
Retail	Total labour force 15 years and older by retail trade industry	11.49	2.34
Trades level education	Proportion of the population who have completed a trades certificate or diploma	13.20	3.76

Variable Label	Definition	<i>M</i>	<i>SD</i>
Transportation	Total labour force 15 years and older by transportation and warehousing industry	5.62	2.21
Unemployed	Proportion of the population 15 years and older who are unemployed	8.94	3.67
University level education	Proportion of the population who have completed a university certificate or diploma at the bachelor's degree level or higher	15.59	9.50
Utilities	Total labour force 15 years and older by utilities industry	0.56	0.49
Wholesale	Total labour force 15 years and older by wholesale trade industry	3.99	1.80

APPENDIX D

Correlation Matrix for Final List of Neighbourhood Predictor Variables

V ^a	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1.	1	-.07	.86	-.26	.17	-.04	.11	-.14	-.29	.05	-.30	.01	.79	.61	.60	.01	.01	.17	-.05	.74	.58	-.39	-.41	-.14
2.		1	-.04	-.13	-.10	-.23	-.30	.18	.10	.02	-.04	.08	-.05	-.18	-.20	-.42	-.34	-.55	-.14	.07	-.51	.73	.30	.09
3.			1	-.41	.47	-.24	-.06	.15	-.47	-.19	-.10	-.16	.54	.61	.66	.07	.14	.08	-.19	.64	.58	-.36	-.24	.13
4.				1	-.33	.66	.47	-.29	.48	.23	-.01	.09	-.03	-.06	-.17	-.09	-.22	.22	.48	-.16	-.06	-.09	-.09	-.21
5.					1	-.37	-.37	.64	-.46	-.59	.43	-.31	-.16	.15	.26	.24	.39	-.20	-.34	.00	.11	-.17	.43	.82
6.						1	.72	-.49	.42	.34	-.14	.10	.15	.06	-.03	.16	.00	.40	.40	-.11	.28	-.27	-.36	-.41
7.							1	-.51	.30	.40	-.25	.16	.28	.21	.07	.09	-.06	.45	.37	.07	.40	-.32	-.41	-.43
8.								1	-.38	-.59	.60	-.28	-.40	-.10	.03	-.01	.16	-.45	-.39	-.15	-.26	.29	.62	.71
9.									1	.27	-.10	.70	-.06	-.17	-.33	.00	-.14	-.15	.11	-.15	-.28	.21	-.13	-.34
10.										1	-.47	.25	.37	.03	-.10	-.25	-.38	.16	.25	.18	-.01	.03	-.21	-.48
11.											1	-.21	-.43	-.12	-.04	.25	.31	-.22	-.18	-.35	-.16	.10	.40	.52
12.												1	.05	-.04	-.12	-.12	-.19	-.24	-.08	.24	-.25	.17	-.20	-.24
13.													1	.46	.39	-.07	-.15	.24	.15	.62	.48	-.31	-.45	-.37
14.														1	.69	.18	.13	.29	.03	.40	.53	-.45	-.33	-.04
15.															1	.25	.30	.27	-.05	.41	.55	-.47	-.28	.05
16.																1	.93	.29	-.06	-.38	.43	-.54	-.26	.08
17.																	1	.18	-.16	-.39	.37	-.46	-.15	.23
18.																		1	.32	-.02	.68	-.68	-.56	-.36
19.																			1	-.01	.16	-.23	-.24	-.27
20.																				1	.19	-.07	-.29	-.16
21.																					1	-.79	-.59	-.24
22.																						1	.49	.10
23.																							1	.69
24.																								1

^aLegend for Variables (V)

- | | | | |
|--------------------------------------|---------------------------------------------------------|-----------------------------------------------------------|--------------------------------|
| 1. No knowledge of official language | 8. Males management occupation | 15. Females doing zero unpaid hours of housework per week | 18. Female lone parent |
| 2. Non-movers for 1 year | 9. Males in primary industry | 16. Males doing zero unpaid hours of childcare per week | 19. Male lone parent |
| 3. Immigrant | 10. Males in processing industry | 17. Females doing zero unpaid hours of childcare per week | 20. Multiple family households |
| 4. Aboriginal Status | 11. Females in management occupation | | 21. Below LICO |
| 5. University level education | 12. Females in primary industry | | 22. Home owner |
| 6. Male unemployed | 13. Females in processing industry | | 23. Affluent male >\$60000 |
| 7. Female unemployed | 14. Males doing zero unpaid hours of housework per week | | 24. Affluent female >\$60 000 |

APPENDIX E

A comparison of Kershaw et al.'s (2005) identification of the 25 most advantaged and disadvantaged Janus neighbourhoods by EDI outcomes to the neighbourhoods identified as off-diagonal in the current study.

	Phy	Soc	Emo	Lan	Com	Any EDI Domain
Advantaged Janus neighbourhoods identified by Kershaw et al. (2005) that were also identified as advantaged in the current study on at least one EDI outcome (<i>n</i>).	<ul style="list-style-type: none"> • Vernon – Central • Ucluelet • Campbell River – Centre • Gateway • Castlegar • Whalley South • Comox West • North Kelowna (8)	<ul style="list-style-type: none"> • Victoria – Downtown • Ucluelet • Whalley East • Strawberry Hill South • Armstrong/Spallumcheen • Grand Boulevard • Nazko/Blackwater • Millstream • Robson/Thrums (9)	<ul style="list-style-type: none"> • Victoria – Downtown • Vernon – West • Vernon – Central • Guildford West • Whalley East • Logan Lake/Savona • Brocklehurst • Gibsons/Langdale • Castlegar • Ucluelet • Tofino – Ahousat • Guildford (12)	<ul style="list-style-type: none"> • Comox West • Lillooet/Clinton • Lazo • Castlegar • Victoria – Downtown • Campbell River – Centre • Grand Boulevard • Robson/Thrums • University Lands • Armstrong/Spallumcheen (10)	<ul style="list-style-type: none"> • Strawberry Hill South • Kirkbride • Tofino – Ahousat • Stikine • Grand Boulevard • Port McNeill • Kitsilano • Vernon – Central • Houston • Thetis Lake (10)	<ul style="list-style-type: none"> • Castlegar • Vernon – Central • University Lands • Strawberry Hill South • Grand Boulevard • Armstrong/Spallumcheen • Campbell River – Centre • Nazko/Blackwater • Vernon – West • White Rock (10)

cont...

	Phy	Soc	Emo	Lân	Com	Any EDI Domain
Disadvantaged Janus neighbourhoods identified by Kershaw et al. (2005) that were also identified as disadvantaged Janus neighbourhoods in the current study on at least one EDI outcome(n).	<ul style="list-style-type: none"> • South Fort George • Prince Rupert – Centre • Esquimalt • Riley Park • Chilliwack – South • Peachland • Glacierview/ Vanier • Quesnel West • Rural South Langley • Westwood • Lower Boucherie/ Mission Hills (11)	<ul style="list-style-type: none"> • Chilliwack – South • Esquimalt • Black Mountain • Burnaby Mountain • Glacierview/ Vanier • Sidney • Downtown – Stewardson • Mount Pleasant • Port Hardy • Upper Lonsdale • South Fort George • Mission – Northeast • East Richmond • South Courtenay • Smithers – Telkwa • Newton North • Mission – North • Westview Centre • Lower Boucherie/ Mission Hills (19)	<ul style="list-style-type: none"> • Esquimalt • Port Hardy • Chilliwack – West • Chilliwack – South • Enderby • Black Mountain • Cinnabar – Extension • Strathcona • Westview Centre • Princeton • Mission – West Heights • Bamfield – Alberni Canal • Newcastle – Townsite • Central Kelowna • Lower Boucherie/ Mission Hills (15)	<ul style="list-style-type: none"> • Bamfield – Alberni Canal • Terrace – Thornhill • Glacierview/ Vanier • Esquimalt • Rural South Langley • Princeton • Burnaby Mountain • South Courtenay • Haida Gwaii • Port Hardy • Chilliwack – Fairfield • South Nanaimo • Chilliwack – South • Island West • Chilliwack – West • Mount Pleasant • KLO/Casorso • Lower Boucherie/ Mission Hills • Central Kelowna • Hospital/South Pandosy • Edmins/12th Avenue (21)	<ul style="list-style-type: none"> • Esquimalt • Queensborough • Cinnabar – Extension • Prince Rupert – Seal Cove • Central Coast • Riley Park • Middelgate • Prince Rupert – Centre • Westview Centre • Ellison • Mount Pleasant • Chilliwack – South • Mission – North • South Fort George • Hospital/South Pandosy (15)	<ul style="list-style-type: none"> • Chilliwack – South • Black Mountain • Mission – North • Glacierview/ Vanier • South Courtenay • Esquimalt • Burnaby Mountain • Port Hardy • Downtown – Stewardson • Terrace – Thornhill • South Fort George • Rural South Langley • Riley Park • Prince Rupert – Centre • Peden Hill • Central Kelowna • Lower Boucherie/ Mission Hills (17)



Certificate of Approval

PRINCIPAL INVESTIGATOR Ford, L.	DEPARTMENT Educ & Couns Psych & Spec Educ	NUMBER B06-0113
INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT UBC Campus ,		
CO-INVESTIGATORS: Lapointe, Vanessa, Educ & Couns Psych & Spec Educ		
SPONSORING AGENCIES Human Early Learning Partnership (HELP)		
TITLE Conceptualizing and Examining the Impact of Neighbourhoods on the School Readiness of Kindergarten Children in British Columbia		
APPROVAL DATE FEB 20 2006	TERM (YEARS) 1	DOCUMENTS INCLUDED IN THIS APPROVAL:
CERTIFICATION: <p>The application for ethical review of the above-named project has been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.</p> <p><i>Approved on behalf of the Behavioural Research Ethics Board</i> <i>by one of the following:</i> Dr. Peter Suedfeld, Chair, Dr. Susan Rowley, Associate Chair Dr. Jim Rupert, Associate Chair Dr. Arminee Kazanjian, Associate Chair</p> <p>This Certificate of Approval is valid for the above term provided there is no change in the experimental procedures</p>		