

**TEEN, OPTIMAL, AND ADVANCED AGE MOTHERS IN CANADA:
DIFFERENCES IN SOCIAL SUPPORT, PARENTING,
AND CHILD BEHAVIOURAL OUTCOMES**

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Abstract

The age range of first-time mothers in Canada is increasing, with an astonishing 195% increase in the number of women delaying their pregnancies after 35 years of age. However, the research around maternal and child outcomes usually focus on teen (under 19 years) and optimal age (20-34 years) groups, and seldom focus on examining the characteristics of health-related outcomes within the advanced age group (over 35 years and older). Therefore, the importance of examining maternal and child health outcomes by maternal age, especially the advanced age group, is greatly emphasized. This three-part dissertation sought to address the research gaps around maternal and child outcomes by maternal age. The first study, “Characteristics of social support among teenage, optimal age, and advanced age mothers in Canada” was a cross-sectional analysis of the National Longitudinal Survey of Children and Youth (NLSCY), which examined the prevalence and characteristics of social support by maternal age. The second study, “Characteristics of positive-interaction parenting style among teenage, optimal age, and advanced age mothers in Canada”, was a cross-sectional analysis of the NLSCY examining the prevalence and characteristics of positive-interaction parenting style by maternal age. The third study, “Investigating pathways to behavioural problems in children of teenage, optimal age, and advanced age mothers in Canada” was a longitudinal analysis that used structural equation modeling to identify the prevalence and potential pathways to child behavioural problems across maternal age groups. This dissertation provides important findings in regards to maternal social support, positive-interaction parenting, and pathways to child behavioural problems, across maternal age groups. Further, it provides important information that analysis should be done separately by maternal age, especially examining the advanced age group, and adapts to meet the needs of Canada’s growing advanced age population of women.

Dedication

For all mothers and their children.

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List of Abbreviations

Adj β : Adjusted Beta Coefficient

ANOVA: Analysis of Variance

CBCL: Child Behavioural Checklist

CES-D: Centre for Epidemiological Studies-Depression

CFI: Composition Fit Index

CI: Confidence Interval

HRSDC: Human Resources and Skills Development Canada

M: Mean

N: Number of Subjects

NLSCY: National Longitudinal Survey of Children and Youth

PMK: Person Most Knowledgeable

RMSEA: Root-Mean-Square Error of Approximation

SD: Standard Deviation

SE: Standard Error

SEM: Structural Equation Modeling

SES: Socioeconomic Status

SPS: Social Provisions Scale

SRMR: Standardized Root Mean Residual

Unadj β : Unadjusted Beta Coefficient

CHAPTER ONE: Introduction

Differences in Childbirth by Maternal Age

It may be argued that there are three major groups of childbearing age in women. The teenage group is composed of girls aged 15 to 19 years old; the optimal age group is comprised of women 20 to 34 years, where they are at the most “optimal” state to give birth to their child; and advanced age group is comprised of women 35 years and older, when fertility rates steeply decline, and conception becomes difficult. In Canada, the average age of mothers at first birth in 2011 was 28.5 years - the oldest recorded to date (Statistics Canada, 2016a). The last two decades of data in Canada show that a steady 3.3% of live births were given by teenage girls, (Statistics Canada, 2016b), with the highest percentage reported in Nunavut (20.0%), followed by Manitoba and Saskatchewan (tied at 8.9%) and the lowest reported in British Columbia, Quebec (both at 3.1%) and Ontario (3.3%) (Statistics Canada, 2015). These numbers are modest compared to live births delivered by teens worldwide at approximately 11% (World Health Organization, (WHO), 2014). However, births delivered by advanced age women aged 35 years and older are increasing. In Canada, the last 20 years of data show an increase of 8% to 20% in the proportion of advanced age women giving live births (Statistics Canada, 2016b). The highest percentage of live births given by advanced age women were in British Columbia (22.7%), followed by Yukon (21.7%) and Ontario (21.6%), with the lowest percentage found in Nunavut (8.8%) (Statistics Canada, 2015). The trend is also reported in many other countries in the last two decades where live births have almost tripled (Office of National Statistics, 2010).

Differences in Maternal Outcomes by Maternal Age

Teen births increase risks for both the mother and her child. There is consensus that the teens are defined as anyone under the age of 20, as defined by the World Health Organization

(WHO) (WHO, 2014). Although the teenage pregnancy birth rate has decreased since 1990, teen births remain a major risk to maternal and child health, mortality, and poverty (WHO, 2014). The World Health Organization has identified that pregnancy and childbirth complications are the second leading cause of death among adolescents around the world, stating that lower maternal age corresponds to greater risk to the baby (WHO, 2014). Teen mothers are at increased risk of eclampsia, preterm delivery (Ganchimeg et al., 2014; Fall et al., 2015), and postpartum depression (Kim et al., 2014). Furthermore, teen mothers' behaviour and attitude towards pregnancy and childbirth are quite different from non-teen mothers. They usually seek less prenatal care and are more resilient when facing demands of childrearing (Bornstein et al., 2006), and approaches to parenting are less verbal, less sensitive, and less skilled (Barratt & Roach, 1995; Bornstein et al., 2006). Becoming a teen mother also has negative economic and social influences. Teen mothers have little or no opportunities to find a job because they usually drop out of school early (WHO, 2014), thus leading to their low socio-economic status.

Advanced age mothers are also at medical risk and present unique behaviour and attitude towards childbearing and motherhood. As fertility steeply declines after the age of 35, advanced age mothers are at decreased ability to conceive successfully (Broekmans, Knauff, te Velde, Macklon, & Fauser, 2007). According to systematic reviews and recent findings on the data of the WHO Multicountry Survey on Maternal and Newborn Health, advanced age mothers are at increased risk of pregnancy-related hypertension, miscarriages, stillbirths (Laopaiboon et al., 2014; Carolan & Frankowska, 2011; Nybo Andersen, Wohlfahrt, Christens, Olsen, & Melbye, 2000), severe maternal outcome, and even maternal death (Laopaiboon et al., 2014). The advanced age cohort is more economically sound than teen mothers as they have an increased focus on educational and career goals and higher socioeconomic status (SES) (Mills & Lavender,

2010). Although they are likely to feel more psychologically prepared for motherhood than younger mothers (Mills & Lavender, 2010), they have also shown to express more worry about giving birth than younger mothers (Aasheim et al., 2013). Furthermore, these older mothers adopt different diets and prenatal care behaviours, and tend to be more experienced and knowledgeable, and interact with their children in more positive ways (Bornstein et al., 2006).

For mothers in the age range between teen and advanced age groups, the medical risks are lower, and they exhibit attitudes and behaviours that are opposite to teen and advanced age mothers (Ventura et al., 2012; Nybo Andersen et al., 2000). Research has shown that the optimal age range for women to give birth is 20 to 34 years of age, as fertility generally peaks in the early and mid-20's (Wallace & Kelsey, 2010), where women have a higher chance to successfully conceive and give birth to healthy babies.

Differences in Child Outcomes by Maternal Age

When examining maternal characteristics and child outcomes, few studies have examined the role of maternal age on child outcomes. In most studies, maternal age is not examined as a continuum, excludes the advanced age group, and/or categorizes mothers into “teen” or “non-teen”. Accordingly, it is important to consider maternal age at first birth as this may influence opportunities available to the mother, which may ultimately affect the development of the child. For instance, children of teen mothers face numerous threats to their development. They are more likely to be born prematurely or with low birth weight that has long-term consequences (Ganchimeg et al., 2014; Fall et al., 2015; WHO, 2014), and are at 50% higher risk of being stillborn or die within the first few weeks of life compared to babies born to non-teen mothers worldwide (WHO, 2014). They are also found to have higher levels of behavioural problems such as physical aggression (Bushnik & Garner, 2008), attention-deficit hyperactivity disorder

(Chang et al., 2014), anxiety (Hardy, Astone, Brooks-Gunn, Shapiro, & Miller, 1998), delinquency and violence (Pogarsky, Lizotte, & Thornberry, 2003), conduct and emotional problems (Rhule et al., 2006). Later into their adolescence, these children are more likely to engage in delinquent behaviours, substance abuse, school dropout and early childbearing themselves (Rhule et al., 2006). These risks stem from maternal characteristics associated with teen pregnancy such as higher levels of depression and stress, lower education, low SES, and poor parenting (Goodman & Brand, 2011; Leadbeater, 1999; Spencer et al., 2002 Huang et al., 2014), which heighten the difficulties and risks in their children who are at a disadvantage (Mollborn & Dennis, 2011). It is also evident that due to the lack of education and low SES in teen mothers, the parenting style is unfavourable, which compromises the child's developmental outcomes (Mollborn & Dennis, 2011). The problems faced by teen mothers remain as they transition into adult mothers, which also continue to negatively affect their children (Rhule et al., 2006).

Considerably less is known about the relationship between advanced maternal age and child outcomes, particularly the potential consequence of their children in the behavioural development. What is known is that their children are at increased risk for birth defects (Reefhuis & Honein, 2004), birth complications (Astolfi & Zonta, 2002), and perinatal mortality (Laopaiboon et al., 2014). A study in the United Kingdom found that fewer social and emotional difficulties in children were associated with increasing maternal age (Sutcliffe et al., 2012). Whereas in Canada, children born to advanced age mothers did not report significant differences in physical aggression and hyperactivity-inattention, and reported similar levels of emotional anxiety levels compared to children of mothers aged 25-29 years (Bushnik & Garner, 2008).

Applying Bronfenbrenner's Ecological Model to Understand Differences in Maternal Age

As evidence in the literature shows (e.g., WHO, 2014; Bushnik & Garner, 2008; Mills & Lavender, 2010), the three maternal age groups: teen, optimal age, and advanced age are the most widely accepted maternal age classification. Bornstein et al. (2006) emphasized the importance of incorporating maternal age in research related to maternal health and child development, highlighting the need to understand the differences in characteristics and outcomes according to the mother's age. To understand these differences, an appropriate conceptual framework such as Bronfenbrenner's ecological model (1979) is proposed. The ecological model is a long-standing and credible theoretical model that has been widely used in research and is a suitable framework to understand the differences in characteristics and outcomes associated with maternal age because these characteristics are systematically arranged into levels. According to the ecological model, the environment is multi-layered and includes the following systems: microsystem, mesosystem, macrosystem, and exosystem. The individual factors (personal attributes or characteristics) exist at the core of these environmental influences that are most directly influential on the outcome, and the layers that surround the individual are less influential as it is indirectly associated (Bronfenbrenner & Morris, 1998; Bronfenbrenner, 1979).

According to Bronfenbrenner's ecological model, the direct interactions between the individual and the immediate setting are what define the *microsystem*. The immediate setting may include physical settings such as the individual's home, daycare, or school environment, and may also include settings where the individual experience the most intimate lessons and relations with significant people in their immediate surrounding, indexed by key variables such as parenting, family functioning, and social support. The interaction of two or more microsystems is the *mesosystem*. Similar to microsystems, mesosystems can affect the individual directly since it

contains the relationship between microsystems. For example, a mother who has a good support group around her may possess more positive parenting towards her child, thereby having a profound effect on her child's behavioural development. The *macrosystem* usually evolves over time as future generations change, and describes the culture in which the individual lives. For example, a child who was raised by parents who do not work may have constant interactions with his/her parents that will affect how the child will grow as an individual. The *exosystem* is the larger social environment in which the individual lives and is not directly affected. It includes structures that may influence the individual by interacting with the microsystem. For example, neighbourhood safety may indirectly influence the child's behavioural development without the child ever physically being in an unsafe neighbourhood, as it may simply influence the mother's behaviour in how she chooses to raise her child.

Differences in Factors of the Ecological Model by Maternal Age

Research has shown that differences exist in microsystem and mesosystem factors such as social support and parenting by maternal age. Social support has been shown to be different based on maternal age, as mothers of different ages have unique risks and challenges throughout pregnancy (Bayrampour et al., 2012; Nybo Andersen et al., 2000; Chen et al., 2007; Ventura et al., 2012) and during the transition into motherhood (Mulherin & Johnstone, 2015). Teen mothers are reported to have lower social support compared to their non-teen mother counterparts (Baheiraei et al., 2012; Wahn & Nissen, 2008; Figueiredo, Bifulco, Pacheco et al., 2006), possibly due to the scrutiny faced by society and their peers for becoming a mother so early in age (Lewis, Scarborough, Rose, & Quirin, 2007). Advanced age mothers, on the other hand, have not been extensively studied in the realm of social support. However, some of the social problems that an advanced age mother experiences include higher anxiety levels due to

concerns with childbearing (Carolan, 2003; Loke & Poon, 2011), balancing her life, and coping with new maternal responsibilities (Viau et al., 2002). Parenting differences exist according to maternal age. Teenage mothers are reported to have a harsher and less supportive parenting style with their children (Trentacosta et al., 2010; Scaramella et al., 2008; Bornstein et al., 2006) compared to non-teen mothers. Non-teen mothers are regarded as being supportive, being able to meet the needs of their child, and demonstrating capability as a parent (Reis, 1989), often showing warmth and sensitivity to their children more so than younger mothers (Bornstein et al., 2006).

Differences in macrosystem and exosystem factors such as socioeconomic status and neighbourhood safety are present by maternal age. Research around the world (e.g., United States, New Zealand, Britain, Canada) shows that young girls who come from a family with low SES or poverty were more likely to become teen mothers (Russell, 2002; Ashcraft & Lang, 2006; Levine & Painter, 2003; Fergusson & Woodward, 2000). Generally, young girls who came from a disadvantaged family of low SES usually knew less about risky sexual behaviour and less about contraception, thereby increasing their risk of becoming teen mothers (Bonell, Strange, Stephenson et al., 2003). Links between low SES and teen mothers (Russell, 2002; Ashcraft & Lang, 2006) and links between low SES and low quality neighbourhoods are well documented (Duncan & Magnuson, 2005), but the link between neighbourhood and maternal age is not clear.

Regardless, these factors at the systems level interact with each other or directly/indirectly influence one another, acting in a cumulative fashion to influence certain outcomes such as child behavioural problems. For example, low-income mothers who live in lower-class neighbourhoods are likely to implement a harsher parenting approach to protect their child from harmful social influences (Azad et al., 2014; Reese, 2002; Wagner et al., 2008), and

found to be correlated with the development of behavioural problems in children (Gutman et al., 2005; Nomura et al., 2002; Tremblay et al., 2004). Although it is profoundly evident, it is unclear whether this pathway to understanding behavioural problems in children is the same for children of teen, optimal, and advanced age mothers. Furthermore, other consequences and risks to the child's behavioural development that fit into Bronfenbrenner's ecological model need to be explored. Some factors that have been linked to child behaviour include: maternal education, income, parenting, family functioning, and maternal depression (Bushnik & Garner, 2008; Thomas, 2004). These factors contribute to child behaviour and can be considered using Bronfenbrenner's ecological model.

Dissertation Rationale

As the age range of first-time mothers is increasing, the importance of incorporating maternal age in studies related to maternal health and child development is important (Bornstein et al., 2006; Bayrampour et al., 2012; Mulherin & Johnstone, 2015). Furthermore, acknowledging the differences in medical risks, attitudes and behaviours examined separately by the mother's age is important. To address the gaps of research around maternal age, particularly the subgroup of advanced age mothers and their children, a three-manuscript doctoral dissertation was developed. The first two manuscripts of the dissertation focus on determining the differences in characteristics of two selected microsystem factors examined separately by maternal age: social support and positive-interaction parenting style. The third manuscript applies the full ecological model, examining the differences in predictors of child behavioural outcome by maternal age, using structural equation modeling.

Dissertation Objectives

This thesis addresses the research gaps around maternal and child outcomes by maternal age. The first study, “*Characteristics of social support among teenage, optimal age, and advanced age mothers in Canada*” was a cross-sectional analysis of the National Longitudinal Survey of Children and Youth (NLSCY), which examined the prevalence and characteristics of social support by maternal age. The second study, “*Characteristics of positive-interaction parenting style among teenage, optimal age, and advanced age mothers in Canada*”, was a cross-sectional analysis of the NLSCY examining the prevalence and characteristics of positive-interaction parenting style by maternal age. The third study, “*Investigating pathways to behavioural problems in children of teenage, optimal age, and advanced age mothers in Canada*” was a longitudinal analysis of the NLSCY using structural equation modeling to identify the prevalence and potential pathways to child behavioural problems across all maternal age groups. Permission to access and use the NLSCY was obtained from the Social Sciences and Humanities Council of Canada and was accessed at the York Region Research Data Centre in Toronto, Canada (See [Appendix A: Research Data Centre Approval Letter](#)).

CHAPTER TWO: Characteristics of Social Support among Teenage, Optimal Age, and Advanced Age Mothers in Canada: A Cross Sectional Analysis

SUMMARY

Background: Social support is highly valued and beneficial for women, especially after childbirth. The objective was to examine the differences of social support reported among teenage, optimal age, and advanced age women, and to identify the characteristics associated with social support separately for each age group.

Methods: This was a cross-sectional analysis of the National Longitudinal Survey of Children and Youth. Primiparous mothers with 0-12-month-old infants were grouped into: teenage (15-19 years), optimal age (20-34 years), and advanced age (35 years and older). The outcome was social support (Social Provisions Scale), and demographic, socioeconomic, health, community, and infant characteristics were considered for stepwise linear regression, separately for the groups.

Results: A weighted total of 455,022 mothers was analyzed. Teens had the lowest social support ($Mean=17.56$) compared to the other two groups ($Means=19.07$ and 19.05 ; $p<0.001$). Teens' volunteer involvement was associated with an increase in social support, $Adj \beta = 2.77$ (95% CI 0.86, 4.68), and depression was associated with a decrease in social support, $Adj \beta = -0.12$ (-0.22, -0.02). Optimal age mothers' support significantly increased with maternal age, $Adj \beta = 0.07$ (0.02, 0.12), working status, $Adj \beta = 0.60$ (0.13, 1.07), and with chronic condition(s), $Adj \beta = 0.59$ (0.16, 1.02), while it decreased with depression, $Adj \beta = -0.05$ (-0.10, -0.01) and ever-immigrants, $Adj \beta = -1.67$ (-2.29, -1.04). Use of childcare was associated with increased support among mothers in advanced age group $Adj \beta = 1.58$ (0.12, 3.04). For all groups, social support was significantly associated with neighbourhood safety.

Conclusion: The characteristics associated with social support varied among the three age groups. The findings may help promote awareness of the essential needs to increase support, especially for teens.

INTRODUCTION

The transition into motherhood is often reported as a joyous and exciting period, bringing significant changes to all domains of life for the mother and her family (Brown & Lumley, 1998). Adjusting to the changes in her new role and responsibility as a mother may cause stress, often putting the mother at psychological health risks. During this transition, more than 10% of mothers develop psychological illnesses such as anxiety disorder, post-traumatic stress, and/or postpartum depression (Verreault et al., 2014). Furthermore, first-time (primiparous) mothers deal with the fast-growing self-doubt that may impact their ability to parent (McVeigh & Smith, 2000), thus adding to their stress. Social support is an important factor that has been identified as a buffer against stress for women in the maternal role (Miller-Loncar et al., 1998). It helps the mother feel reassured and cared for; allows her to feel that assistance is available from others, and that she is part of a support network (Albrecht & Adelman, 1987). It may come in different forms: emotional, social integration, reassurance of worth, tangible help, orientation, and opportunity for nurturance (Russell et al., 1984), and can be given by a family member, friend, husband/partner, and health care professionals.

Social support has shown to be highly valued and is particularly beneficial for women, especially after the birth of the child. It is found to minimize maternal depression (Kim et al., 2014; Logsdon et al., 2002) and decrease anxiety (Warren, 2005), which acts as a proxy for positive physical health benefits. It is also found to reduce the likelihood of cognitive impairments in infants (Shah et al., 2014), and prevent child abuse (Logsdon et al., 2002).

Support, particularly from their spouse and/or their own mother, plays a crucial role in the transition to motherhood (Baheiraei et al., 2012), whereby new mothers are less likely to feel overwhelmed and have more time available for their infants. In addition, a study in the United States found that ethnicity, and socioeconomic status (SES) determined by employment and education were strong predictors of social support among mothers of all childbearing age (Miller-Loncar et al., 1998). Mothers with higher SES were more likely to report higher levels of support compared to mothers of lower SES. Similarly, a population based study among Iranian women also found that higher education and sufficient income was significantly related to higher levels of support, regardless of their age (Baheiraei et al., 2012).

Social support levels have been shown to vary based on maternal age, as expectant women of different ages have unique risks and challenges throughout pregnancy (Bayrampour et al., 2012; Chen et al., 2007; Cleary-Goldman et al., 2005) and during the transition into motherhood (Mulherin & Johnstone, 2015). The optimal age range for successful conception and healthy childbirth is 20-34 years old (thereby deemed “optimal age” mothers), as fertility generally peaks in the early and mid-20 and steeply decline over the age of 35 (Wallace & Kelsey, 2010). Therefore, expectant teens (19 years old and under) and advanced age women (35 years of age and older) are considered “at risk” as they lie outside the optimal range. Teens are at greater risk for obstetrical and pregnancy complications (Bayrampour et al., 2012; Chen et al., 2007), and have lower social support than their non-teen counterparts (Baheiraei et al., 2012; Wahn & Nissen, 2008; Figueiredo et al., 2006). Expectant teens are found to have lower social support due to discrimination and lack of acceptance from society and their peers, as becoming a mother so early in age illustrates immaturity and irresponsibility (Lewis et al., 2007). Advanced age women are also considered at risk for obstetrical and pregnancy complications (Cleary-

Goldman et al., 2005). However, they have not been extensively studied in the realm of social support. Some of the social problems that an expectant advanced age woman experiences include higher anxiety (Loke & Poon, 2011), coping with new maternal responsibilities, and balancing her life (Viau et al., 2002), which are all enough to complicate her transition into motherhood.

Although teens and advanced age women are identified with risks and challenges throughout pregnancy and into their motherhood, they are not considered a homogenous group and need to be treated as separate entities in comparison to optimal age mothers. For example, majority of teen pregnancies are unplanned or unwanted, whereas majority of older mothers report having an intended pregnancy (Oulman, Kim, Yunis, & Tamim, 2015) thereby generating different needs for social support. Additionally, differences in parenting knowledge (Ruchala & James, 1997), anxiety levels, and health behaviours (Loke & Poon, 2011) are evident among the different age groups of mothers. Lack of literature in this area demonstrates a need to examine and compare the characteristics of social support among mothers of different age groups, especially with advanced age mothers. It is becoming more crucial to investigate this age group because there is a 195% increase in the number of women delaying their pregnancies in Canada from 1991 to 2011 (Statistics Canada, 2015a). To address these gaps in the literature, the present study aims to examine the differences of social support reported among teen, optimal age, and advanced age primiparous mothers during the first year of her motherhood, and identify the characteristics associated with social support separately for each age group.

METHODS

Database

This was a cross-sectional study and was based on a secondary analysis of the National Longitudinal Survey of Children and Youth (NLSCY), sponsored by a joint contribution of

Statistics Canada and Human Resources and Skills Development Canada (HRSDC; formerly Human Resources Development Canada). The NLSCY is comprised of data collected from infants 0-1 year of age, and followed until 4-5 years in all provinces from 1994 to 2008 (Cycles 1- 8). The survey includes information on the child's biological, social, emotional, and behavioural development, and information on the parent/caregiver's demographic, social, economic, health, and environment. All variables were self-reported and participation to the survey was voluntary. An interviewer administered the questionnaire using a computer assisted interviewing technique. The caregiver (also known as the person most knowledgeable – PMK) provided responses to the questions regarding the child, except in cases of standardized testing where, the child directly provided the information. Subpopulations, such as Aboriginals, those institutionalized, residents of the territories, and those who reside in remote areas of Canada were excluded from the database. Full description of the NLSCY is described elsewhere (Statistics Canada & HRSDC, 2009).

Study Sample

For this study, analysis was restricted to cycles 4-8 (years 2000-2008). Cycles 1-3 were excluded because the social support index was not consistently measured in these cycles. Because the NLSCY questionnaire was administered to the PMK regardless of the relationship to the child, the following inclusion criteria were required for analyses: biological mother of the child, primiparous, singleton live births, living with infant (0-12 months old) at time of interview, and those who completed the Social Provisions Scale (response rate 98.2%).

Outcome Variable

The outcome variable was social support; indexed by the *Social Provisions Scale (SPS)*, analyzed as a continuous variable. The SPS determines the current level of social support

received from friends, family, and others, adapted from Robert Weiss's Social Provisions Model (Statistics Canada & HRSDC, 2009) (see [Appendix B: Social Provisions Scale](#) for full list of items). It includes six different social functions or "provisions" that may be derived from relationships with others: *guidance* (advice or information), *reliable alliance* (assurance that others can be counted upon for tangible assistance), *reassurance of worth* (recognition of one's competence, skills, and values by others), *opportunity for nurturance* (the sense that others rely upon one for their well-being), *attachment* (emotional closeness for sense of security), and *social integration* (sense of belonging to a group that shares similar interests, concerns, and recreational activities) (Cutrona & Russell, 1987). The total social support measurement consists of eight questions and focuses on the quantity and quality of social support. The total score ranges from 0 and 24, where a high score indicates the presence of high social support. SPS has shown to be valid and reliable (internal consistency coefficient $\alpha=0.93$; Cronbach's $\alpha=0.90-0.91$) and is described elsewhere (Russell et al., 1984; Statistics Canada & HRSDC, 2009).

Independent Variables

The independent variables were: *demographic characteristics* (maternal age at childbirth, province of residence, ever-landed immigrant status, and currently married/with partner); *socioeconomic characteristics* (rural-urban place of residence, highest level of education completed, household income in the last 12 months, and currently working status); *health characteristics* (presence of chronic condition(s) such as allergies and asthma, and diabetes, perceived health status, and current depression); *community characteristics* (use of childcare – infant taken care by another who was not the father or mother, volunteer organization involvement in the last 12 months, devotion to religion in the last 12 months, and neighbourhood safety); and *infant characteristics* (age, sex, and health status). The *data collection year* (survey

cycle) was included in the analysis as a covariate. All independent variables were self-reported, and were categorical except for maternal age, household income, depression, neighbourhood safety, and age of infant, which were continuous variables or scales. Depression was indexed using the Centre for Epidemiological Studies-Depression scale, reduced to 12 items (Cronbach's $\alpha > 0.80$; Statistics Canada & HRSDC, 2009). The total score ranges from 0 to 36, where a high score indicates the presence of depressive symptoms ([Appendix C: Depression Scale](#)).

Neighbourhood safety scale was derived from the revised Simcha-Fagan Neighborhood Questionnaire with 9 items (Cronbach's $\alpha = 0.70$; Statistics Canada & HRSDC, 2009). The total score ranges from 0 to 9, where a high score indicates sense of high degree of safety in their neighbourhood ([Appendix D: Neighbourhood Safety Scale](#)).

Statistical Analysis

Stratified analyses were performed separately for teens (aged 15-19 years), optimal age (aged 20-34 years) and advanced age mothers (aged 35 years and older). Means of social support were calculated for each age group. To assess the significance across the three age groups, ANOVA was performed for continuous variables and chi-square test for categorical variables. Crude beta coefficients (β) and 95% confidence intervals (95% CI) were reported for bivariate analysis using simple linear regression for the outcome social support. Adjusted β (Adj β) and 95% CI were reported for the stepwise linear regression models, separately for each age group. The adjusted β indicates the impact of each covariate when all variables are controlled for in the model. To account for the complex sampling design population weights were applied to estimate unadjusted β , and adjusted β and bootstrapping was performed to calculate standard deviations, standard errors, and 95% CI. Population weights and bootstrap weights were created

by Statistics Canada and provided with the data set. All analyses were performed using Stata (version 13.0 SE). Statistical significance for all analyses was set at $\alpha < 0.05$.

Ethics

Ethics approval was not required as this study was based on a secondary data analysis of the NLSCY. Permission to use the NLSCY was obtained from the Social Sciences and Humanities Council of Canada and was accessed at the York Region Research Data Centre in Toronto, Canada ([Appendix A: Research Data Centre Approval Letter](#)).

RESULTS

The total weighted sample reported was 455,022 primiparous Canadian mothers (weighted using population weights) whose infant was 0-12 months of age at the time of interview. The sample included 23,945 teens, 381,909 optimal age mothers, and 49,168 advanced age mothers. Teens had the lowest social support reported at 17.56 (Standard Error, $(SE)=0.30$), followed by advanced age mothers at 19.05 ($SE=0.33$), and optimal age mothers at 19.07 ($SE=0.12$). There was a significant difference between teens and the other two age groups ($p < 0.001$) however, there was no significant difference between optimal age and advanced age mothers' level of social support.

[Table 1](#) shows the proportions of characteristics of all primiparous mothers with infants 0-12 months old. Significant differences in proportions of the demographic characteristics were noted across the groups. Proportions in marital status across groups significantly differed ($p < 0.001$); only 53.2% of teens were married/partnered compared to optimal age and advanced age mothers whereby majority (>90%) was married/partnered. Teens were less educated (majority with high school education or less: 76.0%) compared to optimal age and advanced age mothers, where most had postsecondary, college, or university education (79.7% and 91.4%

respectively, $p < 0.001$). Teens scored higher on the depression scale compared to optimal and advanced age mothers ($p < 0.001$).

[Table 2](#) shows the results from simple linear regression and stepwise multivariable linear regression, reporting the estimated unadjusted β and the adjusted β (Adj β) of social support and related characteristics, separately for each age group. Being an ever-landed immigrant was significantly associated with social support in optimal age and advanced age mothers however; significance was retained only among the optimal age group after adjusting for other variables in the model Adj $\beta = -1.67$ (95% CI -2.29, -1.04). Working status was significantly associated with social support in optimal and advanced age mothers at the bivariate level, and the significance remained among optimal age group Adj $\beta = 0.60$ (0.13, 1.07). Chronic condition(s), perceived health status, and depression were significantly associated with social support at the bivariate level among optimal age women, and only chronic condition(s) and depression were retained in the multivariable model after adjustment; Adj $\beta = 0.59$ (0.16, 1.02); Adj $\beta = -0.05$ (-0.10, -0.01) respectively. Although depression was not significant for teens at the bivariate level, it was found to be significantly associated with social support after adjustment Adj $\beta = -0.12$ (-0.22, -0.02). The use of childcare was found to be significant among advanced age mothers both at the bivariate and multivariable levels, and volunteer involvement was found to be significant among teens at the multivariable level Adj $\beta = 2.77$ (0.86, 4.68). For all three groups, neighbourhood safety was found to be significant at both the bivariate and multivariable levels.

To estimate effect sizes, coefficients were re-scaled to standardized regression coefficients to provide some indication of the magnitude of these effects. In teens, the largest standardized regression coefficient was observed for neighbourhood safety (0.49), and the smallest standardized regression coefficients were observed for infant's health and depression

(0.16 and 0.18 respectively). In optimal age mothers, among variables that were found to be significantly associated with social support, all but neighbourhood safety indicated a standardized regression coefficient of less than 0.20; and neighbourhood safety was found to have a slightly larger coefficient of 0.29. In advanced age mothers, neighbourhood safety had a standardized regression coefficient of 0.30, household income of 0.23 (although not significant in the adjusted model), and the other variables in the model was found to have a small effect size of less than 0.20.

DISCUSSION

This study is the first to explore a Canadian-wide dataset to compare the differences in social support and identify its predictors among teen, optimal age, and advanced age mothers. The findings show that teens received the lowest social support compared to optimal and advanced age mothers, who reported similar levels of support. The characteristics significantly associated with social support varied among the three groups, suggesting that they are not homogenous. Among teens, social support significantly increased with volunteer involvement, and decreased with depression. Among optimal age mothers, support significantly increased with age, those currently working, and those with any chronic condition(s), while it decreased with depression and those who were an ever-landed immigrant. Lastly, among advanced age mothers, support significantly increased with those who used childcare. Among all three groups, neighbourhood safety was significant with social support, suggesting its importance independent of age. With these findings, researchers, counselors, and healthcare providers will be able to effectively help primiparous mothers who lack social support by addressing the characteristics that are specific to their age group.

Teens were found to have significantly lower social support than optimal and advanced age mothers. This finding is consistent with studies from other countries (Wahn & Nissen, 2008; Figueiredo et al., 2006) but found to be inconsistent with population based studies in Canada where teens reported more social support than non-teen counterparts (Kim et al., 2014; Kingston et al., 2012). However, these studies had different objectives (i.e., outcome was postpartum depression and maternity practices, respectively) and social support was evaluated using one self-reported question rather than a validated scale. Teens may have lower support compared to older mothers because of the social stigma tied to being a young mother – usually defined by lower education status and unwed or without a partner (as our results show). Furthermore, they may lack the connectivity with their own peer groups, which may lead to isolation and lack of social support from peers. They are socially misrepresented by the media as undesirable and irresponsible (Lewis et al., 2007), which leads to less support and acceptance from society. In our study, both optimal and advanced age mothers were found to have similar levels of support. This may be possibly because they do not violate the “socially acceptable” age to be a mother. Optimal age women are at a healthy and appropriate state for childbirth, and there is an increase in advanced age women delaying their pregnancies (Statistics Canada, 2015a) – both groups may receive abundant support during and after pregnancy, and this is especially the case for advanced age women who may require more support to overcome the challenges of pregnancy and childbirth.

Among demographic characteristics, optimal age mothers who were ever-landed immigrants were found to receive less support compared to non-immigrant mothers. The results were only significant to optimal age mothers because the median age of the immigrant population in Canada is 33.4 years (Statistics Canada, 2011), and other studies have also found

that immigrant women have the lowest social support compared to Canadian-born and more long-term immigrant women (Puyat, 2013; Hagan, 1998). Immigrants are left without support, faced with the challenges of having to rebuild their social networks and confronted with difficulties finding how to get help due to language barriers (Puyat, 2013; Hagan 1998).

In contradiction to other studies, this study did not find socio-economic characteristics such as education and income to be significantly associated with social support. This contradiction may be due to differences in populations studied; other studies were based in the United States (Miller-Loncar, 1998), or Iran (Baheiraei et al., 2012), and did not adjust for important factors such as the maternal age, health-related variables, immigration, and neighbourhood safety. In our study, currently working optimal age mothers were found to receive an increase in support compared to those who were not working. According to the Canadian census, the core working age group is between 20 and 60 years of age, with most in the 50 to 54-year-old category (Statistics Canada, 2015b). One can speculate that support and network building can be found amongst co-workers in the work setting however; it is unclear why this significance was found only in optimal age mothers and not in advanced age mothers. Further investigation is warranted.

Among health characteristics, depression significantly predicted low social support among teens and optimal age mothers. Our results are consistent with other studies that have also found a significant relationship between support and depression among teens and older women (Kim et al., 2014; Wahn & Nissen, 2008; Figueiredo et al., 2006); however, in these studies, depression was analyzed as the outcome variable with no distinction between maternal ages - specifically the advanced age group. The relationship between depression and social support is a reciprocal relationship. In a depressed state, social support may decrease because the individual

is not likely to seek help from family and friends and will feel lonely. It is difficult to capture the causality between depression and social support without the knowledge of the mother's previous episodes or diagnosis of depression and family history of depression, as other epidemiological data shows that depression is a highly recurrent disorder (Goodman, 2007). The presence of chronic condition(s) was found to be a significant predictor of support and was positively associated in optimal age mothers. Individuals with chronic illness(es) are likely to gain more support from others dealing with similar issues, and their care provider, friends, and family (Primomo, Yates, & Woods, 1990). However, it is unclear why it was found amongst optimal age mothers only.

Although only a small proportion of advanced age mothers used childcare, they experienced an increase in support. Tangible help such as childcare may allow mothers to feel that they can depend on others to help raise and care for their child (Fairbrother, 2011). It is unclear why significance was not found amongst teens even though more reported using childcare compared to advanced age mothers. Advanced age mothers' use of childcare may have more of an impact on their support level compared to teenage mothers. Majority of advanced age mothers were reported as currently working, and likely to have partners who were also working, and may value childcare as an extended support network to transition back into their lives and minimize the disruption to their routines prior to childbirth. It is postulated that teens may heavily evaluate other systems in the community (e.g., volunteer organizations) to be more supportive, possibly because they may experience discrimination from the childcare system. Volunteer involvement was found to be significant only in teens. Although only a small proportion of teens were part of a volunteer organization, they may have felt more support and benefited more from forming new friendships through these experiences (Wilson, 2012).

Neighbourhood safety was the only characteristic positively significant with social support in all three age groups. Having a sense of safety, security, and space available in a community (such as in parks, playgrounds, etc.) may allow one to feel abundant support and social cohesion (De Jesus et al., 2010), and thus furthers the need to maintain or increase neighbourhood safety to ensure social support needs are being met for mothers.

Limitations and Strengths

The results should be cautiously interpreted, as some limitations were present. The cross-sectional nature of the design may imply reverse causality between the dependent and independent variables. Although our study explored numerous variables, other characteristics, such as social support during pregnancy, quality of partner relationship, stress, mental health, cognitive abilities, and social skills, may have an impact on their negotiation of social support. These were not captured in the NLSCY, and were not part of our analyses. There is potential for selection bias as this survey was voluntary, and thus may not be representative of the sample. However, the survey weights applied to the data allowed the sample to be generalizable at the population level. The data analyzed in this study dates from 2000-2008, therefore it may not exemplify the current population however, it is currently the first and only population-based Canadian survey that covers a comprehensive range of topics including health, behaviour, and social environment of the mother and her child.

CONCLUSION

This study compared the characteristics of social support among three separate age groups of mothers in Canada using a nation-wide dataset. Each age group had unique characteristics that were associated with support, with neighbourhood safety as the only common characteristic among the groups. Since teens reported the lowest support, interventions to target

this group's needs should be prioritized, while simultaneously maintaining or increasing safety in neighbourhoods. Research using qualitative methods to explore the characteristics may be beneficial to identify other factors unique to each age group. The results from our study would greatly benefit existing programs and policy makers to improve social support for primiparous mothers, and emphasize the key components of social support that is conducive to maternal health and wellbeing. Tailoring existing parenting interventions based on the specific needs by maternal age may be a cost-effective and efficient method to ensure they are receiving adequate support. In clinical practice, (i.e., OBGYN and pediatric providers), referring teen mothers to appropriate programs/support groups to minimize the risk of depression, and encouraging them to participate in volunteer organizations may be a good starting point to address the lack of support available to these young mothers. Furthermore, encouraging young mothers to continue her education to decrease social isolation and depression is recommended. A similar approach may be taken with advanced age mothers by connecting them to childcare centres or school programs in the community that are flexible in meeting their needs. The findings here would educate counselors, midwives, and healthcare providers to transcend the traditional care provided in our current healthcare system, allowing them to create innovative ways to provide post-natal care, and be more aware of the essential needs to increase social support during first year of motherhood.

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TABLES

Table 1: Social support and characteristics of primiparous teenage, optimal age, and advanced age mothers with infants 0-12 months old

	Teenage Mothers N = 23,945	Optimal Age Mothers N = 381,909	Advanced Age Mothers N = 49,168	
	%	%	%	P-value^b
Social Support				
Mean ^a (SE) ^b	17.56 (0.30)	19.07 (0.12)	19.05 (0.33)	0.0001
<i>Demographic Characteristics</i>				
Mother's age at childbirth				
Mean ^a (SE) ^b	18.19 (0.10)	27.22 (0.12)	37.11 (0.16)	<0.001
Province of Residence				
Eastern-Atlantic	15.1	7.0	5.5	0.0021
Eastern-Central	49.2	63.2	60.4	
Western-Prairies	21.4	18.0	14.9	
Western-BC	14.3	11.8	19.2	
Ever a Landed Immigrant				
No	94.2	84.0	73.6	0.0005
Yes	5.8	16.0	26.4	
Married/With Partner				
No	46.8	8.2	5.8	<0.001
Yes	53.2	91.8	94.2	
<i>Socio-economic Characteristics</i>				
Place of Residence				
Rural	13.7	9.9	6.0	0.0981
Urban	86.3	90.1	94.0	
Level of Education				
High school or less	76.0	20.3	8.6	<0.001
College/University	24.0	79.7	91.4	

Household Income (\$1000's)				
Mean ^a (SE) ^b	28.38 (1.92)	70.85 (1.83)	86.33 (5.34)	<0.001
Currently Working				
No	43.2	34.5	30.7	0.1904
Yes	56.8	65.5	69.3	
<hr/> <i>Health Characteristics</i> <hr/>				
Any Chronic Conditions				
No	56.8	64.0	64.7	0.4550
Yes	43.2	36.0	35.3	
Perceived Health Status				
Good/Fair/Poor	35.2	20.1	24.4	0.0065
Very good/Excellent	64.8	79.9	75.6	
Depression Scale Score				
Mean ^a (SE) ^b	5.11 (0.43)	3.63 (0.13)	2.98 (0.32)	<0.001
<hr/> <i>Community Characteristics</i> <hr/>				
Use of Childcare				
No	68.7	82.2	87.0	0.0018
Yes	31.3	17.8	13.0	
Volunteer Involvement				
No	93.6	86.2	85.8	0.1295
Yes	6.4	13.8	14.2	
Devotion to Religion				
No	41.2	43.9	47.3	0.6464
Yes	58.8	56.1	52.7	
Neighbourhood safety				
Mean ^a (SE) ^b	6.02 (0.15)	6.44 (0.05)	6.47 (0.16)	<0.001
<hr/> <i>Infant Characteristics</i> <hr/>				
Age of Infant (Months)				
Mean ^a (SE) ^b	8.81 (0.23)	8.63 (0.07)	9.07 (0.19)	0.0163
Sex of Infant				
Male	53.7	54.5	49.1	0.4622
Female	46.3	45.5	50.9	

Health Status of Infant

Good/Fair/Poor	5.6	5.5	3.5	0.5942
Very good/Excellent	94.4	94.5	96.5	

Survey Data Characteristics

Data Collection Year

Cycle 4 (2000-2001)	22.3	16.5	13.8	0.2741
Cycle 5 (2002-2003)	24.8	17.0	21.1	
Cycle 6 (2004-2005)	20.7	18.9	20.2	
Cycle 7 (2006-2007)	17.3	25.4	20.2	
Cycle 8 (2008-2009)	14.9	22.2	24.7	

*Values represent column percentages estimated using population weights, unless otherwise indicated.

^a Sample size and means are estimated using population weights.

^b Standard error values and between group p-values were calculated using bootstrap weights.

Table 2: Unadjusted and adjusted relationships between study characteristics and social support among primiparous mothers

Characteristics	Teenage Mothers		Optimal Age Mothers		Advanced Age Mothers	
	Unadjusted β^a (95% CI) ^b	Adjusted β^a (95% CI) ^b	Unadjusted β^a (95% CI) ^b	Adjusted β^a (95% CI) ^b	Unadjusted β^a (95% CI) ^b	Adjusted β^a (95% CI) ^b
<i>Demographic Characteristics</i>						
Mother's Age at Childbirth	0.39 (-0.20, 0.97)		0.11 (0.05, 0.17)	0.07 (0.02, 0.12)	-0.08 (-0.42, 0.26)	
Eastern-Central Province ^c	-0.55 (-1.81, 0.71)		-0.24 (-0.70, 0.22)		-0.25 (-1.56, 1.06)	
Western-Prairies Province ^c	0.55 (-0.85, 1.96)		0.36 (-0.12, 0.84)		1.23 (-0.22, 2.69)	
Western-BC Province ^c	-0.59 (-2.24, 1.06)		0.14 (-0.55, 0.82)		-0.44 (-2.02, 1.15)	
Ever a Landed Immigrant ^d	-1.30 (-3.12, 0.51)		-2.06 (-2.69, -1.44)	-1.67 (-2.29, -1.04)	-1.47 (-2.83, -0.11)	
Married/With Partner ^d	0.55 (-0.74, 1.85)		0.49 (-0.30, 1.28)		0.83 (-1.53, 3.20)	
<i>Socio-economic Characteristics</i>						
Urban Place of Residence ^e	-1.11 (-3.60, 1.37)		0.21 (-0.41, 0.83)		-0.62 (-2.41, 1.17)	
College/Univ Education ^f	0.67 (-0.73, 2.08)		0.99 (0.45, 1.52)		2.07 (0.84, 3.31)	
Household Income (\$1000's)	0.02 (-0.02, 0.05)		0.01 (-0.0002, 0.01)		0.02 (0.003, 0.03)	0.01 (-0.001, 0.03)
Currently Working ^d	1.02 (-0.19, 2.23)		1.14 (0.66, 1.62)	0.60 (0.13, 1.07)	1.71 (0.43, 2.99)	
<i>Health Characteristics</i>						
Have Chronic Condition(s) ^d	0.71 (-0.64, 2.05)		0.69 (0.17, 1.21)	0.59 (0.16, 1.02)	0.19 (-1.18, 1.57)	
Very Good/Excellent Health ^g	0.47 (-0.80, 1.75)		0.95 (0.44, 1.45)		11.00 (-0.51, 2.50)	
Depression Scale Score	-0.09 (-0.20, 0.02)	-0.12 (-0.22, -0.02)	-0.08 (-0.13, -0.02)	-0.05 (-0.10, -0.01)	-0.09 (-0.30, 0.11)	
<i>Community Characteristics</i>						
Use of Child Care ^d	1.01 (-0.53, 2.54)		0.07 (-0.48, 0.61)		2.16 (0.62, 3.70)	1.58 (0.12, 3.04)
Volunteer Involvement ^d	1.98 (-0.01, 3.97)	2.77 (0.86, 4.68)	0.60 (-0.06, 1.26)		1.87 (0.30, 3.44)	1.29 (-0.15, 2.74)

Devotion to Religion ^d	0.99 (-0.16, 2.14)		-0.27 (-0.76, 0.23)		0.23 (-1.15, 1.61)	
Neighbourhood Safety	0.96 (0.54, 1.39)	1.04 (0.60, 1.47)	0.78 (0.64, 0.92)	0.67 (0.52, 0.81)	0.83 (0.44, 1.21)	0.69 (0.30, 1.07)
<i>Infant Characteristics</i>						
Age of Infant (Months)	-0.05 (-0.33, 0.24)		0.05 (-0.07, 0.16)		-0.07 (-0.34, 0.19)	
Female Sex of Infant ^h	-0.17 (-1.42, 1.08)		-0.10 (-0.59, 0.38)		-0.82 (-2.20, 0.56)	
Very Good/Excellent Health ^g	0.31 (-2.63, 3.24)	-2.25 (-5.35, 0.85)	1.30 (0.39, 2.20)		1.75 (-0.35, 3.85)	
<i>Survey Data Characteristics</i>						
Cycle 5 ⁱ	-0.19 (-1.47, 1.09)		-0.32 (-0.90, 0.25)	0.21 (-0.45, 0.88)	0.80 (-0.88, 2.49)	
Cycle 6 ⁱ	0.61 (-1.06, 2.29)		0.06 (-0.53, 0.65)	0.53 (-0.18, 1.24)	-0.06 (-1.96, 1.84)	
Cycle 7 ⁱ	0.02 (-1.98, 2.02)		0.10 (-0.51, 0.71)	0.65 (-0.02, 1.31)	-0.59 (-2.19, 1.02)	
Cycle 8 ⁱ	-0.07 (-1.76, 1.62)		0.81 (0.32, 1.30)	0.96 (0.34, 1.58)	-0.14 (-1.64, 1.36)	

Values represent means and standard deviations in parentheses estimated using population weights, unless otherwise indicated.

a Beta coefficients were estimated using population weights

b 95% Confidence Interval (95%CI) and standard error values were calculated using bootstrap weights

c Reference category: Eastern-Atlantic; d Reference category: No; e Reference category: Rural; f Reference category: High school or less; g Reference category:

Good/fair/poor health status; h Reference category: Male; i Reference category: Cycle 4

CHAPTER THREE: Characteristics of Positive-Interaction Parenting Style among Teenage, Optimal Age, and Advanced Age Mothers in Canada: A Cross Sectional Analysis

SUMMARY

Background: Positive-interaction parenting early in childhood is encouraged due to its association with behavioural development later in life. The objective of this study was to examine if the level of positive-interaction parenting style differs among teen, optimal age, and advanced age mothers in Canada, and to identify the characteristics associated with positive-interaction parenting style separately for each age group.

Methods: This was a cross-sectional secondary analysis of the National Longitudinal Survey of Children and Youth. First-time mothers with infants 0-23 months were grouped into: teen (15-19 years, N=53,409), optimal age (20-34 years, N=790,960), and advanced age (35 years and older, N=106,536). The outcome was positive-interaction parenting style (Parenting Practices Scale); maternal socio-demographics, health, social, and child characteristics were considered for backward stepwise multiple linear regression modeling, stratified by maternal age.

Results: Teen, optimal age, and advanced age mothers reported similar levels of positive-interaction parenting style. Characteristics differed across the three age groups. Among optimal age mothers, being an ever-landed immigrant, childcare use, and being devoted to religion were found to decrease positive-interaction parenting style, whereas, higher education was found to increase positive-interaction parenting style. Teen mothers were not found to have any characteristics uniquely associated with positive-interaction parenting. Among advanced age mothers, social support was uniquely associated with an increase in positive-interaction parenting. Improved health was found to be positively associated with parenting in teens but negatively associated with parenting in advanced age mothers.

Conclusion: Characteristics associated with positive-interaction parenting varied among the three age groups. Findings may have public health implications through information dissemination to first-time mothers, clinicians, researchers, and public health facilities.

INTRODUCTION

Parenting is a vital component in a child's life. With appropriate parenting motivation and quality, it may protect children from harm and guide them to healthy physical and emotional wellbeing (Hoghughi, 1998). It has an immediate effect on behaviour such as aggression, emotion, conduct, and hyperactivity (Benzies et al., 2009), and strong associations with improved academic functioning and self-control (Bradley et al., 2013; Cheung & McBride-Chang, 2008; VanVoorhis, 2011). Since parenting practices have an impact on children's development and wellbeing, exposure to *positive* parenting early on (when the child is 6-months-old) (Glascoe & Leew, 2010) is encouraged for increased positive behaviour among children (Chronis et al., 2007; Dallaire et al., 2006). Parenting generally falls along two dimensions on a continuum: *responsiveness* (nurturing or warmth) and *demandingness* (setting boundaries and enforcing them) (Baumrind, 1966; 1991). Based on the two dimensions, four types of parenting exist: *authoritative* (responsive and demanding), *authoritarian* (not responsive but demanding), *permissive* (responsive but not demanding), and *negligent* (not responsive and not demanding) (Baumrind, 1966; 1991). Generally, authoritative parenting, often interchangeable with "positive" or "positive-interaction" parenting (Browne et al., 2010; Kakinami et al., 2015), is found to be the most beneficial to child development (Baumrind, 1991). Mothers with positive-interaction parenting display warmth and responsiveness that allows their child to be independent (Baumrind, 1966; 1991). They are involved with their child's activities and are engaged in positive reinforcement (e.g., celebrating their child's accomplishments). They also communicate

with their child on matters of conduct behaviour and the differences between good choices and bad choices. Consistently, research has shown that the warmth displayed by the mother positively predicts positive development in the child later in life (Schofield et al., 2012; Garcia & Garcia, 2009).

The degree and variability that a caregiver displays in positive-interaction parenting may be explained by differences in maternal characteristic such as education, support, and age. In the United States, teen mothers who completed higher education were more likely to be nurturing to their infants compared to those with lower education (Hess et al., 2002). Further, when Chinese immigrant mothers received support from the mother's parents and partner after childbirth, they were more likely to display a positive style of authoritative parenting with their young children (Cheah et al., 2009). Parenting style may also be explained by differences in age, where lower maternal age has shown to predict harsher and less supportive parenting with toddlers (Trentacosta et al., 2010; Scaramella et al., 2008; Bornstein et al., 2006). More specifically, teen mothers (19-years-old and under) are reckoned as being less positive, less supportive, and less accessible to their children compared to non-teen mothers (Reis, 1989; Trad, 1995; Phipps-Yonas, 1980; Lewin et al., 2013), lacking knowledge of their child's needs, and lacking emotional maturity to raise a child (Phipps-Yonas, 1980; Whiteside-Mansell et al., 1996) and therefore, deemed as being at greater risk for suboptimal parenting (Reis, 1989; Lewin et al., 2013). Conversely, non-teenaged mothers (20-years-old and older) are regarded as being more positive, more supportive, more able to meet the needs of their child, and being "capable" to parent (Reis, 1989). Furthermore, older mothers are known to provide warmth and sensitivity to their infants compared to younger mothers, after adjusting for various socio-economic factors (Bornstein et al., 2006).

Most literature to date is focused on the maternal parenting styles with no emphasis on advanced age mothers (35-years-old and older). There is a pressing need to examine this group as the number of advanced age mothers in Canada is increasing every year (Statistics Canada, 2015). Furthermore, advanced age mothers are different from teen and optimal age mothers (20-34 years-old), as they usually have higher education and higher income status (Bayrampour & Heaman, 2011) – both of which are known to influence parenting. Additionally, no research to date has compared the positive-interaction parenting style of teen, optimal age, and advanced age mothers in Canada. This study may help researchers, counselors, and mothers become acquainted with the key characteristics associated with positive-interaction parenting, which, in turn may contribute to healthy physical and emotional wellbeing of their children. Therefore, this study aims to examine if the level of positive-interaction parenting style differs among teen, optimal age, and advanced age mothers in Canada, and identifies the characteristics associated with this parenting style separately for each age group.

METHODS

Database

This study was a cross-sectional design and was based on the secondary analysis of the National Longitudinal Survey of Children and Youth (NLSCY), sponsored by a joint contribution of Statistics Canada and Human Resources and Skills Development Canada (HRSDC) (formerly Human Resources Development Canada). The NLSCY included data collected from infants 0-1 year of age until they turned 4-5 years in all provinces from 1994 to 2008. The survey included information on the child's biological, social, emotional, and behavioural development, and information on the parent/caregiver's demographic, social, economic, health, and environment. An interviewer administered the questionnaire using a

computer assisted interviewing technique. Participation to the survey was voluntary, and all variables were self-reported. The caregiver (also known as the person most knowledgeable – PMK) provided responses to the questions regarding the child. Rare populations, such as Aboriginals, those institutionalized, residents of the territories, and those who resided in remote areas of Canada were excluded from the study. Full description of the NLSCY is described elsewhere (Statistics Canada & HRSDC, 2009).

Study Sample

The study used data collected from years 2000 to 2008 (cycles 4 to 8). Cycles from earlier than 2000 were excluded because key variables used in the analyses were not consistently measured and changes implemented in cycle 4 were continued through subsequent cycles. The analysis was restricted to: the person most knowledge (PMK) being the biological mother of the child, primiparous, singleton live births, and living with infant/toddler (0-23 months-old) at the time of data collection.

Outcome Variable

The outcome variable was positive-interaction parenting measured by the *Positive-Interaction Parenting Scale*, analyzed as a continuous variable. The parenting scale in the NLSCY was adapted from Strayhorn and Weidman's Parenting Practices Scale (Strayhorn & Weidman, 1988), and measured positive parenting behaviours when the child was 0-23 months (Statistics Canada & HRSDC, 2009). Parents with "positive-interaction" parenting style would report more positive encounters with the child (e.g., praised them and laughed with them more). The total score ranged from 0-20, derived from five items, where a high score indicated a high degree of positive-interaction parenting style. This scale has shown to be valid and reliable

(Cronbach's $\alpha = 0.66-0.68$) and is described elsewhere (Statistics Canada & HRSDC, 2009) (see [Appendix E: Parenting Practice Scales](#) for full list of items).

Independent Variables

The independent variables were: *maternal socio-demographic* (actual age at childbirth, ever-landed immigrant status, currently married/with partner, rural-urban place of residence, highest level of education completed, self-reported household income in the last 12 months, and current work status); *maternal health and social* (perceived health status, depression, social support, family functioning, and devotion to religion in the last 12 months); and *child characteristics* (age, sex, use of child care, perceived health status, and temperament). The *data collection year* (survey cycle) was included in the analysis as a covariate. All independent variables were self-reported and were dichotomous/categorical except for age, income, depression, social support, family functioning, and temperament, which were continuous variables or scales. The *Centre for Epidemiological Studies-Depression scale* was a 12-item depression scale, which ranged from 0-36, where a high score indicated the presence of depressive symptoms (Cronbach $\alpha > 0.80$; Statistics Canada & HRSDC, 2009). Sample items include: "I could not shake the blues"; and "In the past week, I felt lonely" (see [Appendix C: Depression Scale](#)). The *Social Provisions Scale* was an 8-item social support scale, which ranged from 0-24, where a high score indicated presence of social support (Cronbach $\alpha > 0.89$; Statistics Canada & HRSDC, 2009). Sample items for social support include: "There is someone I trust whom I would turn to for advice if I were having problems"; "I feel part of a group of people who share my attitudes and beliefs" ([Appendix B: Social Provisions Scale](#)). The *Family Functioning Scale* was a 12-item family dysfunction scale, which ranged from 0-36 where a high score indicated presence of family dysfunction (Cronbach's $\alpha = 0.87$; Statistics Canada &

HRSDC, 2009). Sample items for family dysfunction include: “Making decisions is a problem for our family”; “Drinking is a source of tension or disagreement in our family”; and “We don’t get along well together” ([Appendix F: Family Functioning Scale](#)). Temperament was derived from a question on the overall degree of difficulty the child would present for the average parent, on a scale of 1 to 7 (1=very easy, 7=very difficult).

Statistical Analysis

Analyses were stratified for teen mothers (aged 15-19 years), optimal age mothers (aged 20-34 years) and advanced age mothers (aged 35 years and older). Means of positive-interaction parenting style were calculated for each age group. To assess the significant difference of the characteristics across the three age groups, ANOVA was conducted for continuous variables and chi-square test for categorical variables. Crude beta coefficients (β) and 95% confidence intervals (95% CI) were reported for bivariate analysis using simple linear regression for the outcome positive-interaction parenting. Adjusted (Adj) β and 95% CI were reported for the backward stepwise linear regression models, separately for each age group. Population weights were applied to estimate sample sizes, unadjusted beta coefficients, and adjusted beta coefficients. To account for the complex sampling design, bootstrapping was performed to calculate standard deviations, standard errors, and 95% confidence intervals. Population weights and bootstrap weights were all created by Statistics Canada and provided with the NLSCY data set. All analyses were performed using Stata (version 13.0 SE). Statistical significance for all analyses was set at $\alpha < 0.05$.

Ethics

The National Longitudinal Survey of Children and Youth (NLSCY) research protocol was reviewed by the Health Canada’s Science Advisory Board and Research Ethics Board and

the Federal Privacy Commissioner, and approved by the Statistics Canada's Policy Committee. Ethics approval was not needed as this was based on a secondary analysis of the NLSCY collected by Statistics Canada. Permission to access the NLSCY was obtained through submitting an application to the Social Sciences and Humanities Council of Canada. Access to the NLSCY database was obtained through the Research Data Centre in Toronto, approved by Social Sciences and Humanities Council of Canada ([Appendix A: Research Data Centre Approval Letter](#)).

RESULTS

The total weighted number of women reported in this study was 950,905 primiparous Canadian mothers (weighted using population weights) whose infant/toddler was 0-23 months of age at the time of interview. The sample included 53,409 teen mothers, 790,960 optimal age mothers, and 106,536 advanced age mothers. Teen, optimal age, and advanced age mothers reported similar levels of positive-interaction parenting style as shown in [Table 1](#) ($p=0.270$). Table 1 shows the estimated proportions of characteristics among all primiparous mothers with infants/toddlers 0-23 months old. Proportions in marital status across age groups significantly differed ($p<0.001$); only 52.2% of teen mothers reported being married or with a partner compared to optimal age and advanced age mothers whereby majority (>90%) reported having a partner. Only 9.7% of teen mothers were ever immigrants whereas, 17.6% of optimal age, and 30.0% of advanced age mothers were immigrants ($p<0.001$). A greater proportion of teen mothers reported obtaining a high school education or less (69.8%) whereas a greater proportion (>60%) of optimal and advanced age mothers reported obtaining postsecondary or partial university, with a larger proportion of advanced age mothers obtaining a bachelor degree or higher compared to optimal age mothers ($p<0.001$). Teen mothers scored higher on the

depression scale (5.62) than optimal (3.72) and advanced age mothers (3.89) ($p < 0.001$). Teen mothers reported the highest family dysfunction and lowest social support compared to optimal age and advanced age mothers ($p < 0.001$ and $p = 0.005$ respectively).

[Table 2](#) shows the results from simple linear regression and stepwise multivariable linear regression, with the unadjusted and adjusted beta coefficients (β) of positive-interaction parenting and related characteristics for each group. Among optimal age mothers, positive-interaction parenting was decreased with ever-landed immigrant status Adj $\beta = -0.42$ (95% CI -0.71, -0.14), and significantly increased with increasing education, after adjusting for other variables. Furthermore, depression Adj $\beta = -0.03$ (-0.05, -0.01), family functioning Adj $\beta = -0.05$ (-0.06, -0.03), and devotion to religion Adj $\beta = -0.19$ (-0.33, -0.04) were negatively associated with positive-interaction parenting in optimal age mothers after adjustment. Focusing on child characteristics in optimal age mothers, age of the infant/toddler and use of childcare were negatively significant with positive-interaction parenting. Among teen mothers, positive-interaction parenting significantly increased with improved health and significantly decreased with poor family functioning Adj $\beta = -0.05$ (-0.10, -0.01) after adjustment of variables. Among advanced age mothers, parenting significantly decreased with age of the infant/toddler, improved health, and depression, and significantly increased with social support Adj $\beta = 0.08$ (0.03, 0.13), after adjusting for other variables.

To estimate effect sizes, coefficients were re-scaled to standardized regression coefficients to provide some indication of the magnitude of these effects and compare their impact across groups. In teenage mothers, small effect sizes were observed for improved health (0.20), and family functioning (0.13). In optimal age mothers, among variables that were found to be significantly associated with positive-interaction parenting style, all indicated a

standardized regression coefficient of less than 0.20 in magnitude. In advanced age mothers, all variables that were found to be significant indicated a standardized regression coefficient of less than 0.20 in magnitude.

DISCUSSION

This study identified and compared the characteristics of positive-interaction parenting style among teen, optimal age, and advanced age mothers using a Canadian-wide dataset. There was no significant difference in the frequency of positive-interaction parenting style across the three age groups. However associated characteristics differed. Among optimal age mothers, positive-interaction parenting significantly increased with higher education, and decreased with ever-immigrants, depression, family function, devotion to religion, age of the child, and childcare use. Among teens, positive-interaction parenting significantly increased with improved health, and decreased with family functioning. Among advanced age mothers, positive-interaction parenting significantly increased with social support, and decreased with depression, improved health, and older infants/toddlers. These findings will be relevant to professionals working in counseling, family medicine, nursing, and public health, allowing them to identify the unique and overlapping characteristics that significantly predict positive-interaction parenting style in the three age groups of mothers.

Teen, optimal age, and advanced age mothers reported similar levels of positive-interaction parenting. This finding is inconsistent with previous studies whereby teen mothers were found to be harsher and display less positive parenting styles than older mothers who were generally more positive and warm toward their child (Lewin et al., 2013; Trentacosta et al., 2010; Bornstein et al., 2006; Reis, 1989). This was based on the premise that teen mothers lack emotional maturity and knowledge about the child (Phipps-Yonas, 1980; Whiteside-Mansell et al., 1996), thereby

not being able to positively interact with their children. A probable reason for the inconsistency with other studies is the difference in target population. This study assessed parenting when the infant/toddler was 0-23 months old, whereas others examined parenting styles when the child was older. All three groups may have similarly displayed high levels of positive-interaction parenting, as infants/toddlers have not yet reached the "age of understanding" (Ho, 1989), at which point, more of a disciplinary action may be imposed. Therefore, further investigation on parenting styles among the three age groups with older children in Canada is warranted.

No characteristic was found to be commonly significant across all three age groups. The characteristics uniquely associated with optimal age mothers were ever-landed immigrants, education, childcare use, and devotion to religion. Optimal age mothers who were ever-landed immigrants reported less positive-interaction parenting compared to non-immigrants. Similarly, another study found that immigrant mothers showed a harsher and punitive type of parenting compared to non-immigrants in the United Kingdom and Turkey (Daglar et al., 2011). It is understood that immigrants try to retain their traditional family values that may allow for more restrictive behaviour towards their children to protect them from "perceived" risk in an unfamiliar country (Querido, Warner, & Eyberg, 2002). In contrast, a study in the United States found that immigrant mothers reported warmer and intimate parenting styles compared to non-immigrants (Cheah et al., 2009; Jose et al., 2000; Chao, 1995). The inconsistencies found in these studies may be due to the cultural differences (i.e., Turkey versus United States), and different parenting scales used for assessment. Similarly, in other studies, positive-interaction parenting significantly increased with increasing education in optimal age mothers (Azad et al., 2014; Cheah et al., 2009; Belsky et al., 2006). Mothers with higher education (graduate or professional degrees) were more likely to display positive-interaction parenting, as they were

likely to have a better understanding of the importance of positive-interaction parenting on the social and cognitive development of children (Cheah et al., 2009; Azad et al., 2014; Belsky et al., 2006). On the other hand, positive-interaction parenting was associated with a decrease in childcare use. However, due to reverse causality and the lack of information on duration and quality of childcare use, further investigation is warranted to explore this relationship. Although some studies show that devotion to religion is associated with physical affection and praising of their children (Mahoney et al., 2001; 2010), our results show that being devoted to religion decreased positive-interaction parenting. In certain contexts, those who display stricter parenting hold stronger religious views about disciplinary actions such as setting limits and using corporal punishment for unacceptable behaviour (Mahoney et al., 2001; 2010).

Teen mothers were not found to have any characteristics uniquely associated with positive-interaction parenting. However, social support was uniquely associated with parenting among advanced age mothers. In general, social support promotes positive-interaction parenting by enhancing parents' psychological functioning (Lee et al., 2009; Jennings et al., 1991). Mothers with greater social support are more likely to display positive interactions with their children (Jennings et al., 1991), and are likely to report better parent-child involvement and communication (Lee et al., 2009). Similar results were produced in the United Kingdom where younger mothers exhibited lower rates of positive-interaction parenting compared to older mothers (Thomson et al., 2014).

Positive-interaction parenting style significantly decreased with family function in teen and optimal age mothers. Similarly, poor parenting was found to be associated with family dysfunction where it places children at risk for illnesses, substance misuse, and juvenile crime (Hoghughi, 1998). Improved health was found to be positively associated with parenting in teens

but negatively associated with parenting in advanced age mothers. Although the relationship of improved health and positive-interaction parenting in teens is well supported by another study (Torquati, 2002), the reason why this relationship is different for advanced age mothers warrants further investigation.

Optimal age and advanced age mothers were found to have positive-interaction parenting styles significantly decrease with depression. Previous studies have also shown a link between maternal depression and lower positive-interaction parenting (Azad et al., 2014; Lee et al., 2009; Parke et al., 2004). Depressed mothers are likely to be less engaged and show negative affect towards their children compared to non-depressed individuals (Lovejoy et al., 2000; Lee et al., 2009). Although it has been shown that mothers with older toddlers display more positive maternal behaviour (Nitz et al., 1995), our study showed that positive-interaction parenting decreased with older infants/toddlers. However, as infants/toddlers in our study have not yet reached the “age of understanding” (Ho, 1989), further investigation among children older than 23 months is warranted.

Limitations and Strengths

The results should be cautiously interpreted, as limitations are present. There is potential for reverse causality between the dependent and independent variables due to the cross-sectional nature of the study. Furthermore, information bias may be present as all variables were self-reported however, variables such as the positive-interaction parenting, social support, family functioning, and depression are validated measures that have been effectively used in other studies. Although our study explored numerous variables, other parenting-influenced characteristics such as the mother’s mental health, social skills, and attendance of parenting classes were not captured in the NLSCY, and thus not part of our analyses. The data used in this

study was collected from 2000-2008; therefore, it may not represent the current population. However, the survey weights applied to the data set allowed the sample to be generalizable at the population level that includes a standardized parenting scale and covers a comprehensive range of topics including health, behaviour, and social environment of the mother and her child.

CONCLUSION

Our study is novel in comparing the characteristics of positive-interaction parenting style among three age groups of mothers in Canada using a nation-wide dataset. All mothers reported similar levels of positive-interaction parenting however, unique characteristics associated with parenting were present. There were no common variables significant with parenting across the three groups however, improved health was the most thought-provoking finding in our study. Improved health predicted positive-interaction parenting differently for teen and advanced age mothers, advising readers to be mindful that maternal health may be an important contributor to parenting. The key to better understanding this relationship may lie within conducting further research with advanced age mothers as this area is still in its infancy. Our findings may have strong public health implications through information dissemination to first-time mothers, clinicians, researchers, and public health facilities. Targeting these audiences with information on how improved health may impact parenting differently based on maternal age may be one strategy to increase awareness. Further, the implications of this study may help the academic community to foster partnerships with policy-making bodies to inform evidence-based recommendations specific to health status and positive-interaction parenting.

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TABLES

Table 1: Characteristics of *positive-interaction* parenting style among primiparous teenage, optimal age, and advanced age mothers living with 0-23 month-old infants/toddlers

	Teenage Mothers N= 53,409	Optimal Age Mothers N= 790,960	Advanced Age Mothers N= 106,536	
	%	%	%	p-value*^b
Positive-Interaction Parenting				
Mean ^a (SE) ^b	18.14 (0.12)	18.27 (0.04)	18.40 (0.11)	0.270
Maternal Socio-Demographic Characteristics				
Mother's Age at Childbirth				
Mean ^a (SE) ^b	18.19 (0.07)	27.16 (0.08)	37.27 (0.11)	<0.001
Immigration to Canada				
No	90.3	82.4	70.0	<0.001
Yes	9.7	17.6	30.0	
Married/With Partner				
No	47.8	9.7	7.7	<0.001
Yes	52.2	90.3	92.3	
Place of Residence				
Rural	12.2	9.8	5.9	0.009
Urban	87.8	90.2	94.1	
Level of Education				
High school or less	69.8	16.4	7.5	<0.001
Postsec/Part University	30.2	65.1	64.2	
Bachelor or higher	N/A	18.5	28.3	
Household Income (\$1000's)				
Mean ^a (SE) ^b	32.46 (1.57)	70.59 (1.28)	89.86 (3.62)	<0.001
Work Status in Past Year				
No work in past year	47.7	31.7	27.4	<0.001
Worked part-time	28.8	17.7	16.3	
Worked full-time	23.5	50.6	56.3	

Maternal Health and Social Characteristics

Perceived Health Status

Good/Fair/Poor Health	35.8	22.1	24.7	<0.001
Improved Health	64.2	77.9	75.3	

Depression

Mean ^a (SE) ^b	5.62 (0.32)	3.72 (0.08)	3.89 (0.28)	<0.001
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Family Functioning

Mean ^a (SE) ^b	10.32 (0.31)	8.15 (0.10)	8.79 (0.33)	<0.001
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Social Support

Mean ^a (SE) ^b	17.88 (0.21)	19.11 (0.08)	18.92 (0.22)	0.005
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Devotion to Religion

Never attended	50.4	43.5	46.6	0.125
Partially/regularly attended	49.6	56.5	53.4	

Child Characteristics

Age of Child (Months)

Mean ^a (SE) ^b	13.56 (0.37)	13.04 (0.10)	13.53 (0.27)	0.254
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Sex of Child

Male	52.0	52.9	51.4	0.858
Female	48.0	47.1	48.6	

Use of Childcare

No	68.2	73.3	72.2	0.285
Yes	31.8	26.7	27.8	

Health Status of Child

Good/Fair/Poor Health	11.8	6.4	5.2	0.009
Improved Health	88.2	93.6	94.8	

Temperament

Mean ^a (SE) ^b	2.72 (0.51)	2.57 (0.14)	2.66 (0.35)	0.112
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Survey Data

Data Collection Year

Cycle 4 (2000-2001)	19.4	16.0	14.8	0.102
Cycle 5 (2002-2003)	21.0	17.0	20.4	
Cycle 6 (2004-2005)	22.5	19.6	18.3	

Cycle 7 (2006-2007)	18.7	24.5	20.4
Cycle 8 (2008-2009)	18.4	22.9	26.1

Values represent column percentages estimated using population weights, unless otherwise indicated.

*p-values <0.05 denote significance, and refer to between-subject groups.

^a Sample size and means are estimated using population weights.

^b Standard error values and between group p-values were calculated using bootstrap weights.

Table 2: Estimated unadjusted and adjusted beta coefficients of *positive-interaction parenting* and related characteristics among primiparous mothers with 0-23 month-old infants/toddler

	Teen Mothers N= 49,050		Optimal Age Mothers N= 748,683		Advanced Age Mothers N= 100,137	
	Unadjusted β^a (95% CI) ^b	Adjusted β^a (95% CI) ^b	Unadjusted β^a (95% CI) ^b	Adjusted β^a (95% CI) ^b	Unadjusted β^a (95% CI) ^b	Adjusted β^a (95% CI) ^b
<i>Maternal Socio-Demographic Characteristics</i>						
Age at Childbirth	0.11 (-0.10, 0.32)		0.02 (-0.001, 0.04)		-0.01 (-0.12, 0.10)	
Immigrant to Canada ¹	0.15 (-0.92, 1.21)		-0.53 (-0.83, -0.23)	-0.42 (-0.71, -0.14)	-0.30 (-0.87, 0.28)	
Married/With Partner ²	0.24 (-0.24, 0.71)		0.33 (-0.02, 0.68)		-0.17 (-0.69, 0.35)	
Urban Population ³	-0.06 (-0.70, 0.57)		-0.09 (-0.26, 0.08)		-0.29 (-0.83, 0.25)	
Postsec/Part Univ ⁴	0.13 (-0.40, 0.65)		0.35 (0.10, 0.61)	0.27 (0.02, 0.53)	-0.10 (-0.75, 0.55)	
Bachelor or higher ⁴	N/A		0.48 (0.19, 0.77)	0.39 (0.08, 0.71)	-0.14 (-0.83, 0.56)	
Household Income	0.01 (-0.003, 0.02)		0.002 (0.001, 0.004)		0.001 (-0.002, 0.004)	
Working Part-time ⁵	0.19 (-0.36, 0.75)	0.19 (-0.38, 0.77)	0.19 (-0.02, 0.40)	0.15 (-0.05, 0.36)	-0.39 (-1.07, 0.29)	
Working Full-time ⁵	-0.22 (-0.88, 0.45)	-0.31 (-0.96, 0.34)	-0.02 (-0.22, 0.18)	-0.09 (-0.29, 0.10)	-0.24 (-0.79, 0.31)	
<i>Maternal Health and Social Characteristics</i>						
Improved Health ⁶	0.86 (0.38, 1.34)	0.77 (0.22, 1.31)	0.15 (-0.02, 0.32)		-0.41 (-0.78, -0.03)	-0.62 (-1.04, -0.20)
Depression	-0.04 (-0.09, 0.01)		-0.05 (-0.07, -0.03)	-0.03 (-0.05, -0.01)	-0.07 (-0.13, -0.01)	-0.07 (-0.13, -0.01)
Family Functioning	-0.06 (-0.10, -0.01)	-0.05 (-0.10, -0.01)	-0.06 (-0.07, -0.04)	-0.05 (-0.06, -0.03)	-0.05 (-0.10, -0.01)	
Social Support	0.03 (-0.05, 0.11)		0.06 (0.04, 0.08)		0.08 (0.03, 0.14)	0.08 (0.03, 0.13)
Devoted to Religion ⁸	0.27 (-0.21, 0.75)		-0.20 (-0.35, -0.04)	-0.19 (-0.33, -0.04)	-0.28 (-0.69, 0.13)	
<i>Child Characteristics</i>						
Age (months)	-0.05 (-0.10, 0.01)		-0.04 (-0.05, -0.02)	-0.03 (-0.05, -0.01)	-0.06 (-0.09, -0.02)	-0.05 (-0.09, -0.01)

Female ⁹	-0.46 (-0.92, -0.01)	-0.02 (-0.18, 0.14)		-0.34 (-0.76, 0.09)
Used Child Care ⁷	-0.04 (-0.56, 0.48)	-0.26 (-0.42, -0.09)	-0.29 (-0.48, -0.10)	-0.30 (-0.71, 0.11)
Improved Health ⁶	0.34 (-0.66, 1.33)	0.44 (0.08, 0.79)		0.59 (-0.54, 1.72)
Overall Temperament	0.01 (-0.14, 0.17)	0.01 (-0.0003, 0.01)		-0.002 (-0.09, 0.08) -0.003 (-0.08, 0.07)
Survey Data				
Cycle 5 ¹⁰	0.24 (-0.31, 0.80)	0.28 (0.11, 0.46)	0.35 (0.12, 0.59)	0.23 (-0.27, 0.73)
Cycle 6 ¹⁰	-0.29 (-0.94, 0.36)	-0.09 (-0.28, 0.10)	0.05 (-0.20, 0.30)	0.15 (-0.30, 0.60)
Cycle 7 ¹⁰	-0.30 (-1.07, 0.46)	-0.13 (-0.35, 0.10)	-0.12 (-0.43, 0.19)	-0.18 (-0.87, 0.51)
Cycle 8 ¹⁰	0.29 (-0.18, 0.76)	0.12 (-0.05, 0.30)	0.05 (-0.20, 0.31)	-0.27 (-0.71, 0.17)

Values represent unstandardized beta coefficients and 95% confidence intervals in parentheses estimated using population weights.

N/A = Not Available due to small sample size

a Sample size and beta coefficients were estimated using population weights

b 95% Confidence Interval (95%CI) and standard error values were calculated using bootstrap weights

¹Reference category: Non-immigrants- Canadian born; ²Reference: non-married; ³Reference: rural population; ⁴Reference: High school or less; ⁵Reference: Not working; ⁶Reference: Good/Fair/Poor health status; ⁷Reference: No child care used; ⁸Reference: No devotion to religion; ⁹Reference: Male ¹⁰Reference: Cycle 4 (2000-2001)

CHAPTER FOUR: Investigating Pathways to Behavioural Problems in Children of Teenage, Optimal Age, and Advanced Age Mothers in Canada: A Longitudinal Analysis

SUMMARY

Background: Behavioural problems in the first five years of life can lead to long-term problems and may have adverse effects on families, school, and the child's well-being. The objective was to investigate three comprehensive models to explore the longitudinal pathways that lead to behavioural problems in children of teen, optimal age, and advanced age mothers in Canada.

Methods: This was a longitudinal analysis of the National Longitudinal Survey of Children and Youth. Mothers were grouped into: teen (15-19 years), optimal age (20-34 years), and advanced age (35+ years). Using Bronfenbrenner's theoretical framework, behavioural problems were the outcome measured when the child became 4-5 years old. The predictors examined when the child was 0-1-year-old, and 2-3 years old and were fitted within the systemic levels of the framework. Structural equation modeling was performed separately for each age group.

Results: A total of 4,787 mothers were analyzed. In all models, neighbourhood quality significantly predicted socioeconomic status (SES), and SES significantly predicted depression. In the teen mother group, only greater depression significantly predicted greater behavioural problems for the child ($p=0.038$). In the optimal age group, greater depression significantly predicted greater child behavioural problems ($p<0.001$); and parenting significantly predicted lower child behavioural problems ($p<0.001$). In the advanced age group, only parenting significantly predicted lower behavioural problems ($p=0.005$).

Conclusion: The pathways from depression and parenting to the behavioural problems differed among the groups. Our results highlight the importance of developing targeted interventions to reduce behavioural problems in children separately by maternal age.

INTRODUCTION

Behavioural problems such as emotional-anxiety, hyperactivity-inattention, and aggression occurring in the first five years of life can continue during school-age years and adolescence (Polou, 2015). This may lead to consequences such as delinquency, violence and substance use later in life (Poulou, 2015; Bongers et al., 2004; Campbell, 1995; King et al., 2004), and have substantial adverse effects on families, school, and the child's well-being (Atzaba-Poria et al., 2004). Predictors of behavioural problems in childhood are wide-ranging: from socioeconomic factors, such as maternal employment, income, neighbourhood quality; to home environment factors such as parenting, family functioning, and maternal depression (Zachrisson & Dearing, 2015; Duncan & Magnuson, 2005; Campbell, 1995; Azad et al., 2014; Bagner et al., 2010). Mothers' transition into unemployment status has been associated with an increase in child behavioural problems (Zachrisson & Dearing, 2015). Links between low household income and child's behavioural development are reported (Duncan et al., 1998), and are further supported by the claim that the hardships of living in a low-income household is found to be intricately linked to low quality neighbourhoods (Duncan & Magnuson, 2005). These socioeconomic factors are found to interact with the home environment, more specifically, parenting style, family functioning, and maternal depression (Campbell, 1995; Azad et al., 2014; Bagner et al., 2010). For example, low-income mothers who live in lower-class neighbourhoods are likely to implement a stricter/harsher parenting approach to protect their child from harmful social influences (Azad et al., 2014; Reese, 2002; Wagner et al., 2008), and are correlated with the development of behavioural problems in children (Gutman et al., 2005; Nomura et al., 2002; Tremblay et al., 2004). Furthermore, children from dysfunctional families are likely to have high levels of physical aggression (Tremblay et al., 2004), and correlated with the development of

anxiety and hyperactivity in children (Crea et al., 2015; Cussen et al., 2012). Maternal depression, which may disrupt the mother-child interaction (Beck, 1998), has been shown to also be a relevant contributor to child behavioural problems (Bagner et al., 2010; Trapolini et al., 2007; Edwards and Hans, 2015).

Research shows that these risk factors can influence behavioural problems in children both directly and indirectly. However, it is known that risk factors do not act alone rather, interact in complex relations with other risk factors in a cumulative fashion. Deater-Deckard et al (1998) found that risk factors from four different domains (e.g., child characteristics, sociocultural, and parenting) uniquely predicted behavioural problems later in childhood. Furthermore, studies have demonstrated that behavioural problems in children can be predicted using a theoretical model as a framework to guide their research. For example, Parke and colleagues (2004) used the family stress model to find pathways that lead to child problems. They found that maternal depression affected maternal hostile parenting, but did not find any significant association to child problems (Parke et al., 2004). Atazaba-Poria and colleagues (2004) used Bronfenbrenner's model as a framework and found that microsystem factors such as family style and parenting style, and exosystem factors such as job influence on other aspects of life were predictive of behavioural problems in children.

Research has shown that medical risks around pregnancy and childbirth are more common in teen mothers (under 19 years) and advanced age mothers (over 35 years) than optimal age mothers (20-34 years) (Ventura et al., 2012; Berkowitz et al., 1990; Gilbert, Nesbitt & Danielson, 1999; Nybo Andersen et al., 2000). There are also behavioural differences noted according to maternal age. Teen mothers usually seek less prenatal care, are healthier on average (Bornstein et al., 2006), found to be less verbal, less sensitive and responsive to their child

(Barratt & Roach, 1995), and their parenting styles are found to be associated with less skilled childrearing and poorer environments (Bornstein et al., 2006). On the other hand, older mothers (not necessarily advanced age) begin prenatal care earlier, are more likely to follow a healthy diet, and abstain from illicit substances during pregnancy (Bornstein et al., 2006). They also tend to be more experienced and knowledgeable, and are likely to have financial stability (Bornstein et al., 2006). Older mothers tend to interact with their children in more positive, stimulating, sensitive, and verbal ways (Bornstein et al., 2006). As older mothers delay their first births, they are usually found to lack the capacity to meet the demands of parenting due to the decline in physical fitness and health (Mirowsky, 2002). Due to these differences in medical risks and behaviours, there can also be differences in how this affects child outcomes.

Understanding the early predictors of behavioural problems is important to prevent more consequential problematic behaviours occurring later in life. As the age range of first-time mothers is increasing, especially the advanced age group (Statistics Canada, 2015), the importance of incorporating maternal age in studies related to child development is greatly emphasized (Bornstein et al., 2006). The differences in medical risks and behaviours examined by maternal age motivated us to explore the predictors of behavioural problems in children of teen, optimal age, and advanced age mothers, as it remains unanswered in the Canadian context. Furthermore, there have been no studies that longitudinally explore the early predictors of behavioural problems in children at preschool age, segmented by maternal age groups. Studies have also reported the lack of guidance from theoretical frameworks such as Bronfenbrenner's ecological model (1979) to find pathways leading to these behavioural problems. Therefore, the purpose of this study was to investigate three separate comprehensive models guided by Bronfenbrenner's ecological theory to explore the longitudinal pathways that lead to behavioural

problems in 4-5-year-old children of teen, optimal age, and advanced age mothers. Exploring these models will give researchers and policy makers a better understanding of the significant interactions that contribute to child behavioural problems and lay the foundation for future models that examine other childhood adversities.

Bronfenbrenner's Ecological Theory

Bronfenbrenner's ecological theory (1979) posits that child development occurs as a result of involvement in progressively complex, reciprocal interactions with people in the individual's immediate and extended environment. These interactions are systematically arranged at the systems level: microsystem, mesosystem, macrosystem, and exosystem (Bronfenbrenner & Morris, 1998; Bronfenbrenner, 1979). The child exists within the microsystem and is at the core of these environmental influences that are most directly influential on the outcome. The layers that surround the individual (i.e., mesosystem, macrosystem and exosystem) are indirectly associated with the outcome. The direct interactions between the individual child and the immediate setting define the *microsystem*. For example, maternal parenting style creates the setting for the child to directly experience the most intimate lessons and relations with his/her mother. The interaction of two or more microsystems is the *mesosystem*, and can also affect the child directly. Perhaps, arguments that arise in the home may give the child conflicting ideals on family cohesiveness, and thus hinder the child's growth in different channels. The *macrosystem* usually evolves over time as future generations change, and describes the culture in which the child lives. A child who was raised by parents who do not work may have constant interactions with his/her parents that will affect how the child will grow as an individual. The *exosystem* is the larger social environment in which the child lives in but does not have direct interactions with. It includes structures that may influence the child's

development by interacting with the microsystem and mesosystem. For instance, the neighbourhood quality may indirectly influence the child's development without the child ever physically being in these places, as it may influence the mother's behaviour in how she chooses to raise her child. Overall, Bronfenbrenner's theory defines the behavioural outcome in terms of the direct and indirect interactions between the factors embedded in the system levels of the child's ecology. The ecological systems theory has been used in other areas of research around child development such as developmental risk (Garbarino & Ganzel, 2000), effects of poverty, (Eamon, 2001), obesity (Birch & Ventura, 2009), and behavioural problems (Atazaba-Poria et al., 2004). However, to date, applying the ecological theory on behavioural problems in children of teen, optimal age, and advanced age mothers in Canada are non-existent. Applying this theory that comprises of multilevel systems to identify the pathways to child behavioural problems will only strengthen our understanding in this field.

Bronfenbrenner (1979) states that development occurs as a result of participating in the complex interactions with people in the individual's immediate environment. Bronfenbrenner's ecological theory emphasizes the importance to consider the effects of immediate settings of the child (e.g., home environment) on later behavioural development, and how these settings are dependent on contexts (e.g., SES, depression) and timing. Therefore, the variables that were selected for this study included parenting, family functioning, maternal depression, socioeconomic status, and neighbourhood quality at different time points because these have been well documented as relationships that make up the ecology of the child's behavioural problems.

METHODS

Database

This study was a longitudinal design and was based on the secondary data analysis of the National Longitudinal Survey of Children and Youth (NLSCY), sponsored by a joint contribution of Statistics Canada and Human Resources and Skills Development Canada (HRSDC) (formerly Human Resources Development Canada). The NLSCY includes longitudinal data collected at different cycles (every two years) from infants 0-1 year of age until they turned 4-5 years in all provinces from 1994 to 2008. The survey included information on the child's biological, social, emotional, and behavioural development, and information on the parent/caregiver's demographic, social, economic, health, and environment. An interviewer administered the questionnaire using a computer assisted interviewing technique. Participation in the survey was voluntary, and all variables were self-reported. The caregiver (also known as the person most knowledgeable – PMK) provided responses to the questions regarding the child. Rare populations, such as those institutionalized, residents of the territories, and those who resided in remote areas of Canada were excluded from the study. Full description of the NLSCY is described elsewhere (Statistics Canada & HRSDC, 2009).

Study Sample

The study used longitudinal data collected from years 1998 to 2008 (cycles 3-8). Cycles from earlier than 1998 were excluded because key variables used in the analyses were not consistently measured and changes starting in cycle 3 were made and kept for subsequent cycles. The analysis was restricted to: PMK being the biological mother of the child, primiparous, singleton live births, and living with the child at the time of data collection.

Applying the Theoretical Framework

Bronfenbrenner's theoretical framework was used with, an index of behavioural problems as the main outcome measured at the individual level when the child became 4-5 years of age. The predictors were examined longitudinally and were fitted within each of the systematic levels of the framework. The microsystem/mesosystem consisted of parenting behaviour, family functioning, and maternal depression, which were measured when the child was 2-3 years of age. The macrosystem included socio-economic status, measured when the child was 2-3 years of age, and the exosystem comprised of neighbourhood safety, measured when the child was 0-1 year old.

Measures at the Individual Level (Child at 4-5 years of age – Time 3)

The Child Behavioural Checklist (CBCL) was used to assess the adverse outcome (behavioural problem) at the individual level, among children at 4-5 years of age. The CBCL is a reliable psychometric assessment tool derived from Achenbach's Child Behavioural Checklist, which corresponds to behavioural disorders as identified by the Diagnostic and Statistical Manual of Mental Disorders (Achenbach & Rescorla, 2000). Four behavioural outcomes were assessed (Statistics Canada and Human Resources and Skills Development Canada (HRSDC), 2009): *Emotional Disorder-Anxiety* (total score ranges from 0-14, Cronbach's $\alpha=0.69$), *Indirect Aggression* (total score ranges from 0-10, Cronbach's $\alpha=0.63$), *Physical Aggression* (total score ranges from 0-12, Cronbach's $\alpha=0.77$), and *Hyperactivity-Inattention* (total score ranges from 0-14, Cronbach's $\alpha=0.81$). All items are rated as never or not true (score of 0), sometimes or somewhat true (score of 1), or often or very true (score of 2). Total scores were given for each outcome where a high score indicates the presence of the behavioural outcome to a high degree (Statistics Canada and HRSDC, 2009) ([Appendix G: Child Behaviour Checklist](#)).

Measures at the Microsystem/Mesosystem Levels (Child at 2-3 years of age – Time 2)

Parenting behaviour was indexed by the NLSCY parenting scale adapted from Strayhorn and Weidman's Parenting Practices Scale, which is comprised of four scales (Statistics Canada & HRSDC, 2009): *Hostile/ineffective parenting* measures adequate encounters with the child - e.g., annoyed at the child more, angered at the child more often (total score ranges from 0-28, Cronbach's $\alpha=0.63$); *Positive interaction parenting* measures having more positive encounters with the child - e.g., laughed with them more and praised them more (total score ranges from 0-20, Cronbach's $\alpha=0.68$); *Consistency parenting* measures how often and consistent disciplinary actions are implemented to the child - e.g., how often the child is able to get out of punishment, how often the child ignores the disciplinary punishment (total score ranges from 0-20, Cronbach's $\alpha=0.65$); and *Rational parenting* measures how often discussions or punishments are raised when the child breaks the rules or does things that he/she is not supposed to - e.g., how often the problem is calmly discussed with the child when he/she breaks the rules, how often physical punishment is used when he/she breaks the rules (total score ranges from 0-16, Cronbach's $\alpha=0.53$). Total scores were given for each outcome where a high score indicates the presence of the respective parenting style to a high degree (Statistics Canada and HRSDC, 2009) ([Appendix E: Parenting Practice Scales](#)).

Family functioning was defined using the 12-item *Family Functioning Scale* derived from the McMaster Family Assessment Device. This scale measures various aspects of family functioning such as problem solving, communication, involvement, and responsiveness. The total score ranges from 0 to 36, where a higher score indicates family dysfunction (Cronbach's $\alpha=0.92$; Statistics Canada and HRSDC, 2009) ([Appendix F: Family Functioning Scale](#)).

Maternal depression was indexed by an abbreviated version of the *Centre for Epidemiological Studies-Depression (CES-D)* Scale in the NLSCY. Maternal depression total score ranges from 0 to 36, where a high score indicates the presence of depression symptoms (Cronbach's $\alpha=0.82$; Statistics Canada and HRSDC, 2009) ([Appendix C: Depression Scale](#)).

Measures at the Macrosystem Level (Child at 2-3 years of age – Time 2)

Socioeconomic status (SES) was created as a latent variable indexed by estimated household income and number of job working hours per week. The total working hours ranges from 0 to 80 hours.

Measures at the Exosystem Level (Child at 0-23 months of age – Time 1)

Neighbourhood quality scores were based on a revised version of the Simcha-Fagan *Neighborhood Questionnaire*. Neighbourhood quality gathers information about the satisfaction with the neighbourhood as a place to raise children, including perception of the extent of danger, problems, and social cohesion or neighbourliness. The total score ranges from 0 to 15, where a higher score indicates a high degree of neighbor cohesiveness (Cronbach's $\alpha=0.91$; Statistics Canada and HRSDC, 2009) ([Appendix H: Neighbourhood Quality Scale](#)).

Statistical Analysis

Means and standard deviations for each predictor with associated p-values computed from ANOVA for the comparison across groups were reported for each covariate of interest. Three structural equation models (SEM) were used to test models for the outcome, behavioural problems combined of children of teen mothers (15-19 years), children of optimal age (20-34 years), and children of advanced age (35+ years) mothers respectively. Only paths that made theoretical sense were added. Although removing non-significant paths improved the fit indices, to keep theoretical paths, these predictors remained in the model. Unstandardized beta

coefficients and confidence intervals were reported for the SEM pathways. The fit statistics reported were the chi-square index, Composition Fit Index (CFI), Standardized Root Mean Residual (SRMR), and Root-Mean-Square Error of Approximation (RMSEA). The CFI fit index values should be greater than 0.90, and preferably greater than 0.95 to consider the fit of a model to data to be acceptable, but is sensitive to non-significant paths (Bentler, 1990). The SRMR value ≤ 0.05 is considered an acceptable fit, but sensitive to non-significant paths. The RMSEA is an absolute index of fit, where values under 0.05 indicate close fit to the data, values between 0.05 and 0.08 represent reasonable fit, values between 0.08 and 0.10 reflect poor fit, and values greater than 0.10 are unacceptable (Browne & Cudeck, 1993). All analyses were completed using STATA (Version SE 13.0).

RESULTS

The initial sample size was 16,000 women; of which, 13,846 women reported being biological mothers of the child, and 4,787 women were primiparous mothers with singleton births. The final sample analyze were: 361 were teen mothers, 3,985 were optimal age mothers, and 441 were advanced age mothers. Summary characteristics are presented in [Table 1](#). On average, children reported a mean (M) of 2.19 ($SD=1.93$) on emotional-anxiety scale, $M=4.28$ ($SD=2.70$) on the hyperactivity-inattention scale, $M=1.34$ ($SD=1.80$) on the physical aggression scale, and $M=0.44$ ($SD=0.94$) on the indirect aggression scale. Children of teen mothers were found to have significantly higher levels of hyperactivity-inattention than children of optimal age and advanced age mothers ($p<0.001$ for both), significantly higher level of indirect aggression than children of optimal age mothers ($p=0.026$), and significantly higher level of physical aggression than children of advanced age mothers ($p=0.003$). Children of teen mothers were found to have significantly lower level of emotional-anxiety compared to children of optimal age

mothers ($M=1.97$, $SD=1.89$; $M=2.22$, $SD=1.96$; respectively, $p=0.048$) but significant differences were not found compared to children of advanced age mothers. Children of advanced age mothers were found to have the lowest levels of hyperactivity-inattention, physical aggression, and indirect aggression. However, the child behavioural problem differences between children of advanced age and optimal age mothers were not significant. On average, advanced age mothers worked more hours per week compared to optimal age and teen mothers, who reported the lowest hours worked per week ($p<0.001$). There were significant differences reported in the quality of neighbourhood, where advanced age mothers lived in neighbourhoods with more cohesiveness compared to other groups ($p<0.001$). Teen mothers reported the highest level of depression compared to advanced age mothers and optimal age mothers ($p<0.001$). Teen mothers reported to have the highest level of family dysfunction, followed by advanced age mothers and optimal age mothers ($p<0.001$). With parenting styles, only consistency parenting differed – where, advanced age mothers had the highest level of consistency parenting followed by optimal age and teen mothers ($p<0.001$).

The SEM path diagrams are shown in [Figures 1-3](#). The outcome, behavioural problems is a latent factor with four factor loadings (emotional-anxiety, indirect aggression, physical aggression, and hyperactivity-inattention). In all three groups, neighbourhood quality significantly predicted SES, and SES significantly predicted depression. Among optimal age mothers, SES also significantly predicted parenting behaviour but this was not observed in the teen and advanced age groups. The pathways from the microsystem differed among the three groups. In the optimal age mother group, depression and parenting behaviour were both found to have significant direct effects for child behavioural problems. Specifically, greater depression resulted in greater likelihood of child behavioural problems (unstandardized paths 0.027

($SE=0.006$), $p<0.001$); and parenting resulted in lower behavioural problems in the child (unstandardized paths -1.045 ($SE=0.145$), $p<0.001$). In the teen mother group, only greater depression resulted in greater behavioural problems for the child (unstandardized paths 0.037 ($SE=0.018$), $p=0.038$). In the advanced age group, only parenting predicted lower behavioural problems but did not have any significant indirect effects (unstandardized paths -0.496 ($SE=0.174$), $p=0.005$). The SEM summary of fit indices is presented in [Table 2](#). Generally, all three models resulted in a good fit. Removal of non-significant pathways was not considered, given the confirmatory nature of the analyses to keep theoretical paths. The model for children of teen mothers indicated a close fit to the data; however, the model for optimal age group indicated a slightly closer fit (RMSEA= 0.049 and 0.048 , respectively). The model for children of advanced age mothers represented a reasonable fit (RMSEA= 0.055).

DISCUSSION

The purpose of this study was to investigate the pathways leading to the child's behavioural problems at age 4-5 years, by analyzing a comprehensive model separately for children of teen, optimal age, and advanced age mothers, guided by Bronfenbrenner's ecological theory. Overall, children of teen mothers had a significantly higher risk for hyperactivity-inattention, physical aggression, and indirect aggression; and children of advanced age mothers were at the least risk. Greater maternal depression significantly predicted increase in behavioural problems for children of optimal age and teen mothers; and parenting directly predicted lower behavioural problems in children of optimal and advanced age mothers. In addition, neighbourhood quality indirectly predicted behavioural problems mediated by SES and depression only among children of teen and optimal age groups. The findings contribute to the

underdeveloped understanding of behavioural problems, especially among children of advanced age mothers in Canada.

Children of teens were at most risk for hyperactivity-inattention, physical aggression, and indirect aggression than children of optimal age and advanced age mothers, while children of advanced age mothers were at the least risk for these behavioural problems. This is consistent with other studies where children of teen mothers were found to be at greater risk for problem behaviours (Coyne et al., 2013; Lipman et al., 2011; Fergusson & Woodward, 1999). Teens are more likely to come from a lower SES and education, which has significant associations with behavioural problems in children (Duncan & Magnuson, 2005). Children of advanced age mothers showed the least risk for behavioural problems in our study. A recent study also found that older maternal age was predictive of less frequent behavioural problems (Vafai et al., 2016), but the results were based on infants 18 months of age. This may be based on the surmise that advanced age mothers are more likely to be well-educated, hold better jobs which have shown to be significantly related to higher levels of positive parenting (Azad et al., 2014) that benefits children.

The common pathway leading to behavioural problems for all groups was the indirect pathway from neighbourhood quality to SES to depression. Neighbourhood had a significant impact on low-SES and thus predicted the parenting practices of the mother similar to other findings (Azad et al., 2014). Research suggests that economic adversity puts families at risk, (Emerson & Hatton, 2007), and such exposure to adverse SES may account for most or all of the risk of poorer mental health (such as depression) among mothers (Emerson et al., 2006).

Children of teen mothers had one significant pathway to behavioural problems using Bronfenbrenner's ecological theory. Depression was a direct effect and a mediator for SES and

behavioural problems for this group. This is not surprising, as depressive symptoms may influence the mother-child interaction (Beck, 1998), which leads to behavioural problems in the child as found in other studies (Bagner et al., 2010; Trapolini et al., 2007; Edwards and Hans, 2015). In many of these studies, the context driving the relationship between depression and child behaviours were not explored (i.e., maternal age, parenting, family functioning). This study adds to the literature as it confirms the significant pathway from depression to behavioural problems while considering these missing relationships. However, parenting did not significantly predict child behaviour problems in the teen group. It is speculated that maternal parenting may not be an important contributor for this group rather; it may be the grandmother's parenting that has a more profound impact on behavioural problems. Teen mothers are usually single, and likely to live with their own mothers, and have shown to remain dependent on their own mothers for support to raise their child (Figueiredo et al., 2006; Cooley & Unger, 1991).

Children of advanced age mothers did not have a significant pathway to behavioural problems that was explained using Bronfenbrenner's ecological theory. Parenting was the only significant factor that directly predicted behavioural problems in children of advanced age mothers but this was not preceded by any other variables in the model. Literature has also shown that the development of anxiety and hyperactivity in children were predicted by parenting (Gutman et al., 2005; Nomura et al., 2002). However, in these studies, parenting was not observed as part of the child's microsystem, and advanced maternal age was not considered. Although there seems to be a "disconnect" within the mesosystem/microsystem (more specifically, from depression to other variables), this does not mitigate the importance of addressing advanced age mothers who are experiencing depressive symptoms. The lack of

significance found in the pathway between depression and behaviour in children of advanced age mothers warrant investigation.

The pathways that predicted behavioural problems in children of optimal age mothers involved both maternal depression and parenting. Increase in maternal depression affected parenting negatively, which led to lower behavioural problems in the child. Unsafe living conditions and stress caused by economic hardship may lead to insensitive parenting, which in turn is associated with less favourable emotional outcomes for the typical developing child (McLoyd, 1998). A study in the United States using structural equation modeling has also shown that maternal depression significantly predicted parenting, but did not show any significant pathways leading to child adjustment problems (Parke et al., 2004). Although our significant pathways to behavioural problems involving depression and parenting are inconsistent with the other study, the inconsistency may be due to how parenting was measured (e.g., only hostile parenting was measured in the other study). Furthermore, in the other study, it was speculated that the mothers supported their husband's parenting practice, which was found to predict child outcomes (Parke et al., 2004). It was concluded that maternal parenting only had an indirect influence on the child through high correlation between maternal and paternal parenting practice (Parke et al., 2004).

The pathway leading to family dysfunction did not significantly predict behavioural problems. This differed from previous findings where family dysfunction was found to have a significant impact on children's behavioural problems (Henry et al., 2014; Parke et al., 2004), and where the development of anxiety and hyperactivity in children were correlated with low levels of family cohesion (Holmes et al., 1999). It is suggested that when other factors are simultaneously accounted for in the child's immediate setting (e.g., parenting), it may minimize

or obliterate the negative effects of family dysfunction on the child's behaviour. However, as this relationship was not observed, further investigation is warranted on the pathways leading to family dysfunction.

Limitations and Strengths

This study had few limitations which should be cautiously interpreted. This focused on Bronfenbrenner's theory however, it is recognized that other theoretical models or factors may have been suggested as important predictors of child behavioural problems (e.g., child care/nursery experience). There is a possibility that due to the small sample size, significant relationship between parenting and child behaviour was not found among children of teen mothers, and as such, this needs to be cautiously interpreted, as the lack of significance in this pathway does not negate the importance of teen parenting in predicting child behaviour problems. Furthermore, teen mothers analyzed in this study may not have been representative of all teen mothers, especially those who are at high-risk – for example, those institutionalized, Aboriginal, and incarcerated are found to have higher prevalence of high-risk teen pregnancies – and unfortunately, these populations were excluded from analyses as the NLSCY did not capture their data. Additionally, there may have been information bias – i.e., mothers may have under or over-reported child behaviour and parenting behaviour items therefore, future studies could include observational studies examining parent-child relationships through video-recordings to mitigate this bias. Other aspects such as the onset of maternal depressive symptoms may be pertinent to its association to behavioural problems, which may have had an influence in children of advanced age mothers. Paternal factors may also have been important factors that predict child behaviour but due to the nature of this study (i.e., secondary data analysis), these were not captured. The models could be improved with the outcome, child behavioural problems being

split into externalizing (physical aggression and hyperactivity-inattention) and internalizing behaviours (indirect aggression and emotional-anxiety), as the pathways leading to these may differ. The data used in this study dates from 2000-2008, therefore it may not fully represent the current Canadian population however, it is the first and only population-based Canadian longitudinal survey that covers a comprehensive range of topics including health, behaviour, and social environment of the mother and her child. Furthermore, the longitudinal design and the application of Bronfenbrenner's theory have enormously strengthened this research.

CONCLUSION

Our study applied Bronfenbrenner's ecological theory to determine the significant pathways to behavioural problems in three separate groups: children of teen, optimal age, and advanced age mothers in Canada. The pathways from the mesosystem/microsystem to the behavioural problems differed among the three groups. For children of teen mothers, greater depression increased the child's behavioural problems; whereas, for children of advanced age mothers, parenting decreased the child's behavioural problems. The key to better understanding these pathways, especially the "disconnected" pathway in children of advanced age mothers, may lie within conducting further research with this group as this area is still in its infancy. Our findings highlight the importance of developing targeted interventions to address behavioural problems in children of teen, optimal age, and advanced age mothers, with a focus on its influence later in their adolescence and adulthood. Further, the findings here would educate social workers, healthcare providers, and the academic community to transcend the usual care provided in our community, allowing them to move forward with interventions (for example, home visiting), to address behavioural problems in children.

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TABLES

Table 1: Differences in predictors and child behavioural problems of teen mother, optimal age, and advanced age mothers

	Teenage Mothers N=361	Optimal Age Mothers N=3985	Advanced Age Mothers N=441	
	Mean (SD)	Mean (SD)	Mean (SD)	P- value*
Maternal Age (Years)	18.12 (0.97)	26.86 (3.81)	37.14 (2.12)	<0.001
<i>Exosystem</i>				
Neighbourhood Quality	9.34 (2.80)	10.30 (2.44)	10.50 (2.25)	<0.001
<i>Macrosystem</i>				
Household Income (\$1,000s)	32.38 (24.06)	89.20 (503.00)	84.91 (67.83)	0.0903
Working Hours	17.45 (16.43)	21.77 (16.57)	24.34 (16.44)	<0.001
<i>Mesosystem</i>				
Depression	5.69 (5.51)	4.09 (4.73)	4.19 (4.78)	<0.001
Family Functioning	9.67 (5.08)	8.39 (5.01)	9.02 (5.38)	<0.001
<i>Microsystem</i>				
Hostile Ineffective parenting	9.02 (3.72)	8.74 (3.32)	8.56 (3.14)	0.1812
Positive Interaction parenting	16.95 (2.18)	17.13 (2.02)	17.04 (2.21)	0.2417
Consistency parenting	14.19 (3.31)	15.35 (3.09)	15.39 (3.14)	<0.001
Rational parenting	6.24 (2.84)	6.14 (2.93)	5.99 (2.97)	0.4852
<i>Child Outcome</i>				
Emotional-Anxiety	1.97 (1.89)	2.22 (1.96)	2.07 (1.70)	0.0242
Indirect Aggression	0.57 (1.19)	0.43 (0.91)	0.42 (1.00)	<0.001
Physical Aggression	1.57 (2.10)	1.34 (1.79)	1.14 (1.62)	0.0050
Hyper-Inattention	4.96 (2.86)	4.24 (2.70)	4.16 (2.53)	<0.001

N=number of subjects

SD = standard deviation

*p-values were derived from f-test ANOVA

Table 2: Summary of fit indices for the structural equation modeling analyses for ecological model testing, by maternal age

	Teenage Mothers	Optimal Age Mothers	Advanced Age Mothers
	Model	Model	Model
	N=229	N=2660	N=281
$X^2(df)$, p value^a	$X^2(59) = 90.80, 0.005$	$X^2(59) = 417.06, <0.001$	$X^2(59) = 108.83, <0.001$
RMSEA (90%CI), p value^b	0.049 (0.027, 0.068), 0.529	0.048 (0.044, 0.052), 0.796	0.055 (0.038, 0.071), 0.296
CFI^c/SRMR^d	0.90/0.05	0.88/0.03	0.85/0.06

df = degrees of freedom, *RMSEA* = root mean square error of approximation, *CI* = confidence interval, *CFI* = comparative fit index, *SRMR* = standardized root mean square residual

^a p-value ≥ 0.15 is indicative of a good fit but highly affected by sample size and complexity

^b RMSEA upper 90%CI of less than 0.10 or a p value ≥ 0.05 , suggesting an adequate fit; primary value used to assess model fit

^c CFI value ≥ 0.90 is considered an acceptable fit, but sensitive to non-significant paths

^d SRMR value ≤ 0.05 is considered an acceptable fit, but sensitive to non-significant paths

FIGURES

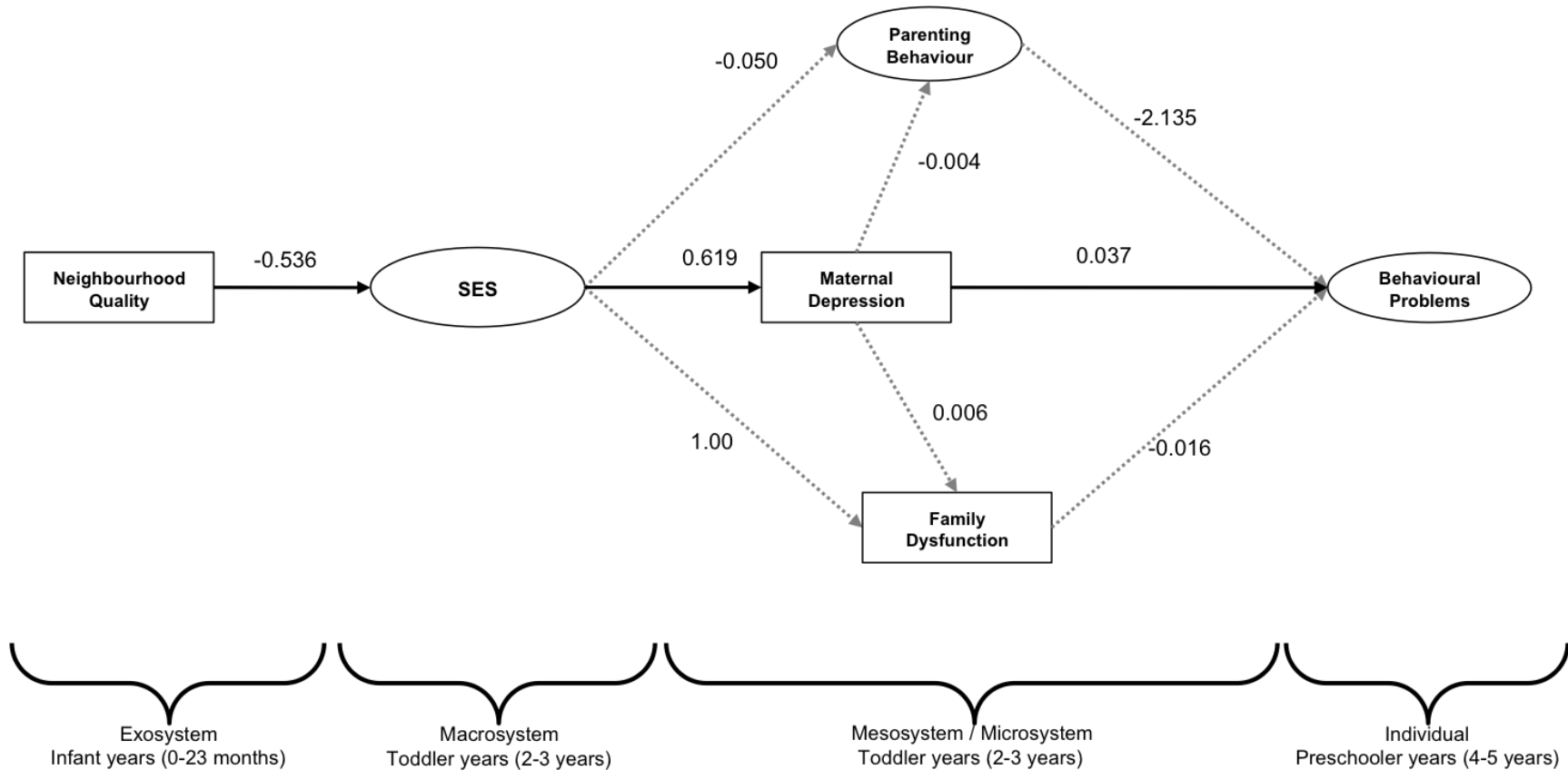


Figure 1: Predictors of behavioural problems among children of teenage mothers guided by Bronfenbrenner's ecological theory.

*Black solid lines indicate significant unstandardized coefficients. Grey dotted line indicates non-significant unstandardized coefficients. Observed variables for latent constructs and error terms are omitted for simplicity.

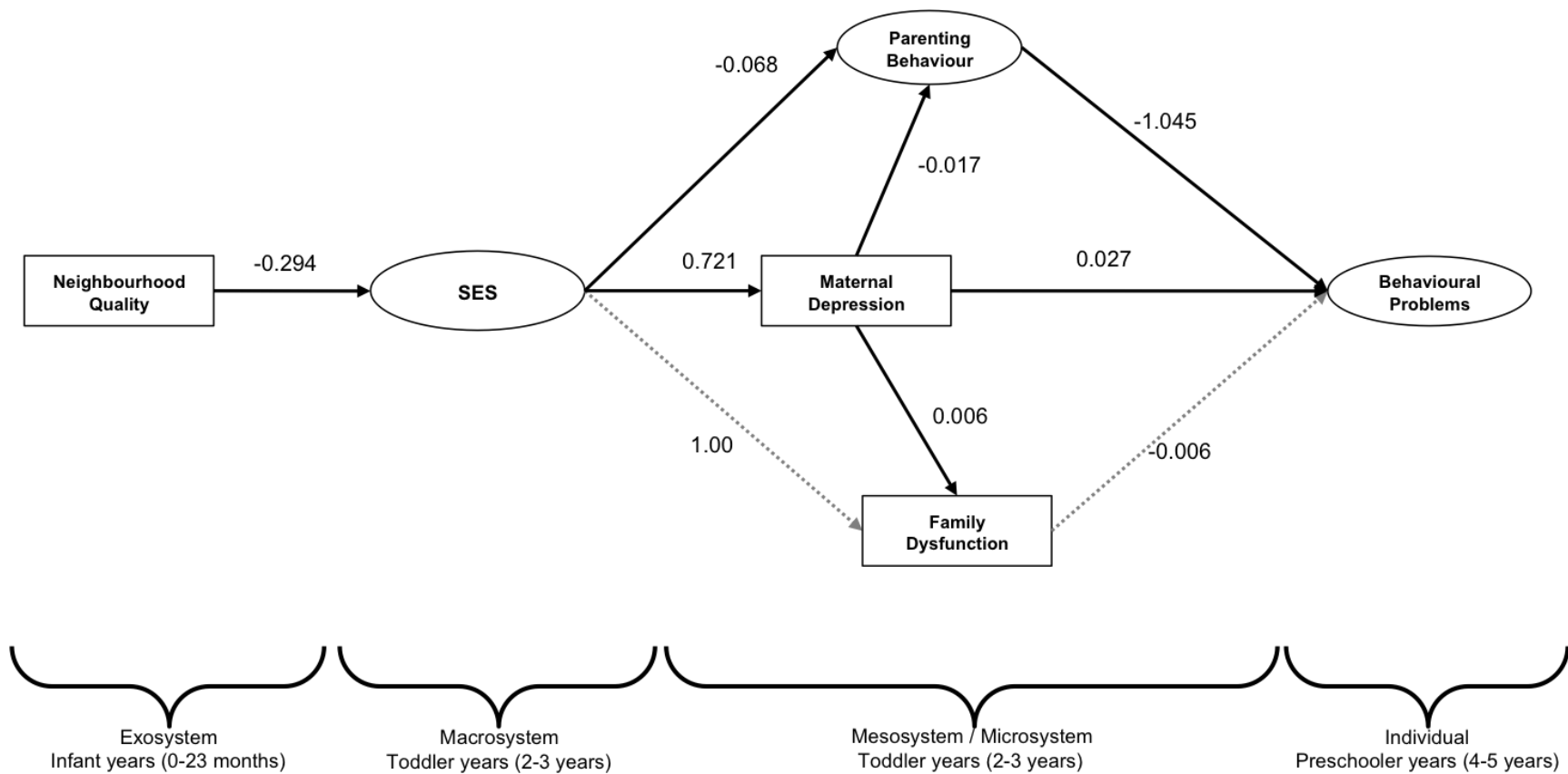


Figure 2: Predictors of behavioural problems among children of optimal age mothers guided by Bronfenbrenner’s ecological theory.

*Black solid lines indicate significant unstandardized coefficients. Grey dotted line indicates non-significant unstandardized coefficients. Observed variables for latent constructs and error terms are omitted for simplicity.

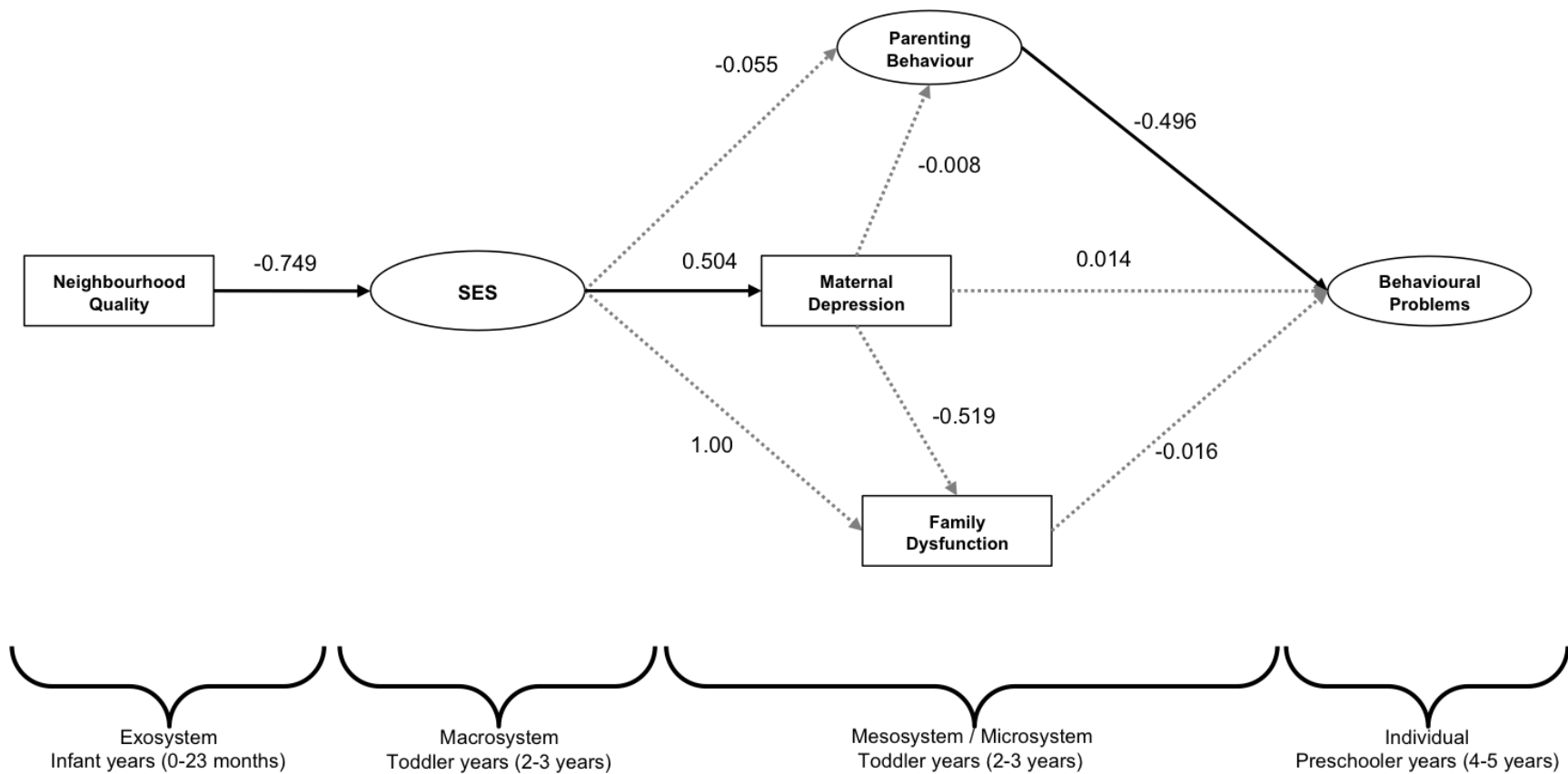


Figure 3: Predictors of behavioural problems among children of advanced age mothers guided by Bronfenbrenner’s ecological theory.

*Black solid lines indicate significant unstandardized coefficients. Grey dotted line indicates non-significant unstandardized coefficients. Observed variables for latent constructs and error terms are omitted for simplicity.

CHAPTER FIVE: General Discussion

Summary

To summarize, this three-manuscript doctoral dissertation addressed some of the research gaps around maternal age, especially with advanced age mothers and their children. All three studies were based on a secondary analysis of a nationally representative data from the National Longitudinal Survey of Children and Youth (NLSCY), collected by Statistics Canada. The first study's objective was a cross-sectional analysis to determine the prevalence and characteristics of social support in teen, optimal age, and advanced age mothers in Canada. Similarly, the second study determined the prevalence and characteristics of positive-interaction parenting style in teen, optimal age, and advanced age mothers in Canada. The third study's objective was a longitudinal analysis using structural equation modeling to identify the prevalence and pathways to behavioural problems in children of teen, optimal age, and advanced age mothers in Canada. This section will highlight the main findings from each of the studies, and review the roles of social support and parenting in Bronfenbrenner's ecological model.

Differences in Microsystem Factors and Child Behavioural Outcomes by Maternal Age

The importance of incorporating maternal age in studies related to maternal and child development is highlighted in this dissertation. This work provides clear evidence that maternal age should be incorporated in any research related to maternal and child health as the characteristics and predictors of maternal and child outcomes differed significantly when examined separately by maternal age – i.e., teen, optimal age, and advanced age mothers. The first study, “*Characteristics of social support among teenage, optimal age, and advanced age mothers in Canada*” demonstrated that teens had the lowest social support compared to the other groups. The characteristics significantly associated with social support differed among the three

age groups of mothers, except for neighbourhood safety, which was significantly associated with social support in all groups. Although maternal depression was significantly associated with a decrease in social support in teen and optimal age mothers, this significance was not found in advanced age mothers. The only characteristic that was found to be uniquely significant to an increase in social support among advanced age mothers was the use of childcare. The second study, *“Characteristics of positive-interaction parenting style among teenage mothers, optimal age mothers, and advanced age mothers in Canada”* reported that the levels of positive-interaction parenting style were similar in all three groups. However, the characteristics associated with parenting differed across the groups. Among advanced age mothers, social support was uniquely associated with an increase in positive-interaction parenting whereas, among teen mothers, no unique characteristics were found to be associated with parenting. The last study, *“Investigating pathways to behavioural problems in children of teen, optimal age, and advanced age mothers in Canada”*, found that the pathways to child behavioural problems differed by maternal age. Among children of teen mothers, depression was a significant predictor of greater behavioural problems. Among children of advanced age mothers, only parenting was a significant predictor of lower behavioural problems. Among children of optimal age mothers, both greater depression and parenting significantly predicted greater child behavioural problems.

All three studies highlight that maternal age plays an important role in understanding the differences in characteristics of social support, parenting, and child behavioural outcomes. Research has shown that social support and parenting are perceived differently by mothers depending on their age (Bayrampour et al., 2012; Nybo Andersen et al 2000; Mulherin & Johnstone, 2015); however, these studies did not examine advanced age mothers separately. Although the literature has shown that social support may play a direct and indirect role for

behavioural problems in children (Heberle et al., 2015), and shown to be associated with other factors such as parenting (Ensor & Hughes, 2010), this relationship was not found in any of the three structural equation models. Bronfenbrenner's ecological theory is a comprehensive and well-evaluated framework that considers many factors at the multi-system level. The structural equation models demonstrated that social support was not selected and did not fit in the models whereas, parenting was found to be a significant predictor of child behaviour. The results suggest that parenting may play a more important role in predicting child behavioural problems, especially among children of advanced age mothers. For children of advanced age mothers, parenting was not predicted by a macrosystem (SES) or exosystem (neighbourhood quality) factor. For advanced age mothers, their SES were not found to influence their parenting, perhaps suggesting that parenting may be influenced by other macrosystem factors, which usually evolve over time and describes the culture in which the individual lives. For example, a child who was raised by a mother who does not work may have constant interactions with his/her mother that will affect how the child will behaviourally develop as an individual. Compared to a working mother, a non-working mother may have a unique set of personal experiences that may serve as a filter or lens through how she interprets parenting, which in turn may influence child behaviour.

Limitations and Strengths

The studies had a few limitations. All the outcomes and variables of interest were self-reported, which may be subjected to recall bias. The first two studies were based on a secondary analysis of a cross-sectional survey, which may be subjected to reverse causality. The data used in the studies were collected from 2000-2008, and the response rates were approximately 78%. Additionally, information bias may have been present – i.e., mothers may have under or over-reported child behaviour and parenting behaviour items therefore, the results should be

cautiously interpreted. However, the strengths of NLSCY is found in its national representative database which includes valid and standardized scales (e.g., Social Provision Scale, Child Behaviour Checklist) that covers an extensive range of topics around maternal and child health, behaviour, and environment. The research questions in this dissertation were developed with respect to the research gaps identified by the lack of literature around maternal age and child outcomes. This will be a foundation for future research in similar fields of maternal and child health.

Future Directions

Although this dissertation has addressed some of the research gaps in maternal age, further and continued research is recommended, especially with the advanced age group. For the manuscript in chapter two, use of childcare was the only unique characteristic significantly associated with social support in advanced age mothers and therefore, qualitative research is recommended to explore other predictors of social support. Qualitative research will allow us to recognize other barriers and facilitators that were not explored in this study, especially for advanced age mothers. For the manuscript in chapter three, continued research is recommended for teen and advanced age mothers through mixed-methods design; perhaps exploring other variables such as culture, attitudes and beliefs toward parenting that were not captured in this study. The manuscript in chapter four warrants continued research in building on the current structural equation models to explore other predictors longitudinally – for example, paternal characteristics (education, income, working status), and child’s cultural upbringing. In Addition, future research should focus on how these same predictors affect the child’s behaviour at late adolescence or teenage years. As the proportion of first-time advanced age mothers are increasing in Canada, it is essential that we continue to adapt to understand the predictors of

social support, parenting, and child behavioural problems by maternal age, and build on the existing foundation created from these three studies. Furthermore, other maternal and child outcomes can be carefully examined by maternal age, with emphasis on the advanced age group. Analyses with teen mothers also warrant further investigation. Capturing data from teen mothers who are at high-risk – e.g., those institutionalized, Aboriginal, and incarcerated – would strengthen our understanding of this population, as the teen mothers analyzed in the NLSCY may not have been representative of all teen mothers. Future studies could include observational studies; for example, examining parent-child relationships and child behaviour through video-recordings to mitigate information bias in the outcomes measured in the three studies.

Implications and Recommendations for Action

An understanding of the differences in the characteristics among the three age groups of mothers is needed to better understand the mothers' maternity experiences and parenthood, and how it affects maternal and child outcomes. As Canada's maternal population is changing, it is essential for health care institutions and health policy makers to continue to adapt to meet the needs of the nation's growing advanced age population of women. The findings from this dissertation can be used to develop and implement prevention interventions or improve on parenting interventions that reflect the uniqueness of maternal age. There is a need to redirect policy efforts to higher level interventions (e.g., existing parenting intervention run by Public Health integrated in tertiary care settings) that targets specific age groups of mothers – i.e., teen, optimal age, and advanced age. This in turn may help address child behavioural problems to prevent long-term consequences later in life. As Canada's maternal age gap widens, it is essential for public health policy to continue to adapt to meet the needs of mothers and their children in matters around parenthood and child development, examined separately by maternal age.

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Appendix A: Research Data Centre Approval Letter



SSHRC  CRSH

September 24, 2014

Ms. Theresa Hae Min Kim

FILE: CISS-RDC-761443

Dear Ms. Kim:

Thank you for submitting an application to the CISS-Access to the RDC Program, a joint initiative between Statistics Canada, the Social Sciences and Humanities Research Council and the Canadian Institutes of Health Research. The RDC-Access Granting Committee has now completed the review of your project proposal and has approved it. Before you are granted access to the RDC to begin your project proposal you will need to complete the following steps (<http://www.statcan.gc.ca/rdc-cdr/process-eng.htm>):

- 1) Complete the security screening process
- 2) Sign the Oath of Office and Secrecy
- 3) Participate in an RDC Orientation session
- 4) Sign a Microdata Research Contract with Statistics Canada.

Your RDC analyst can be found at the centre listed on the following web page:
<http://www.statcan.gc.ca/rdc-cdr/network-reseau-eng.htm>.

You have 1 year from the date of approval of your project proposal in order to initiate access to the RDC. If you are unable to commence your project proposal within the first 12 months after your project proposal has been approved for RDC access, please contact the RDC analyst to make special arrangements. If you have not contacted your RDC analyst within the first 12 months after your project proposal has been approved, you will need to re-apply to SSHRC in order to re-gain access to the RDC.

The reviews of the project proposal were based on SSHRC peer review procedures. Each project proposal was evaluated on the basis of four main criteria: scientific merit and viability of the proposed research; the viability of the methods to be applied given the data on which the analysis will be performed; a demonstrated need for access to detailed micro data; and, the expertise and ability of the researchers to carry out the work.

Enclosed is a copy of the evaluation results from the SSHRC peer review procedures for your information. If you need to discuss these results please contact your RDC analyst.



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Should you have further questions, please feel free to contact the officer responsible for the administration of the CISS-Access to the RDC Program, Mika Oehling,

Sincerely,

Éric Bastien
Deputy Director
Research Grants and Partnerships Division

cc: Beverley Hunt, Research Data Centres Headquarters Operations

Encl.



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Appendix B: Social Provisions Scale

Item		Score
If something went wrong, no one would help me.*	Strongly Agree	0
	Agree	1
	Disagree	2
	Strongly Disagree	3
I have family and friends who help me feel safe, secure and happy.	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
There is someone I trust whom I would turn to for advice if I were having problems.	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
There is no one I feel comfortable talking about problems with.*	Strongly Agree	0
	Agree	1
	Disagree	2
	Strongly Disagree	3
I lack a feeling of closeness with another person.*	Strongly Agree	0
	Agree	1
	Disagree	2
	Strongly Disagree	3
There are people I can count on in an emergency.	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
I feel part of a group of people who share my attitudes and beliefs.	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
There is no one who shares my interests and concerns.*	Strongly Agree	0
	Agree	1
	Disagree	2
	Strongly Disagree	3

*Indicates that the values have been reversed.

Appendix C: Depression Scale

(Shorter version of the Center for Epidemiologic Studies Depression Scale)

All questions were based on the following category of responses:

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

Items

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

- ...I did not feel like eating; my appetite was poor.
- ...I felt that I could not shake off the blues even with help from my family or friends.
- ...I had trouble keeping my mind on what I was doing.
- ...I felt depressed.
- ...I felt that everything I did was an effort.
- ...I felt hopeful about the future. *
- ...my sleep was restless.
- ...I was happy. *
- ...I felt lonely.
- ...I enjoyed life. *
- ...I had crying spells.
- ...I felt that people disliked me.

*Indicates that the values have been reversed.

Appendix D: Neighbourhood Safety Scale

Item		Score
It is safe to walk alone in this neighbourhood after dark. *	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
It is safe for children to play outside during the day. *	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
There are safe parks, playgrounds and play spaces in this neighbourhood. *	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0

*Indicates that the values have been reversed.

Appendix E: Parenting Practice Scales

Positive Interaction Parenting Scale		Score
How often do you praise this child, by saying something like “Good for you!” or “What a nice thing you did!” or “That’s good going!”?	Never	0
	About once a week or less	1
	A few times a week	2
	One or two times a day	3
	Many times each day	4
How often do you and this child talk or play with each other, focusing attention on each other for five minutes or more, just for fun?	Never	0
	About once a week or less	1
	A few times a week	2
	One or two times a day	3
	Many times each day	4
How often do you and this child laugh together?	Never	0
	About once a week or less	1
	A few times a week	2
	One or two times a day	3
	Many times each day	4
How often do you do something special with this child that he enjoys?	Never	0
	About once a week or less	1
	A few times a week	2
	One or two times a day	3
	Many times each day	4
How often do you play sports, hobbies, or games with this child?	Never	0
	About once a week or less	1
	A few times a week	2
	One or two times a day	3
	Many times each day	4

Total score varies from 0 to 20, a high score indicating positive interactions.

Hostile Ineffective Parenting Scale		Score
How often do you get annoyed with this child for saying or doing something he is not supposed to?	Never	0
	About once a week or less	1
	A few times a week	2
	One or two times a day	3
	Many times each day	4
Of all the times that you talk to this child about his behaviour, what proportion is praise? *	Never	4
	Less than half the time	3
	About half the time	2
	More than half the time	1
	All the time	0
Of all the times that you talk to this child about his behaviour, what proportion is disapproval?	Never	0
	Less than half the time	1
	About half the time	2
	More than half the time	3
	All the time	4
How often do you get angry when you punish this child?	Never	0
	Less than half the time	1
	About half the time	2
	More than half the time	3
	All the time	4
How often do you think that the kind of punishment you give this child depends on your mood?	Never	0
	Less than half the time	1
	About half the time	2
	More than half the time	3
	All the time	4
How often do you feel you are having problems managing this child in general?	Never	0
	Less than half the time	1
	About half the time	2
	More than half the time	3
	All the time	4
How often do you have to discipline this child repeatedly for the same thing?	Never	0
	Less than half the time	1
	About half the time	2
	More than half the time	3
	All the time	4

*Indicates that the values have been reversed.

The total score varies between 0 and 28, a high score indicating hostile/ineffective interactions.

Consistent Parenting Scale		Score
When you give this child a command or order to do something, what proportion of the time do you make sure that he does it?	Never	0
	Less than half the time	1
	About half the time	2
	More than half the time	3
	All the time	4
If you tell this child he will get punished if he doesn't stop doing something, and he keeps doing it, how often will you punish him?	Never	0
	Less than half the time	1
	About half the time	2
	More than half the time	3
	All the time	4
How often does this child get away with things that you feel should have been punished? *	Never	4
	Less than half the time	3
	About half the time	2
	More than half the time	1
	All the time	0
How often is this child able to get out of a punishment when he really sets his mind to it? *	Never	4
	Less than half the time	3
	About half the time	2
	More than half the time	1
	All the time	0
How often when you discipline this child, does he ignore the punishment? *	Never	4
	Less than half the time	3
	About half the time	2
	More than half the time	1
	All the time	0

*Indicates that the values have been reversed.

The total score varies between 0 and 20, a high score indicating consistent parenting behaviour.

Rational Parenting Scale		Score
Please tell me how often you, as his parent, do each of the following when this child breaks the rules or does things that he is not supposed to:		
...raise your voice, scold or yell at him?	Never Rarely Sometimes Often Always	0 1 2 3 4
...calmly discuss the problem? *	Never Rarely Sometimes Often Always	4 3 2 1 0
...use physical punishment?	Never Rarely Sometimes Often Always	0 1 2 3 4
...describe alternative ways of behaving that are acceptable? *	Never Rarely Sometimes Often Always	4 3 2 1 0

*Indicates that the values have been reversed.

The total score varies between 0 and 16, a high score indicating punitive/aversive interactions.

Appendix F: Family Functioning Scale

All questions were based on the following category of responses:

- 0 = Strongly Agree
- 1 = Agree
- 2 = Disagree
- 3 = Strongly Disagree

Items

Planning family activities is difficult because we misunderstand each other. *

In times of crisis we can turn to each other for support.

We cannot talk to each other about sadness we feel. *

Individuals, in the family, are accepted for what they are.

We avoid discussing our fears or concerns. *

We express feelings to each other.

There are lots of bad feelings in our family. *

We feel accepted for what we are.

Making decisions is a problem for our family. *

We are able to make decisions about how to solve problems.

We don't get along well together. *

We confide in each other.

*Indicates that the values have been reversed.

Total score varies between 0 and 36, a high score indicating family dysfunction.

Appendix G: Child Behaviour Checklist

Physical Aggression		Score
How often would you say that this child gets into many fights?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child when somebody accidentally hurts him, he reacts with anger and fighting?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child physically attacks people?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child threatens people?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child bullies or is mean to others?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child kicks, bites, or hits other children?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2

Total score varies from 0 to 12, a high score indicating behaviours associated with conduct disorder and physical aggression.

Indirect Aggression		Score
How often would you say that this child when mad at someone, tries to get others to dislike that person?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child when mad at someone, becomes friends with another as revenge?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child when mad at someone, says bad things behind the other's back?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child when mad at someone, says to others let's not be with him/her?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child when mad at someone, tells that person's secrets to a third person?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2

Total score varies from 0 to 10, a high score indicating behaviour associated with indirect aggression.

Hyperactivity/Inattention		Score
How often would you say that this child can't sit still or is restless?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child is easily distracted, has trouble sticking to any activity?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child can't concentrate, can't pay attention for long?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child is impulsive, acts without thinking?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child has difficulty waiting for his turn in games or groups?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child cannot settle on anything for more than a few moments?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child is inattentive?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2

Total score varies from 0 to 14, a high score indicating the presence of hyperactive/inattentive behaviour.

Emotional/Anxiety		Score
How often would you say that this child seems to be unhappy or sad?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child is not as happy as other children?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child is too fearful or nervous?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child is worried?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child cries a lot?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child is nervous, high strung or tense?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2
How often would you say that this child has trouble enjoying himself?	Never or not true	0
	Sometimes or somewhat true	1
	Often or very true	2

Total score varies from 0 to 14, a high score indicating the presence of behaviours associated with anxiety and emotional disorder.

Appendix H: Neighbourhood Quality Scale

Items		Score
If there is a problem around here, the neighbours get together to deal with it	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
There are adults in the neighbourhood that children can look up to.	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
People around here are willing to help their neighbours.	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
You can count on adults in this neighbourhood to watch out that children are safe and don't get in trouble.	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0
When I'm away from home, I know that my neighbours will keep their eyes open for possible trouble.	Strongly Agree	3
	Agree	2
	Disagree	1
	Strongly Disagree	0

Total score varies between 0 to 15, a high score indicating high degree of neighbour cohesiveness. All values were reversed to create this scale.