POVERTY, PARENTAL DEPRESSION, PARENTAL SELF-EFFICACY, SOCIAL
SUPPORT, AND THE HOME LEARNING ENVIRONMENT OF TODDLERS:
AN APPLICATION OF THE FAMILY STRESS MODEL

by

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Abstract

Background: Family poverty and the home learning environment (HLE) of toddlers both have significant impacts on children’s future cognitive and academic outcomes. Families facing poverty experience economic hardships and pressures that may lead to difficulty providing a quality HLE. The family stress model was developed to help explain how poverty influences child adjustment through economic pressure and behaviours. There is evidence of its utility in explaining the investments parents make in their children’s learning, but it is not yet known whether the family stress model may be used to predict the HLE of toddlers. In addition, two parental protective factors, parental self-efficacy and social support, may play a role in disrupting the negative effects of depression related to poverty on the HLE.

Purpose: The purpose of this study was to examine the relationships between economic hardship (low family income), economic pressure (financial difficulty), parental depression, parental self-efficacy, parental social support, and the HLE (shared book reading and story-telling) of toddlers.

Methods: We used logistic regression analysis to perform a secondary data analysis on 423 parent participants of children ages 14-24 months from the Toddler Development Instrument Phase 2 Pilot Implementation Study conducted by the Human Early Learning Partnership at the University of British Columbia. Convenience sampling was used to recruit participants from community-based organization partners across 19 communities in British Columbia, Canada.

Findings: After accounting for parental education and child sex, we found: 1) economic hardship and economic pressure were independently negatively associated with the HLE; 2) parental depression was negatively associated with the HLE, and appeared to fully mediate the impact of economic pressure on the HLE; 3) parental self-efficacy was positively associated with the HLE, but social support was not; 5) neither parental self-efficacy nor social support moderated the negative association between parental depression and the HLE.

Conclusion: The family stress model predicted those families providing a higher quality HLE for toddlers, but did not predict families providing a poorer quality HLE. Economic hardship, economic pressure, parental depression, parental self-efficacy and parental education were associated with the HLE. Practitioners should focus attention on these factors when supporting family HLEs.
Lay Summary

This study examined how poverty (economic hardship such as low family income, and economic pressures such experiences of financial difficulty) is related to how frequently parents read books and tell stories to their toddlers - an indicator of parents’ ability to provide a quality home learning environment. We found both economic hardship and economic pressure had separate, negative associations with the home learning environment of toddlers. The findings suggest that economic pressure go hand in hand with parental depression, which, in turn, may have a harmful effect on the home learning environment. We also found parental self-efficacy (a parent’s belief in their ability to positively influence their children’s development and confidence about their ability to parent successfully) was positively related to the home learning environment of toddlers, but social support for parents was not. Neither parental self-efficacy nor social support were able to lessen the negative association between parental depression and the HLE.
Preface

This thesis is original, unpublished work by the author, L. Bendickson, utilizing previously collected, unpublished data from the *Toddler Development Instrument (TDI) Phase 2 Pilot Implementation Study* conducted by the Human Early Learning Partnership at the University of British Columbia (UBC) (Principal Investigator: Dr. Martin Guhn).

The identification and design of the research study, and all parts of the literature search, literature review, statistical analysis, and writing were performed by L. Bendickson. Dr. S. Dahinten provided extensive guidance and contributed to all aspects of the study. Dr. M. Guhn provided guidance and contributed extensively to the study design and analytic approach. Drs. M Guhn and M. Ranger both reviewed and provided feedback on the written thesis.

This study was reviewed and approved by the UBC Behavioural Ethics Research Board (Certificate of Approval – Minimal Risk; H19-01476) under the project title *Poverty and toddler developmental experiences: The impact of parental and family contexts*. The original Toddler Development Instrument Study also received UBC Behavioural Ethics Research Board approval under the title *Harmonized Review Project TDI 2 version 16.0* (H16-02186).
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Chapter 1: Introduction

In British Columbia, 18.9% of children under 6 years of age were living in low income families in 2017 (First Call BC Child and Youth Advocacy Coalition, 2019). The rate for British Columbia is only slightly lower than the Canadian average rate of 19.6%. Such a high rate of child poverty is cause for concern as there is a well-known positive relationship between income and developmental outcomes known as the ‘income gradient’ wherein children living in a higher family income strata have better outcomes than children living in the family income strata just below them (Human Early Learning Partnership & Commission on Social Determinants of Health, 2007; Mikkonen & Raphael, 2010; Public Health Agency of Canada, 2018). Moreover, the income gradient has far-reaching effects over the life course (Conroy et al., 2010; Power & Hertzman, 1997). For example, a 30-year longitudinal study in New Zealand found that lower family income during childhood was associated with lower educational achievement and adult economic situation in adulthood, even after controlling for social, family, and individual factors (Gibb et al., 2012).

One explanation for this gradient in child development outcomes is a difference between the home learning environments (HLE) of children with lower family incomes compared with children living in families with middle and higher family incomes. The HLE refers to cognitively stimulating enrichment and learning experiences and activities provided by the family inside and outside of the home that enhance child development, learning, school readiness, such as frequency of shared book reading (M. A. Foster et al., 2005; Hayes et al., 2018; Melhuish et al., 2008). Evidence to date demonstrates that parents experiencing poverty do not appear to provide the same level of HLE for their children as higher income parents do, leading to poorer child developmental outcomes in cognitive areas (Hayes et al., 2018; Kelly et al., 2011). This may be because the economic pressures experienced by low income parents negatively impact their capacity to provide a positive HLE, particularly if economic pressures lead to depression. For example, the family stress model (R. D. Conger & Conger, 2002) theorizes that economic pressure (daily strains and hassles related to poor economic conditions, such as the inability to purchase food or housing) caused by economic hardship (low income or negative economic events), leads to parental psychological distress (depression, anxiety, anger, and/or alienation), disrupted parenting, and ultimately, disrupted child adjustment (R. D. Conger et al., 2010; R. D. Conger & Conger, 2002, 2008; R. D. Conger & Donnellan, 2007; Masarik & Conger, 2017).
While the family stress model does not specifically focus on the HLE or child developmental outcomes, it has been successfully applied to these concepts (Gershoff et al., 2007).

The family stress model additionally posits that parental protective factors may buffer the impacts of these factors – economic hardship, economic pressure, parental psychological distress such as depression – on one another, and child adjustment. However, to date, it is not known whether the parental protective factors of parental self-efficacy and social support buffer the impact of these factors on the HLE.

**Research Problem**

Previous studies have demonstrated the utility of the family stress model in explaining parental investments, a construct similar to, but broader in nature than the HLE, in kindergarteners (Gershoff et al., 2007; Raver et al., 2007). However, it is not yet known whether the family stress model may be used to predict the HLE of toddlers. Studies examining parental self-efficacy have found greater parental self-efficacy moderates the relationship between income and parental stress (H. A. Raikes & Thompson, 2005) and is associated with improved HLE for all parents (Peacock-Chambers et al., 2017). Some studies have also found a moderating effect for parental social support on parental stress among parents experiencing economic hardship (McConnell et al., 2011), but results have been mixed (H. A. Raikes & Thompson, 2005). However, it is not known whether parental self-efficacy or social support buffer the relationship between parental depression - one type of psychological distress posited by the family stress model - and the HLE in parents experiencing economic hardship and economic pressures.

**Research Purpose, Questions, and Hypotheses**

The purpose of this study was to examine the relationships between economic hardship (e.g. low family income), economic pressure (e.g. financial difficulty), parental depression, parental self-efficacy, parental social support, and the HLE of toddlers. We addressed the following research questions:

1. How are economic hardship and economic pressure associated with the HLE of toddlers, after accounting for parental education and child sex?
2. How is parental depression associated with the HLE of toddlers, after accounting for parental education, child sex, economic hardship, and economic pressure?
3. Does parental depression mediate the association between economic pressure and the HLE of toddlers, after accounting for parental education, child sex, and economic hardship?

4. How are parental self-efficacy and social support associated with the HLE of toddlers, after accounting for parental education, child sex, economic hardship, economic pressure, and parental depression?

5. Do parental self-efficacy and social support moderate the association between parental depression and the HLE of toddlers, after accounting for parental education, child sex, economic hardship, and economic pressure?

We hypothesized (see Figure 1 for the conceptual model underlying this study):

1. Economic hardship and economic pressure are negatively associated with the HLE of toddlers, over and above parental education and child sex.

2. Parental depression is negatively associated with the HLE of toddlers, over and above parental education, child sex, economic hardship, and economic pressure.

3. Parental depression mediates the association between economic pressure and the HLE of toddlers, over and above parental education, child sex, and economic hardship.

4. Higher parental self-efficacy and social support are positively associated with the HLE of toddlers, over and above parental education, child sex, economic hardship, economic pressure, and parental depression.

5. Higher parental self-efficacy and social support buffer the negative association between parental depression and the HLE of toddlers, over and above parental education, child sex, economic hardship, and economic pressure.
Figure 1: Conceptual Model

Economic Hardship

Economic Pressure

Parental Depression

Home Learning Environment of Toddlers

Parental Self-Efficacy

Social Support

Note: Economic Hardship, Economic Pressure, and Parental Depression have direct negative associations with the HLE. Parental Depression mediates the association between Economic Pressure and the HLE. Parental Self-Efficacy and Social Support have direct positive associations with the HLE. Parental Self-Efficacy and Social Support buffer the association between Parental Depression and the HLE. Solid lines with + indicate positive relationships. Solid lines with – indicate negative relationships. Dotted lines indicate buffering effects.
Thesis Outline

This chapter has provided an introduction to the study, a brief overview of the theoretical basis of the study, and identified the research questions to be answered. Chapter 2 reviews current research evidence and theoretical perspectives linking poverty, child development, the home learning environment, parental depression, parental self-efficacy, and social support. Chapter 3 presents study methods, beginning with a description of the research design, source of data and the sample. Data collection methods, measures, analytical procedures, and ethical considerations are also described.
Chapter 2: Literature Review

This chapter provides a review of the theoretical literature and scholarly literature on key concepts in the study and their inter-relationships. This chapter is organized as follows: search strategy, theory underpinning this study (family stress model), and evidence linking: 1) poverty with the family stress model and child development, 2) the HLE with the family stress model and child development, and 3) parental self-efficacy and social support and the family stress model.

Search Strategy

The electronic bibliographic database PsycInfo was searched as the majority of relevant literature was determined to be within the field of psychology. A combination of major concepts and key words were used that included: family stress model, low income, low-income, lower income level; socioeconomic status, poverty, socioeconomic status, SES, childhood development, early childhood development, child, development, learning environment, home environment, parental involvement, home learning environment, home learning activities, home literacy environment, home music parental involvement, shared book reading, shared music, danc*, sing*, social support, self-efficacy, mastery, confidence, depression, major depression, parenting. Google Scholar was additionally searched using the same key words (concept terms were also used as key words). Hand/ancestry searching of reference lists of articles most relevant to the current study was conducted.

The Family Stress Model

This study was informed by the family stress model (R. D. Conger et al., 2010; R. D. Conger & Conger, 2002, 2008; R. D. Conger & Donnellan, 2007; Masarik & Conger, 2017). The family stress model suggests that family economic hardship (e.g. low income or negative financial events) leads to economic pressure (e.g. day-to-day strains such as difficulty paying bills or inability to purchase basic necessities), causing parental psychological distress, partner relationship problems, and deterioration in parenting behaviour, which ultimately leads to poorer child adjustment. There is evidence linking each step of the model, as well as the overall process (Masarik & Conger, 2017). The family stress model is a social causation perspective, positing that the social conditions children grow up in influence their development (R. D. Conger et al., 2010; R. D. Conger & Donnellan, 2007; McLoyd et al., 2013). Much of the research supporting the family stress model has been cross-sectional, but some longitudinal studies have also been conducted, providing stronger evidence of causal associations between each step of the model.
Conger, Conger and Martin (2010) suggest family stress processes may better explain child behavioural outcomes while ‘parental investments’ in their children’s learning resources, activities, and experiences may better explain child cognitive development. However, it is also possible that family stress processes may influence the relationship between income and these types of parental investments (R. D. Conger & Conger, 2008), such as the HLE.

The family stress model additionally suggests that protective factors may influence family stress processes (Masarik & Conger, 2017). In a recent review, Masarik and Conger (2017) found some evidence that parental social support, effective coping strategies, a sense of optimism, endorsement of familism values, effective problem solving, and neighborhood support may buffer the negative impacts of economic hardship and pressure on negative parenting behaviours, and ultimately, child outcomes.

**Poverty**

**Poverty as Conceptualized by the Family Stress Model**

Poverty “represents a lack of necessary goods and services” that occurs as a result of inadequate resources available to meet one’s needs (Short, 2016, p. S46). Poverty can either be seen as absolute, as in severe deprivation of human needs, or relative, “where access to resources so deviates from the societal average as to be problematic for the individual” (Raphael, 2013, p. 5). The first two key constructs in the family stress model, economic hardship and economic pressure, reflect this broader concept of poverty: economic hardship represents a lack of economic means, whereas economic pressure represents the psychological stress (strains) experienced as a result of it.

The construct of economic hardship has been best captured by income-based poverty measures. For example, some countries, such as the U.S.A., use an income-based poverty threshold to identify level of income below which families or individuals cannot meet their needs, irrespective of geographical residence (United States Census Bureau, 2019). In Canada, until recently, we have not had an official measure of poverty. Rather, Statistics Canada used ‘low income cut-offs’ which set income thresholds below which a family is likely to devote a larger percentage of its income on food, shelter, clothing, and other necessities, and takes into account family size and community of residence (Statistics Canada, 2015). In 2017, Statistics Canada used the After-Tax Census Family Low Income Measure (CFLIM-AT), which identifies
family incomes, adjusted for family size, below which families are identified as low income (poverty lines) (First Call BC Child and Youth Advocacy Coalition, 2019; Statistics Canada, 2017). Even more recently, Canada has begun using a new market basket measure that establishes poverty thresholds based on the cost of goods (food, clothing, shelter, transportation and other) that reflect a basic standard of living for the family size and region (Statistics Canada, 2019).

Economic hardship additionally overlaps with the construct of low socioeconomic status, another measure of disadvantage that often includes income-based poverty. Socioeconomic status, however, is a broader construct, representing social position, and variously includes income, education attainment, occupation, or other measures. It captures constructs beyond poverty which may have separate effects on child development, such as parental education (G. J. Duncan & Magnuson, 2003).

In contrast, economic pressure, the second key construct of the family stress model, is defined within the family stress model literature as the “day to day strains and hassles that unstable economic conditions create for families, such as difficulty paying bills or being unable to purchase basic necessities due to financial need” (Masarik & Conger, 2017, p. 86). Economic pressure, therefore, gives “psychological meaning” to economic hardship (Masarik & Conger, 2017, p. 86) and reflects the subjective experience of poverty. Economic pressure has been measured in different ways. Rand D. Conger & Elder (1994) described an Economic Strain Questionnaire, which is a 6 item index that assesses the degree to which families are able to make ends meet, and have enough money in the household for a home, clothing, food, and medical care. Some studies have specifically used or adapted this questionnaire (e.g. Leinonen et al., 2002; Newland et al., 2013). Other studies have used similar items but included additional items, such as financial cutbacks and difficulty paying bills (Kavanaugh et al., 2018) or expanded the original items to include additions such as changing food shopping to save money or taking an extra job to meet expenses (Neppl et al., 2016). Some authors have described economic pressure as material hardships, such as food insecurity, housing hardship, unmet medical needs, and reported financial insecurity (Gershoff et al., 2007). A qualitative study found evidence that mothers’ experience of economic pressure found economic pressure was associated not only with inability to meet basic needs, but also modest but highly valued ‘extras’ for symbolically significant items, such as celebrations such as birthdays and holidays (Mistry et
al., 2008), though no quantitative studies we examined included items which reflected this finding.

Because studies from different fields have used all of these different but overlapping constructs to describe child and family poverty, for the purposes of the following review, we included literature using any of them.

**Poverty and Child Development**

Children growing up in poverty are more likely to be affected by developmental delay and to perform poorly on cognitive tests than children who do not (Johnson et al., 2016). By 2 years of age, children from lower income families, compared to those from middle income families, begin to show a ‘word gap’ in vocabulary and comprehension (Hindman et al., 2016). It has been found that by fourth grade, approximately half of U.S. children living in poverty still cannot read at a basic level (US Department of Education National Center for Education Statistics, 2013). As well, children growing up in poverty show structural differences in brain areas related to language, learning, and memory (Johnson et al., 2016). Family socioeconomic status has also been consistently linked to child cognitive developmental outcomes including academic achievement, literacy, and language development (Letourneau et al., 2013; Sirin, 2005). Meta-analytic findings show low child socioeconomic status has negative effects on overall child executive brain function (Lawson et al., 2018).

**Poverty, Parental Depression, and Parenting**

Under stress, parents may experience exhaustion of their cognitive and emotional resources, decreasing the likelihood of emotional self-regulation, and increasing likelihood of impulsive responses to children’s misbehaviour (McQuillan & Bates, 2017). The family stress model posits that economic pressure (economic strains or stress) first leads to parental psychological distress, including depression, anxiety, or anger, and parental psychological distress then leads to disrupted parenting behaviour. There is evidence that economic pressure is positively associated with depressive symptoms in mothers (Kavanaugh et al., 2018; C. S. Lee et al., 2011; J. S. Lee & Lee, 2016), and that economic pressure mediates the association between economic hardship and parental stress and depression (Gershoff et al., 2007). Depression, in turn, has been found to mediate the relationship between economic pressure and some parenting behaviours (sensitivity, positive regard, stimulation, animation versus detachment, intrusiveness, and negative regard) (Newland et al., 2013). It is possible that other parenting behaviours, such
as the provision of a quality home learning environment, may similarly be influenced by poverty and depression.

**The Home Learning Environment (HLE)**

The HLE has been defined variously as the formal and informal cognitively stimulating enrichment and learning experiences and activities provided by the parents both inside and outside of the home. These experiences provide opportunities for interpersonal interactions that facilitate learning and are expected to improve ability and motivation for learning, contribute to school readiness and capacity for educational achievement, and overall, enhance child development (M. A. Foster et al., 2005; Hayes et al., 2018; Melhuish et al., 2008). One common example of the HLE is shared book reading, where a parent or caregiver engages in reading a book with a child. The HLE is a construct often applied in the study of children from birth to kindergarten age (5 or 6 years old), when children are expected to spend most time with parents at home. However, it may also be applied to school-age children.

The HLE is a construct similar in nature to both the ‘home environment’ measured in the HOME Inventory, (Bradley, 2012; Bradley & Caldwell, 1984) and ‘parental investments’ (e.g. Yeung, Linver, & Brooks-Gunn, 2002). However, both of these constructs are broader than the HLE: The HOME Inventory includes the HLE’s cognitively stimulating activities, but also includes parental behaviours and practices (including warmth, discipline, family rules, and routines), household disorder, and social networks (Bradley, 2012). Parental investments, a construct which stems from economist perspectives, examines the HLE’s cognitively stimulating activities, but also the goods and services families purchase for their children (Yeung et al., 2002).

**The HLE and Child Development**

The quality of the HLE has been consistently linked with child development outcomes, including cognitive and language skills (Bojczyk et al., 2018; Bono et al., 2016; Buckingham et al., 2014). The HLE predicts children’s preschool literacy and numeracy outcomes (T. D. Foster et al., 2016; Manolitsis et al., 2013; Niklas & Schneider, 2013). Skills related to learning, including cooperation, competence, motivation, attention, and persistence, are also associated with home learning activities (C. E. Baker, 2013; M. A. Foster et al., 2005; Hindman & Morrison, 2016). Much of the research on home learning activities has been focused on activities provided by mothers. However, one meta-analysis of 21 studies found father involvement in
early childhood has small to moderate effect sizes for frequency of positive engagement activities, and positive associations with cognitive outcomes, self-regulation/learning behaviours, and a negative association with externalizing problem behaviours (McWayne et al., 2013).

A large evidence base exists connecting shared book reading with child developmental outcomes. One meta-analysis found shared book reading was related to language growth, emergent literacy, and reading achievement, independent of family SES (Bus et al., 1995). Another large meta-analysis found child exposure to print (such as books and printed materials) has moderate to strong associations with reading comprehension, technical reading and spelling, and academic achievement (Mol & Bus, 2011). Shared book reading has been found to be predictive of children’s concepts about print (for example, locating book titles, identifying the direction of text) in families of low socioeconomic status (Burris et al., 2019).

Shared book reading and number of books in the home have been linked not only to better scores in reading, but also approaches to learning in boys in kindergarten (C. E. Baker et al., 2012). In a large longitudinal cohort study, Baker (2013) found parents who participated in more frequent home literacy experiences, including shared book reading, had children with better outcomes in reading, math, and social-emotional areas (such as attention and less problematic behaviours) later in preschool. Similarly, in a longitudinal study of low-income families, frequency of participation in literacy activities at age 14 and 24 months uniquely predicted language and cognitive skills at 36 months, beyond child and family characteristics (Rodriguez et al., 2009). These findings demonstrate that the HLE, and shared book reading in particular, is a significant predictor of early child development. This stresses the importance of studying the factors influencing the quality of the HLE, including poverty.

The HLE and Poverty

The HLE has been found to mediate or partially mediate the relationship between family income and cognitive development and child behaviour in 5-year-olds (Yeung et al., 2002), income and cognitive and language outcomes at 54 months (Bono et al., 2016), family socioeconomic status and child executive function in 6-year-olds (Hackman et al., 2015), and family socioeconomic status and school readiness in 3-5 year-old children (M. A. Foster et al., 2005).

The family stress model illustrates one potential pathway for understanding these connections. As discussed above, the family stress model posits that economic pressures, caused
by economic hardship, lead to parental psychological distress, such as depression, which disrupts parenting. Disrupted parenting could take the form of decreased quality of the HLE. Raver, Gershoff, and Aber (2007) applied the family stress model to parental ‘investments’ in their children (a broader concept that includes the HLE as well as additional resources and activities, such as extracurricular activities). Using a nationally representative sample of over 21,000 6-year-old children in the United States, the authors found that economic hardship was associated with increased economic pressures, higher parental stress (as indicated by parent stress, depression, and marital discord), poorer parenting behaviour, lower parental investment in their children (as measured by learning materials in the home, parent activities with the child outside of the home, extracurricular activities, and involvement with the child’s school), which all together were associated with lower child cognitive skills. Parental investments mediated the relationship between economic hardship (family income) and child cognitive outcomes, and economic pressures (material hardship) partially mediated the relationship between family income and parental investments.

It is also known that children from families of low socioeconomic status are less likely to have experiences that develop foundational skills necessary for learning to read (phonological awareness, vocabulary, and oral language, word identification, and language comprehension) (Buckingham et al., 2014). There is evidence that low income presents challenges to parents with regard to providing the same level of HLE for their children as higher income parents do (Hayes et al., 2018; Kelly et al., 2011). Both low income and low maternal education have been found to be associated with lower levels of some HLE activities at age 2, and have a more rapid decrease in HLE activities over time (Hayes et al., 2018).

The HLE and Parental Depression

According to the family stress model, economic pressure leads to parental psychological distress (defined as depression, anxiety, or hostility), which leads to disrupted parenting (Masarik & Conger, 2017). For the purposes of this study, parental psychological distress will be assessed through parental depression. At least one study has found a link between poverty, parental depression, and the HLE. Jackson et al. (2000) found that economic pressure was positively associated with parental depression, and that parental depression negatively impacted the home environment (a construct broader than the HLE, measured by the HOME inventory). Other studies have found that parental depression is associated with lower quality of the HLE.
Depressive symptoms in both mothers and fathers have been associated with less frequent provision of home learning activities (reading, signing songs, telling stories, playing games) in post-partum parents (Paulson et al., 2006) and parents of children 0-4 years of age (Giallo et al., 2013). Elevated maternal post-partum depression symptoms when children are 3 months old have been associated with reduced maternal involvement (as measured by the HOME Inventory) at 12 months (Sampson et al., 2017). As well, depressive symptoms in fathers have been associated with lower quality HLE (Nuttall et al., 2019).

Numerous studies have linked depression with other parenting behaviours. Meta-analyses indicate that maternal depression is associated with less sensitivity towards infants aged birth to 1 year old (Bernard et al., 2018) and other negative behaviours (negative maternal affect, irritability, hostility) (Lovejoy et al., 2000). Another recent meta-analysis has found fathers’ depressive symptoms have a small negative relationship with positive parenting behaviours (including warmth, acceptance, support, nurturance) and a small positive relationship with negative parenting behaviours (including rejection, hostility, psychological control, over-reactivity, inconsistent discipline) (Cheung & Theule, 2019). Given the known negative impact of depression on the HLE and other parental behaviours, and the known relationship between economic pressures and depression, it is likely that parental depression may mediate the relationship between economic pressure, and the HLE.

**Measurement of the HLE**

The HLE is currently commonly measured using parent self-report measures. Previously, the *Home Observation or Measurement of the Environment (HOME) Inventory* (Bradley & Caldwell, 1984) was commonly used to examine the quality of the home environment. However, the HOME is a broad measure that includes not only home learning activities focused on child cognitive and social development, but also parental behaviours (including warmth, and discipline), family rules and routines, household disorder, and social networks (Bradley, 2012). Therefore, many researchers now use self-report measures more specific to the HLE. Self-report measures of the HLE either measure a number of parent-child home activities, or focus on specific aspects of home literacy or numeracy (Niklas, Nguyen, et al., 2016). In a recent review, Niklas, Nguyen, et al. (2016) argued that a general definition and common operationalization of the HLE in self-report measures is missing, but identify that almost all large-scale longitudinal studies have used *frequency of shared reading* as a key item. Other common items have
included: number of children’s books at home, how often the child is sung to, whether explicit teaching of numbers or letters occurs, whether the child visits the library, whether the child plays board, card or dice games or does art or craft activities. Less frequently used items have included: involving child in everyday activities such as cooking, caring for a pet, watching tv, telling stories, messy play, or doing activities outside such as walking, swimming or cycling. However, they acknowledge that specific measures may be justified when theoretically linked to the outcome measure. Overall, they advise more psychometric work is required on the HLE with regard to measurement consistency, reliability, distinctness, and comparability between groups, including child age, sex and ethnicity.

A recent longitudinal Australian study measuring the HLE used parent self-reported frequency of shared reading in the last week in combination with 5 activities that provide learning opportunities through parent-child interaction: told a story (not from a book), drawn a picture or did other art/craft activities, played music, sung songs, or did other musical activities, played with toys or games indoors, played games outdoors or did other physical outdoor activities with the child (Hayes et al., 2018). Both measures used at child age 2 years predicted child developmental outcomes at age 6 years, including language, literacy, and positive approaches to learning.

Shared reading, as a single-item measure, has been shown to be predictive of children’s learning outcomes over and above the influence of poverty and other indicators of socioeconomic status, however none of these studies accounted for the effects of economic pressure (Farrant & Zubrick, 2013; Hayes et al., 2018; H. Raikes et al., 2006). Shared reading is also correlated with other measures of shared book reading (Mol & Bus, 2011).

**HLE: Other Influencing Factors**

In addition to economic hardship, economic pressure, and parental depression, there is evidence that other parent and child characteristics impact the HLE. Maternal education has been found to be significantly associated with the HLE (Bingham et al., 2017; Hayes et al., 2018; Rodriguez et al., 2009). In an Australian study, Hayes et al. (2018) found the frequency mother read to their children at age two was negatively associated with non-English home language and child male sex (Hayes et al., 2018).
**Parental Protective Factors**

The family stress model suggests protective factors may additionally influence family stress processes (Masarik & Conger, 2017). There is some evidence that parental social support, effective coping strategies, a sense of optimism, endorsement of familism values, effective problem solving, and neighborhood support may buffer the negative impacts of economic hardship and pressure on negative parenting behaviours, and ultimately, child outcomes (Masarik & Conger, 2017). Two potential parental protective factors, parental self-efficacy and social support, may impact the HLE within the family stress model.

**Parental Self-Efficacy**

Parental self-efficacy is defined as parents’ belief in their ability to positively influence their children’s development and developmental contexts (Crnic & Ross, 2017; Glatz & Buchanan, 2015) in ways that would support the child’s success (Ardelt & Eccles, 2001; T. L. Jones & Prinz, 2005). It has also been described as the expectation or confidence parents hold about their ability to parent successfully (T. L. Jones & Prinz, 2005; Wittkowski et al., 2017). The term *parental confidence* has been used interchangeably with parental self-efficacy in the literature (De Montigny & Lacharité, 2005; Glatz & Buchanan, 2015; T. L. Jones & Prinz, 2005). It has been argued that the two constructs are unique, with parental confidence seen to be a beliefs that are broader and non-specific, and parental self-efficacy seen to be beliefs more specific to tasks and including an assessment of one’s capability (e.g. De Montigny & Lacharité, 2005; Wittkowski et al., 2017). However, parental self-efficacy ‘general domain’ measures are not specific to task and thus fit this definition of parental confidence.

Parental self-efficacy is thought to be a resource that helps parents cope with stress (Nomaguchi & Milkie, 2017). There is a relationship between parental self-efficacy and the HLE: higher maternal parental self-efficacy has been positively associated with higher quality HLEs in several studies (Bojczyk et al., 2018; Machida et al., 2002; Peacock-Chambers et al., 2017), and higher paternal parental self-efficacy has shown a positive relationship with the HLE in at least one study (Giallo et al., 2013). Higher parental self-efficacy has also been linked to positive child academic outcomes (Albanese et al., 2019), which may be related to the impact of parental self-efficacy on the HLE. Mothers’ parental self-efficacy has also been found to mediate the effects of family stress on home learning activities (Machida et al., 2002). Because parental...
depression is linked to economic pressures, a source of stress, it is possible that parental self-efficacy may also interact with parental depression to affect the HLE.

**Measures of Parental Self-Efficacy.** A recent systematic review by Wittkowski, Garrett, Calam, and Weisberg (2017) found parental self-efficacy is usually assessed via self-report measures and these commonly utilize one of the four domains of parental self-efficacy identified by Coleman and Karraker (2000): domain-specific (ability to perform parenting tasks specific to child age), domain-general (daily parenting functions that are non-task-specific), narrow-domain (highly task-specific), or general. They note general parental self-efficacy measures are not specific to parenting tasks or child ages, but rather aimed broadly at the parent’s self-efficacy in the parenting role. Items may include, “What I do has little effect on my child’s behaviour” (Campis et al., 1986). Therefore, general measures are considered appropriate for a range of child ages, though not as sensitive to age-specific parenting tasks (Ćrnčec et al., 2010; Wittkowski et al., 2017). Overall, the reviewers found the extant literature contains 34 parental self-efficacy self-report measures, few clinically significant differences between the measures, a lack of criterion validity evidence, and a further need for psychometric evaluation (Wittkowski et al., 2017).

**Parental Social Support**

Social support is defined as “a social network’s provision of psychological and material resources intended to benefit an individual’s ability to cope with stress” (Cohen, 2004, p. 676), although it may also promote mental and physical health more directly (S. Cohen & Wills, 1985), and when stress is not present (S. Taylor, 2011). Social support may include instrumental support (financial assistance, help with chores), informational support (advice or guidance for problems), or emotional support, including “the expression of empathy, caring, reassurance, and trust and provides opportunities for emotional expression and venting.” (Cohen, 2004, p. 677).

There appears to be a relationship between the social support parents receive or perceive from others, (parental social support) and the HLE of toddlers: parental social support has been found to be positively correlated with more frequent HLE parent-child activities at both 14 months and 36 months (Green et al., 2007). While few studies have investigated the relationship between parental social support and the HLE, other studies have found positive benefits of parental social support on other parenting behaviours, including decreased ineffective parenting (McConnell et al., 2011) and punitive parenting (Leinonen et al., 2002). Social support has also
been found to have an impact on parental psychological distress. In a longitudinal study, social support was found to impact the relationship between parental psychological distress and later suboptimal parenting behaviour (Heberle et al., 2015). As well, in a recent Korean study, social support was found to predict more positive psychological well-being in mothers, which in turn was significantly associated with the quality of the HLE (Chang, 2017). Given the impact of social support on parental psychological distress, and the impact of social support on the HLE, it is possible that parental social support may buffer the impacts of depression on the HLE.

**Measures of Social Support.** The measurement of social support is usually based on self-report, using surveys or interviews (Gottlieb & Bergen, 2010). There are a wide variety of social support measures used in the literature. Different social support measures focus on different types of social support, and some include additional concepts, such as social networks and social integration (Gottlieb & Bergen, 2010). Perceived availability of support has been found to account for the buffering effects of support more than received support (S. Cohen & Wills, 1985; Gottlieb & Bergen, 2010). Therefore, measures of social support should reflect perception of support availability.

**Summary of the Literature**

In summary, family poverty has been shown to have a significant impact on child development. The family stress model may be a useful theoretical model for explaining this relationship at the family level. The model posits that family economic hardship leads to economic pressure, leading to parental psychological distress such as depression, leading to a deterioration in parenting behaviour, and ultimately results in poorer child adjustment. Evidence demonstrates poverty is linked with higher levels of parental depression, and parental depression has been linked with a negative impact on parenting behaviours.

The family stress model may also be useful in explaining the negative impact of poverty on parental provision of a quality HLE, which is known to impact child developmental outcomes. Most of our hypotheses are based on the family stress model, without clear empirical evidence; however, lower quality HLEs are associated with both poverty and parental depression, and the utility of the family stress model in explaining parental investments, a construct similar to, but broader in nature than the HLE, in kindergarten-age children, has been demonstrated in previous studies.
In addition, parental self-efficacy and parental social support may be parental protective factors that can disrupt family stress model processes on the HLE. Both parental self-efficacy and social support have been linked to better quality HLE. Parental self-efficacy has also been found to explain the effect of family stress on home learning activities. Parental social support has also been linked to better quality HLE through better positive psychological well-being in mothers.

This study aimed to address the following identified gaps in the literature: is the family stress model a useful theoretical model for explaining the impact of poverty on the HLE? Do parental self-efficacy and social support act as protective factors that buffer the relationship between parental depression and the HLE in parents experiencing poverty?
Chapter 3: Methods

The purpose of this study was to examine the relationships between economic hardship (e.g. low family income), economic pressure (e.g. financial difficulty), parental depression, parental self-efficacy, parental social support, and the HLE of toddlers. We aimed to answer the following research questions:

1) How are economic hardship and economic pressure associated with the HLE of toddlers, after accounting for parental education and child sex?
2) How is parental depression associated with the HLE of toddlers, after accounting for parental education, child sex, economic hardship, and economic pressure?
3) Does parental depression mediate the association between economic pressure and the HLE of toddlers, after accounting for parental education, child sex, and economic hardship?
4) How are parental self-efficacy and social support associated with the HLE of toddlers, after accounting for parental education, child sex, economic hardship, economic pressure, and parental depression?
5) Do parental self-efficacy and social support moderate the association between parental depression and the HLE of toddlers, after accounting for parental education, child sex, economic hardship, and economic pressure?

Research Design

This study was a secondary data analysis using a descriptive correlational study design with cross-sectional data. Descriptive correlational designs are valuable for detecting relationships, particularly in large data sets (Polit & Beck, 2018). Our study used an existing data set to ask new questions about relationships.

Sample

Data for this study were drawn from the Toddler Development Instrument (TDI) Phase 2 Pilot Implementation Study conducted by the Human Early Learning Partnership at the University of British Columbia (UBC). The purpose of that study was to determine reliability and validity of a questionnaire (TDI) that gathers information from parents and caregivers on the early life experiences and family and community contexts of toddlers aged 12-24 months: early physical, cognitive, social, and emotional development, healthy eating and sleep routines, play,
family-child interactions, and available supports (unpublished to date). The Human Early Learning Partnership collaborated with several community-based organizations providing services for families with young children in British Columbia to recruit participants and collect completed surveys. Convenience sampling was used.

The original sample included 486 parents or caregivers of toddlers 12-24 months of age who were residing in 19 communities across British Columbia in 2017. For the purposes of our study, age restriction was necessary to decrease the potential confounding effects of developmental age. Therefore, we excluded participants with children outside of the ages 14 to 24 months, and 21 cases that had missing age data. This resulted in a final sample size of 423. As only 1.7% of respondents of our final sample were non-parent guardians, we used the term “parent” to include both parents and non-parent respondents.

**Statistical Power.** The key analytic strategy used in this study was logistic regression. Determining sample size for multiple logistic regression is more complex than determining the required sample size for multiple linear regression. We used the most recent recommendation by Hosmer, Lemeshow, and Sturdivant (2013) of a minimum of 20 cases per predictor variable. To test a model with 6 predictors would, therefore, require 120 participants. Thus, our final sample size was determined to be adequate.

**Ethical Considerations**

This study was a secondary data analysis of previously collected data and posed no risks to participants. There were no known risks to participants in the original study. There were no known individual benefits to participants in the original study and are none in the present study. However, this study may provide insight into potential intervention points to disrupt the negative impact of low income on children’s development. UBC *Behavioural Research Ethics Board* approval was granted for this study.

**Data Collection**

Surveys in the original study were completed by paper and pen and took approximately 10-20 minutes of participants’ time. Surveys were collected and sent by facilitators to the UBC Human Early Learning Partnership.

**Access to Data**

The secondary data for this study were accessed via remote access to the UBC Human Early Learning Partnership’s secure access server. Access to the server was limited to the time
required for study completion. Prior to being granted access, completion of the Tri Council Policy Statement 2 course and study approval from the UBC Behavioural Research Ethics Board were required. Only the research team members responsible for statistical analysis of the data were given access. All personal identifiers were removed other than child birth dates, which were required for sample inclusion/exclusion purposes. Relevant data were extracted by L.B. from the master data file for the Toddler Development Instrument (TDI) study. Both the extracted data and all statistical analysis output were stored in the UBC Human Early Learning Partnership’s secure access server.

Measures

The Toddler Development Instrument (TDI) was developed by the UBC Human Early Learning Partnership in 2017. The TDI consists of 47 items related to demographic and contextual factors that influence early physical, cognitive, social, and emotional development of children, including play, reading, music, resources, and supports. Most items were drawn from existing Canadian research tools, including the National Longitudinal Survey on Children and Youth (Human Resources Development Canada, 1996; Statistics Canada, 1997) and Quebec Longitudinal Study of Child Development (Institut de la statistique du Quebec, 2019). These were incorporated into the TDI after review and refinement by research experts within the UBC Human Early Learning Partnership, and after input from the TDI’s community-based partners (early childhood professionals) and parents/caregivers. The measures used in the present study are described below.

Economic Hardship

Because this study was theoretically framed within the family stress model, our goal was to capture poverty in terms of both economic hardship and economic pressure. We operationalized economic hardship as low income. The underlying principle of low income measurement is that measures “should compare one’s resources with one’s needs” (Xu & Ren, 2017, p. 570). Although there is a difference in income-to-need ratios across our study sites in British Columbia (e.g., because of higher or lower living expenses), families (lone parent with one child, couple with one child, lone parent with two children, or couple with two children) living anywhere in the province making $50,000 or less were living below Statistics Canada’s 2017 Thresholds for After-Tax Census of Family Low Income Measures (CFLIM-AT) for family type and composition (First Call BC Child and Youth Advocacy Coalition, 2019; Statistics
Canada, 2017). Therefore we used a self-reported measure of income: 

> Which of the following is the best estimate of your overall household income last year, before taxes? 

Items were measured on a 7-point Likert scale from 1-7: Under $20,000, $20,000-49,999, $50,000-74,999, $75,000-99,999, $100,000-149,000, $150,000-199,999, $200,000 or more. We recoded responses into a binary variable indicating low income (0=$50,000 and above, 1=less than $50,000). To ensure that this recoding scheme did not bias our statistical results, we tested the relationship between income and our outcome variable (reading/storytelling) with income measured in various forms (the original 7-point measure, as 3 categories, and as a binary variable with different cut-off points) using means plots and correlation and chi-square tests. We also tested income measured in these same various forms in our logistic regression analysis. The pattern of relationships remained stable so we retained the $50,000 cut-off point.

**Economic Pressure**

The TDI used a self-reported single item drawn from the Kingston Caregiver Stress Scale, which was developed in used in studies of dementia patients, “How often do you experience any financial difficulties associated with raising this child/your family?” to measure subjective family economic concerns. There is no published reliability or validity information reported for this single item. We used this item as our measure of economic pressure. Items were measured on a 5-point scale ranging from 0-4: Never, a few times a year or less, about once a month, a few times a month, most days, or every day. We expected a qualitative difference between experiencing financial difficulties once a month or more compared to a few times per year or less. Therefore, we recoded responses into a binary variable with 0=less than once a once a month, and 1=once a month or more. To ensure that this recoding scheme did not bias our statistical results, we tested the relationship between financial difficulty and our outcome variable with financial difficulty measured in various forms (as 3 categories, and as a binary variable with different cut-off points) using means plots and correlation and chi-square tests. We also tested financial difficulty measured in these same various forms in our logistic regression analysis. The pattern of relationships remained stable so we retained the once a month or more cut-off point.

**Parental Depression**

The TDI used the 2-question Patient Health Questionnaire – 2 (PHQ-2) (Kroenke et al., 2003) as a measure of parental depressive symptoms. The PHQ-2 is considered a depression
screener, rather than diagnostic tool, and has been demonstrated to have good criterion and construct validity (Kroenke et al., 2003). The items asked “over the past two weeks, how often have you been experiencing any of the following: 1) having little interest or pleasure in doing things? 2) feeling down, depressed, or hopeless?” The 4-point response scale ranged from 0-3 (not at all, several days, more than half the days, nearly every day) for a total possible score of 0-6, consistent with the original PHQ-2 scale. A score of 3 or more has high sensitivity and specificity for major depression and is considered the optimal cut-off for depression screening purposes (Kroenke et al., 2003). However, in our study, only 9% of the sample scored 3 or above. We recoded this variable into a binary variable of no depressive symptoms 0=0 and any depressive symptoms 1=1 or more. 38% of our sample fell into the any depressive symptoms category.

Parental Self-Efficacy

The TDI questions regarding parental self-efficacy were based on the Quebec Longitudinal Study of Child Development (Institut de la statistique du Quebec, 2019) [section 2; questions 35 (24), 49 (38), 29 (18)] and Kingston Caregiver Stress Scale (Caregiving issues, question 6) (Kilik & Hopkins, 2006). The questions were modified by the Human Early Learning Partnership development team. TDI items included My parenting/caregiving has a large impact on this child’s development and wellbeing; What I do as a parent/caregiver supports this child’s development and wellbeing; I feel confident in my ability to provide care for this child; I feel I am good at calming this child down when she/he is upset, fussy, or crying. Items were measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). We found Cronbach’s alpha coefficient for the 4 items was .839, suggesting good internal consistency. We computed a mean score for the four items (for cases that had provided responses to at least three of the 4 questions). To aid in coding and interpretation of interaction terms and results, we then recoded the ordinal level mean scores into a binary variable of low parental self-efficacy (0=less than 5.0) versus high parental self-efficacy (1=5.0). 56% of our sample scored fell into the high parental self-efficacy category. To ensure that this recoding scheme did not bias our statistical results, we tested the relationship between parental self-efficacy and our outcome variable (reading/storytelling) with parental self-efficacy measured in various forms (as a binary variable with different cut-off points) using means plots and correlation and chi-square tests. We also
tested parental self-efficacy measured in these same various forms in our logistic regression analysis. The pattern of relationships remained stable so we retained the 5.0 cut-off point.

**Parental Social Support**

The TDI used a perceived emotional support question from the *Quebec Longitudinal Study of Child Development* (Institut de la statistique du Quebec, 2019) that was adapted from the *Multidimensional Scale of Perceived Social Support* (Family Subscale) (Zimet et al., 1988): *I get the emotional help and support I need from my family and friends.* Items were measured on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). We recoded responses into a binary variable indicating *low* (0=less than 5.0) versus *high* (1=5.0) levels of social support. To ensure that this recoding scheme did not bias our statistical results, we tested the relationship between social support and our outcome variable (reading/story-telling) in various forms (as the original 5-point measure, and as a binary variable with different cut-off points) using means plots and correlation and chi-square tests. The original 5-point measure and binary variable code described above were associated with our outcome variable, though alternate binary variable coding was not. We also tested social support measured in these same various forms in our logistic regression analysis. Because the pattern of relationships between the 5.0 cut-off point and original measure was consistent, we retained the 5.0 cut-off point.

**The HLE**

The TDI included several items indicative of the HLE. However, because shared book reading is the most commonly used measure of the HLE across studies, and, as a single-item measure, has been shown to be predictive of children’s learning outcomes (Farrant & Zubrick, 2013; Hayes et al., 2018; H. Raikes et al., 2006), in this study we used shared book reading and story-telling frequency as a representative measure of the home learning environment. The specific TDI item used was, *“During the past month, how often did you or another adult in this child’s household read books or tell stories with this child?”* The TDI drew this question from the literacy and learning activities section of the *National Longitudinal Survey on Children and Youth (Cycle 8 Survey Instruments, 2008/2009, question: LIT_Q01C, LIT_Q01E).* The item was measured on a 5-point scale from 0-5: *not yet, less than once a week, once a week, 2-3 times a week, 4-6 times a week, one or more times daily* (Human Resources Development Canada, 1996; Statistics Canada, 1997). To be consistent with logistic regression data requirements, we recoded responses into a binary variable with 0=*less than 4 times a week* and 1=*4 times a week or more.*
This cut-off was chosen for statistical reasons, as only 12.5% of the sample reported a frequency of less than 4 times a week. Means plots and correlation and chi-square tests indicated a relationship between reading/story-telling frequency in both forms (the original 5-point measure, and the binary variable at this 4.0 cut-off point) and all other study variables, so we retained the binary form to permit logistic regression analysis.

**Control Variables**

Parental education and child sex were controlled for in our various analyses. The TDI asked about the participants’ highest education level, with 8 possible responses. Based on previous studies finding an association between maternal educational attainment of a post-secondary qualification (coded “yes” or “no”) and both shared book reading and other home activities (Hayes et al., 2018), we recoded responses into a binary variable with \( 0 = \text{high school or less} \), and \( 1 = \text{some post-secondary or more} \). We tested the relationship between parental education in various forms (as the original 9-point measure, as a categorical variable with 3 levels, and as a binary variable at this cut-off point) and our outcome variable (reading/story-telling) using means plots and correlation and chi-square tests. The pattern of relationships remained stable so we retained the high school cut-off point. Child sex was also controlled for using a binary variable of \( 0 = \text{male} \) and \( 1 = \text{female} \).

**Data Analysis Procedure**

Data were cleaned using frequency listings and logic checks. Missing data were assessed, and amounted to less than 5% of cases per variable, so no further action was taken. During variable recoding, we ensured each category of each variable contained a minimum of 10-15% of the sample to ensure more accurate and precise statistical estimates. Our lowest percentage of the sample in a category was the outcome variable with 12.5% of sample in the lowest category \((\text{reading/story-telling less than 4 times a week})\). Analysis began with performing descriptive statistics (frequencies and measures of central tendency appropriate to the distribution of the data) to examine the demographic characteristics of the sample and key study variables. Next, means plots with 95% confidence interval and error bars were graphed between the dependent variable and each of the independent variables to explore relationships. Bivariate analyses using chi-square test for independence and Pearson correlations were then conducted to examine the strength and direction of the relationships between key variables. Lastly, a series of hierarchical binary logistic regressions was performed. IBM Statistical Program for the Social Sciences
(SPSS) version 25 software was used for all analyses. An alpha of 0.05 was used as the criterion for determining statistical significance.

**Logistic Regression**

The order of entry of variables into the regression equations was determined by closely following the steps of the family stress model and our conceptual model for the study (see Figure 1 in Chapter 1). Moderating effects were analyzed by entering the full model followed by each interaction term separately: a) parental depression x parental self-efficacy, and b) parental depression x parental social support. The specific set of variables and sequence of variable entry is outlined below, for each research question:

1) How are economic hardship and economic pressure associated with the HLE of toddlers, after accounting for parental education and child sex?
   - **DV:** HLE (Shared Reading and Story-Telling Frequency)
   - **Block 1:** Parental Education
     - Child Sex
   - **Block 2:** Economic Hardship (Low Income)
     - Economic Pressure (Financial Difficulty)

2) How is parental depression associated with the HLE of toddlers, after accounting for parental education, child sex, economic hardship, and economic pressure?
   - **DV:** HLE (Shared Reading and Story-Telling Frequency)
   - **Block 1:** Parental Education
     - Child Sex
   - **Block 2:** Economic Hardship (Low Income)
     - Economic Pressure (Financial Difficulty)
   - **Block 3:** Parental Depression

3) Does parental depression mediate the influence of economic pressure on the HLE of toddlers?
   
   Note: the following sub-analysis will be conducted as a test of mediation effects following the analysis for research question 2 above:
4) How are parental self-efficacy and social support associated with the HLE of toddlers, after accounting for parental education, child sex, economic hardship, economic pressure, and parental depression?
   DV: HLE (Shared Reading and Story-Telling Frequency)
   Block 1: Parental Education
           Child Sex
   Block 2: Economic Hardship (Low Income)
           Economic Pressure (Financial Difficulty)
   Block 3: Parental Depression
   Block 4: Parental Self-Efficacy
           Parental Social Support

5) Do parental self-efficacy and social support moderate the influence of parental depression on the HLE of toddlers, after accounting for parental education, child sex, economic hardship, and economic pressure?
   DV: HLE (Shared Reading and Story-Telling Frequency)
   Block 1: Parental Education
           Child Sex
   Block 2: Economic Hardship (Low Income)
           Economic Pressure (Financial Difficulty)
   Block 3: Parental Depression
   Block 4: Parental Self-Efficacy
           Parental Social Support
   Block 5a: Parental Depression x Parental Self-Efficacy
   Block 5b: Parental Depression x Parental Social Support
Chapter 4: Results

This chapter presents the findings of our study examining a revised version of the family stress model for predicting the HLE of toddlers. We examined the relationships between economic hardship, economic pressure, depression, parental self-efficacy, social support, and the HLE of toddlers. We also tested whether depression mediates the relationship between economic pressure and the HLE, and whether parental self-efficacy and social support moderate the relationship between depression and the HLE of toddlers. Study findings are presented in three sections. The first section reports descriptive statistics of the study sample and key study variables. The second section presents the results of bivariate analysis: chi square tests of the associations between key predictor variables and our outcome variable. Results of hierarchical logistic regression analyses predicting the HLE are presented in the third section.

Descriptive Statistics

Descriptive statistics, frequencies and measures of central tendency appropriate to the distribution of the data, were used to examine the demographic characteristics of the sample (see Table 1) and describe the distribution of key study variables (see Table 2). The mean age of toddlers in the sample was 18.7 months (SD 1.86); approximately half were male and half were female. Only 2% of the toddlers were born outside of Canada; therefore, we did not control for immigrant status in our final analysis. Of adult respondents, almost all were parents (98%) and female (88%). As less than 2% of the sample identified as non-parent guardians, we used the term “parent” to include both parent and non-parent guardians. The majority of parents (82%) resided in towns rather than large urban centres. Approximately one quarter (27%) of parents reported economic hardship (low family income under $50,000), but only 16% reported economic pressure (financial difficulties once per month or more). The majority (80%) had at least some post-secondary education, and 40% had a university degree or higher. At least one depressive symptom was reported by over one third (37%) of parents. Approximately half of the parents reported high levels of parental self-efficacy (55%) and social support (47%). The outcome variable in this study was the HLE (measured by frequency of shared reading and storytelling); only 12.5% of the sample read with or told stories to their child less than 3 times per week.
Table 1

Demographic Characteristics of Participants (N= 423)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>M (SD)</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respondent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent</td>
<td>-</td>
<td>413 (97.6)</td>
</tr>
<tr>
<td>Non-Parent Guardian</td>
<td>-</td>
<td>7 (1.7)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>-</td>
<td>370 (87.5)</td>
</tr>
<tr>
<td>Male</td>
<td>-</td>
<td>53 (12.5)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
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<td></td>
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<tr>
<td>High School or Less</td>
<td>-</td>
<td>79 (18.7)</td>
</tr>
<tr>
<td>Some Post-Secondary or More</td>
<td>-</td>
<td>337 (79.7)</td>
</tr>
<tr>
<td><strong>Region</strong></td>
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<td></td>
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<tr>
<td>Large Urban Centre</td>
<td>-</td>
<td>77 (18.2)</td>
</tr>
<tr>
<td>Town</td>
<td>-</td>
<td>346 (81.8)</td>
</tr>
<tr>
<td><strong>Child Age (Months)</strong></td>
<td>18.7 (1.86)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Child Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>-</td>
<td>215 (50.8)</td>
</tr>
<tr>
<td>Female</td>
<td>-</td>
<td>206 (48.7)</td>
</tr>
<tr>
<td><strong>Child Born in Canada</strong></td>
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<td></td>
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<tr>
<td>Yes</td>
<td>-</td>
<td>409 (96.7)</td>
</tr>
<tr>
<td>No</td>
<td>-</td>
<td>9 (2.1)</td>
</tr>
</tbody>
</table>
Table 2

Descriptive Statistics for Key Predictors and the HLE (Frequency of Shared Reading/Story-telling) (N = 423).

<table>
<thead>
<tr>
<th>Predictors</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economic Hardship</strong></td>
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</tr>
<tr>
<td>No (family income ≥ $50,000)</td>
<td>287 (67.8)</td>
</tr>
<tr>
<td>Yes (family income &lt; $50,000)</td>
<td>117 (27.7)</td>
</tr>
<tr>
<td><strong>Economic Pressure</strong></td>
<td></td>
</tr>
<tr>
<td>Low (financial difficulty &lt; 1/month)</td>
<td>348 (82.3)</td>
</tr>
<tr>
<td>High (financial difficulty ≥ 1/month)</td>
<td>69 (16.3)</td>
</tr>
<tr>
<td><strong>Parental Depression</strong></td>
<td></td>
</tr>
<tr>
<td>No symptoms</td>
<td>253 (59.8)</td>
</tr>
<tr>
<td>Any (≥1) symptoms</td>
<td>161 (38.1)</td>
</tr>
<tr>
<td><strong>Parental Self-Efficacy</strong></td>
<td></td>
</tr>
<tr>
<td>Low (scores &lt;5)</td>
<td>181 (42.8)</td>
</tr>
<tr>
<td>High (score = 5)</td>
<td>237 (56.0)</td>
</tr>
<tr>
<td><strong>Parental Social Support</strong></td>
<td></td>
</tr>
<tr>
<td>Low (scores &lt; 5)</td>
<td>223 (52.7)</td>
</tr>
<tr>
<td>High (score = 5)</td>
<td>197 (46.6)</td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td></td>
</tr>
<tr>
<td>HLE (Frequency of Shared Reading/Story-telling)</td>
<td></td>
</tr>
<tr>
<td>Less frequent (&lt;4 times/week)</td>
<td>53 (12.5)</td>
</tr>
<tr>
<td>More frequent (4+ times/week)</td>
<td>370 (87.5)</td>
</tr>
</tbody>
</table>

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

Bivariate Analysis

Chi-square tests were conducted to examine the strength and direction of the relationships between the HLE and predictor variables (see Table 3). All key predictor variables were associated with the HLE in the expected direction. Parents with economic hardship were less likely to read more frequently (75.2%) than those without economic hardship (92.7%), \( \chi^2 = 23.39, p < .001 \); similarly, those with more economic pressure were less likely to read more frequently (71.0%) than those without economic hardship (90.8%), \( \chi^2 = 20.66, p < .001 \). Parents with any depressive symptoms were also less likely to read more frequently (77.0%) than those without any depressive symptoms (94.1%), \( \chi^2 = 26.05, p < .001 \). Parents with lower parental self-efficacy were less likely to read more frequently (81.2%) than those with high parental self-efficacy (92.4%), \( \chi^2 = 11.80, p = .001 \); and those with lower social support were also less likely to read
more frequently (84.3%) than those with higher social support (91.9%), \( \chi^2 = 5.62, p = .018 \). The chi-square test results supported the inclusion of all key predictor variables in the multivariate model. Using Cohen’s (1988) effect size criteria (for 2 X 2 tables, .10 = small, .30 = medium, .50 = large), economic hardship (\( phi = -.241 \)), economic pressure (\( phi = -.223 \)), depression (\( phi = -.251 \)), and parental self-efficacy (\( phi = .168 \)) showed small to medium effect sizes for their relationship with HLE. Social support (\( phi = .116 \)) showed a small effect size. Of our control variables, parental education yielded a small-medium effect size (\( phi = .262 \)), but child sex was non-significant.

Correlation analysis was also conducted to examine the strength and direction of the relationships between all key variables; Table 4 shows the phi coefficients for the associations. Economic pressure was negatively associated with all key study variables except parental self-efficacy. Economic pressure had a positive association of medium effect size with economic hardship (\( phi = .305 \)) and small to medium effect size with parental depression (\( phi = .283 \)). Parental social support and parental self-efficacy were moderately positively correlated with one another (\( phi = .304 \)). Parental social support was moderately negatively correlated with Parental Depression (\( phi = -.313 \)).
Table 3

Chi-Square Test Results

<table>
<thead>
<tr>
<th></th>
<th>HLE (Frequency of Shared Reading/Story-telling)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less frequent (n=53)</td>
<td>More frequent (n =370)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>$\chi^2$ (df, n)</td>
<td></td>
</tr>
<tr>
<td><strong>Parental Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ High school</td>
<td>24 (30.4)</td>
<td>55 (69.6)</td>
<td>28.50*** (1, 416)</td>
<td></td>
</tr>
<tr>
<td>≥ Some post-secondary</td>
<td>28 (8.3)</td>
<td>309 (91.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Child Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>32 (14.9)</td>
<td>183 (85.1)</td>
<td>2.10 (1, 421)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>21 (10.2)</td>
<td>185 (89.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Economic Hardship</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (family income ≥ $50,000)</td>
<td>21 (7.3)</td>
<td>266 (92.7)</td>
<td>23.39*** (1, 404)</td>
<td></td>
</tr>
<tr>
<td>Yes (family income &lt; $50,000)</td>
<td>29 (24.8)</td>
<td>88 (75.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Economic Pressure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (financial difficulty &lt; 1/month)</td>
<td>32 (9.2)</td>
<td>316 (90.8)</td>
<td>20.66*** (1, 417)</td>
<td></td>
</tr>
<tr>
<td>High (financial difficulty ≥ 1/month)</td>
<td>20 (29.0)</td>
<td>49 (71.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parental Depression</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No symptoms</td>
<td>15 (5.9)</td>
<td>238 (94.1)</td>
<td>26.05*** (1, 414)</td>
<td></td>
</tr>
<tr>
<td>Any (1 or more) symptoms</td>
<td>37 (23.0)</td>
<td>124 (77.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parental Self-Efficacy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (scores &lt; 5)</td>
<td>34 (18.8)</td>
<td>147 (81.2)</td>
<td>11.80** (1, 418)</td>
<td></td>
</tr>
<tr>
<td>High (scores = 5)</td>
<td>18 (7.6)</td>
<td>219 (92.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parental Social Support</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (scores &lt; 5)</td>
<td>35 (15.7)</td>
<td>188 (84.3)</td>
<td>5.62** (1, 420)</td>
<td></td>
</tr>
<tr>
<td>High (score = 5)</td>
<td>16 (8.1)</td>
<td>181 (91.9)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. HLE coded 0= Less frequent (< 4/week), 1= More frequent (≥ 4/week). $\chi^2$ reported with Yates Continuity Correction for 2x2 tables, reported significance is asymptotic (2-sided). No cells had expected counts less than 5. *p < .05, **p < .01, ***p < .001.
### Table 4

Correlations (Phi Coefficients) between Key Study Variables

<table>
<thead>
<tr>
<th>Study variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. HLE (^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Parental Education (^b)</td>
<td></td>
<td>.262**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Child Sex (^c)</td>
<td></td>
<td>.071</td>
<td>.032</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Economic Hardship (^d)</td>
<td></td>
<td>-.241**</td>
<td>-.266**</td>
<td>-.054</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Economic Pressure (^e)</td>
<td></td>
<td>-.223**</td>
<td>-.116*</td>
<td>-.118*</td>
<td>.305**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Parental Depression (^f)</td>
<td></td>
<td>-.251**</td>
<td>.075</td>
<td>.094</td>
<td>.128**</td>
<td>.283**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Parental Self-Efficacy (^g)</td>
<td></td>
<td>.168**</td>
<td>-.014</td>
<td>.065</td>
<td>.023</td>
<td>-.057</td>
<td>-.168**</td>
<td></td>
</tr>
<tr>
<td>8. Parental Social Support (^h)</td>
<td></td>
<td>.116*</td>
<td>.091</td>
<td>.128**</td>
<td>-.133**</td>
<td>-.200**</td>
<td>-.313**</td>
<td>.304**</td>
</tr>
</tbody>
</table>

Note. \(^a\)0= Less frequent (< 4/week), 1= More frequent (≥ 4/week); \(^b\)0= ≤ High school, 1= ≥ Some post-secondary; \(^c\)0= Male, 1= Female; \(^d\)0= No family income (≥ $50,000), 1= Yes (< $50,000); \(^e\)Financial difficulty 0= < 1/month, 1= ≥ 1/month; \(^f\)0= No symptoms, 1= Any (1+) symptoms; \(^g\)0= Low (scores < 5), 1= High (scores = 5); \(^h\)0= Low (scores < 5), 1= High (scores = 5). 

\(^*p < .05\), \(^**p < .01\), \(^***p < .001\)
Hierarchical Binary Logistic Regression

Hierarchical logistic regression analysis was conducted to answer the five research questions. Prior to running the analysis, we checked the following data assumptions for logistic regression, as outlined by Tabachnick and Fidell (2019):

*Ratio of cases to variables and adequacy of expected frequencies and power:* Using the SPSS Crosstabs procedure, we evaluated expected cell frequencies between reading/story-telling and each key predictor. All expected cell frequencies were greater than 5, which met Tabachnick and Fidell’s criteria for adequacy of expected frequencies and power (all expected cell sizes are greater than 1 and no more than 20% of cell frequencies are less than 5).

*Absence of Multicollinearity:* High correlations among predictor variables may result in large parameter estimates and standard errors and/or failure of a tolerance test. Therefore, we checked multicollinearity using SPSS multiple regression collinearity diagnostics procedure (Pallant, 2016). All variables included had tolerance values > .1 and variance inflation factor (VIF) values less than 10, indicating the key predictors were not highly correlated with one another.

*Outliers:* In logistic regression, if enough cases are poorly predicted by the solution, the model will have poor fit. Therefore, post-analysis, we examined the standardized residuals for outliers. In each analysis, less than 5% of the 423 cases had standardized residual z scores below -2.5, so these were retained.

**Logistic Regression Findings**

Results for the logistic regression analyses are reported with respect to each of the five research questions (see Tables 4 and 5).

*Question 1: How are economic hardship and economic pressure associated with the HLE of toddlers after accounting for parental education and child sex?* In statistical Model 1, we entered the two control variables, education and child sex. Both variables were significant predictors (education, OR = 5.225, 95% CI [2.719, 10.040]; child sex, OR = 2.073, 95% CI [1.084, 3.967]). Parents with higher education and female children were more likely to report more frequent shared reading/story-telling. We entered economic hardship and economic pressure in statistical Model 2 to determine if they were associated with the HLE over and above parental education and child sex. The goodness of fit test (Omnibus Tests of Model Coefficients) indicated that Model 2 performed significantly better than Model 1, $\chi^2 (2) = 18.223, p < .001$. As
hypothesized, parents who reported economic hardship, OR = 0.407, 95% CI [0.204, 0.813] and economic pressure, OR = 0.381, 95% CI [0.185, 0.784], were less likely to report more frequent shared reading/story-telling compared with parents without economic hardship and economic pressure. Stated inversely, those without economic hardship and economic pressure were 2.5 and 2.6 times more likely to report more frequent shared reading/story-telling. However, the strongest predictor of more frequent shared reading/story-telling was the control variable, parental education. Those parents with any post-secondary education were 3.6 times more likely to report more frequent reading/story-telling than those who had high school education or less (95% CI [1.799, 7.293]). Child sex was not predictive of the HLE after adding economic hardship and pressure to the model. Overall, Model 2 was statistically significant, $\chi^2 (4) = 45.058, p < .001$, with a Nagelkerke pseudo R$^2$ of 20.6%. The model correctly classified 99.1% of those who reported more frequent shared reading/story-telling, but only 12.2% of those who reported less frequent shared reading/story-telling. Model 2 results indicated that after accounting for parental education and child sex, economic hardship and economic pressure were both negatively associated with the HLE, as hypothesized.

**Question 2:** How is parental depression associated with the HLE of toddlers after accounting for parental education, child sex, economic hardship, and economic pressure? The results of Model 3 supported our hypothesis that parental depression is negatively associated with the HLE of toddlers over and above the effects of parental education, child sex, economic hardship, and economic pressure. Parents with any symptoms of depression were less likely to report more frequent shared reading/story-telling than those without symptoms of depression, OR= 0.213, 95% CI [0.102, 0.446]. Stated inversely, parents without any depressive symptoms were 4.7 times more likely to report more frequent reading/story-telling. In Model 3, depression was the strongest predictor of more frequent reading/story-telling. Model 3 performed significantly better than Model 2, $\chi^2 (1) = 18.677, p < .001$. Model 3, $\chi^2 (5) = 63.734, p < .001$, had a Nagelkerke R$^2$ of 28.5%, and correctly classified 98.8% of those who reported more frequent shared reading/story-telling with their toddlers, but only 24.5% of those who reported less frequent shared reading/story-telling. Classification of those who reported a poorer HLE improved by 12.2% over Model 2.

**Question 3:** Does parental depression mediate the association between economic pressure and the HLE of toddlers, after accounting for parental education, child sex, and
economic hardship? Mediator variables explain the pathway by which a predictor influences an outcome. Following the causal steps approach of Baron and Kenny (1986), the results of Model 3 provide evidence that parental depression mediates the impact of economic pressure on the HLE, as hypothesized. Economic pressure was statistically significant in Model 2, but became non-significant after depression was included in Model 3. We then tested the relationship between economic pressure and parental depression by regressing parental depression on economic pressure. Logistic regression results yielded an OR of 4.804, 95% CI [2.718, 8.491], \( p \leq .001 \), indicating that economic pressure was highly predictive of parental depression. Taken together, results indicate that parental depression fully mediated the effects of economic pressure on the HLE. No further mediation testing was conducted as the results indicated full rather than partial mediation.

**Question 4:** How are parental self-efficacy and social support associated with the HLE of toddlers after accounting for parental education, child sex, economic hardship, economic pressure, parental depression? Our hypothesis that higher parental self-efficacy and social support are positively associated with the HLE of toddlers, over and above parental education, child sex, economic hardship, economic pressure, and parental depression was supported for parental self-efficacy but not for social support. In Model 4, parents with high parental self-efficacy were almost 3 times more likely to report more frequent shared reading/story-telling than those with lower parental self-efficacy, \( \text{OR} = 2.796, 95\% \text{ CI} [1.319, 5.925] \). However, social support was not statistically significant over and above the other variables in Model 4, \( \text{OR} = 0.789, 95\% \text{ CI} [0.358, 1.741] \). Model 4, \( \chi^2 (7) = 71.400, p < .001 \), performed significantly better than Model 3, \( \chi^2 (2) = 7.666, p = .022 \). The Nagelkerke pseudo \( R^2 \) improved from 28.5% in Model 3 to 31.6% in Model 4, but the correct classification of those with less frequent shared reading/story-telling dropped from 24.5% to 20.4%, indicating a slightly poorer predictive ability than Model 3.

**Question 5:** Do parental self-efficacy and social support moderate the association between parental depression and the HLE of toddlers, after accounting for parental education, child sex, economic hardship, and economic pressure? Moderator variables affect the strength or direction of a relationship between variables (Polit & Tatano Beck, 2017), and we hypothesized that each parental self-efficacy and social support would buffer the negative association between parental depression and the HLE of toddlers. As indicated in Table 5, we ran two separate
analyses to test each interaction term independently (Model 5 parental depression X parental self-efficacy and Model 6 parental depression X parental social support). After accounting for other variables in the model, neither of the interaction terms were found to be significant, failing to support our hypothesis. Moreover, goodness of fit tests indicated that neither Model 5 or Model 6 performed better than Model 4.
### Table 5

Results of Hierarchical Logistic Regression Analyses Predicting the HLE (Frequency of Shared Reading/Story-telling)

<table>
<thead>
<tr>
<th></th>
<th>Model 1 OR [95% CI]</th>
<th>Model 2 OR [95% CI]</th>
<th>Model 3 OR [95% CI]</th>
<th>Model 4 OR [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Sex&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.073* [1.084, 3.967]</td>
<td>1.818 [0.925, 3.573]</td>
<td>1.759 [0.876, 3.535]</td>
<td>1.722 [0.844, 3.513]</td>
</tr>
<tr>
<td>Economic Hardship&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.407* [0.204, 0.813]</td>
<td>0.402* [0.195, 0.827]</td>
<td>0.354* [1.690, 0.739]</td>
<td>0.354 [1.890, 0.739]</td>
</tr>
<tr>
<td>Economic Pressure&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.381** [0.185, 0.784]</td>
<td>0.569 [0.267, 1.210]</td>
<td>0.551 [0.255, 1.190]</td>
<td>0.551 [0.255, 1.190]</td>
</tr>
<tr>
<td>Parental Depression&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
<td>0.213*** [0.102, 0.446]</td>
<td>0.234*** [0.109, 0.505]</td>
<td></td>
</tr>
<tr>
<td>Parental Self-Efficacy&lt;sup&gt;f&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>2.796** [1.319, 5.925]</td>
</tr>
<tr>
<td>Parental Social Support&lt;sup&gt;g&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>0.789 [0.358, 1.741]</td>
</tr>
<tr>
<td>Nagelkerke Pseudo R2</td>
<td>12.6%</td>
<td>20.6%</td>
<td>28.5%</td>
<td>31.6%</td>
</tr>
<tr>
<td>Correct Classification</td>
<td>87.4%</td>
<td>88.1%</td>
<td>89.5%</td>
<td>86.9%</td>
</tr>
<tr>
<td>More frequent</td>
<td>100.0%</td>
<td>99.1%</td>
<td>98.8%</td>
<td>96.5%</td>
</tr>
<tr>
<td>Less frequent</td>
<td>0.0%</td>
<td>12.2%</td>
<td>24.5%</td>
<td>20.4%</td>
</tr>
</tbody>
</table>

Note. CI = Confidence Interval. HLE coded 0= Less frequent (< 4/week), 1= More frequent (≥ 4/week); <sup>a</sup>0= ≤ High school, 1= ≥ Some post-secondary; <sup>b</sup>0= Male, 1= Female; <sup>c</sup>Low family income 0= No (≥ $50,000), 1= Yes (< $50,000); <sup>d</sup>Financial difficulty 0= < 1/month, 1= ≥ 1/month; <sup>e</sup>0= No symptoms, 1= Any (1+) symptoms; <sup>f</sup>0= Low (scores < 5), 1= High (scores ≥ 5); <sup>g</sup>0= Low (scores < 5), 1= High (scores ≥ 5).

*p < .05, **p < .01, ***p < .001
Table 6

Results of Hierarchical Logistic Regression Analyses Predicting the HLE (Frequency of Shared Reading/Story-telling): Testing Moderating Effects

<table>
<thead>
<tr>
<th></th>
<th>Model 5 OR [95% CI]</th>
<th>Model 6 OR [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parental Education</td>
<td>3.793** [1.777, 8.098]</td>
<td>3.744** [0.754, 7.993]</td>
</tr>
<tr>
<td>Child Sex</td>
<td>1.725 [0.846, 3.515]</td>
<td>1.685 [0.820, 3.458]</td>
</tr>
<tr>
<td>Economic Hardship</td>
<td>0.360** [0.173, 0.750]</td>
<td>0.358** [0.171, 0.751]</td>
</tr>
<tr>
<td>Economic Pressure</td>
<td>0.542 [0.251, 1.173]</td>
<td>0.553 [0.256, 1.191]</td>
</tr>
<tr>
<td>Parental Depression</td>
<td>0.320* [0.124,0.830]</td>
<td>0.266* [0.102, 0.696]</td>
</tr>
<tr>
<td>Parental Social Support</td>
<td>0.769 [0.349, 1.694]</td>
<td>0.974 [0.272, 3.489]</td>
</tr>
<tr>
<td>Parental Depression x Parental Self-Efficacy</td>
<td>0.456 [0.099, 2.106]</td>
<td>0.720 [0.152, 3.413]</td>
</tr>
</tbody>
</table>

Nagelkerke Pseudo R² | 32.0% | 31.7% |
Correct Classification | 88.7% | 88.1% |
More frequent | 97.3% | 97.3% |
Less frequent | 28.6% | 24.5% |

Note. CI= Confidence Interval. HLE coded 0= Less frequent (< 4/week), 1= More frequent (≥ 4/week); a 0= ≤ High school, 1= ≥ Some post-secondary; b 0= Male, 1= Female; c Low family income 0= No (< $50,000), 1= Yes (≥ $50,000); d Financial difficulty 0= < 1/month, 1= ≥ 1/month; e 0= No symptoms, 1= Any (1+) symptoms; f 0= Low (scores < 5), 1= High (scores ≥ 5); g 0= Low (scores < 5), 1= High (scores ≥ 5).
*p < .05, **p < .01, ***p < .001

Summary

Among the statistical models we tested, the best fitting statistical model for predicting reading/story-telling frequency was Model 4, which correctly classified 96.5% of parents who engaged in more frequent shared reading/story-telling with their toddlers. However, in all of our statistical models parents who engaged in less frequent reading/story-telling were poorly identified. Figure 2 shows the results obtained in Model 4 for each of the hypothesized pathways in the conceptual model. Parental depression was the strongest independent predictor of reading/story-telling frequency, followed by parental education, economic hardship, and parental...
self-efficacy. Our results also indicated that parental depressive symptoms mediated the association between economic pressure and the HLE.
Figure 2: Conceptual Model with Results

Note: NS = non-significant. Figure 2 summarizes the results (Statistical Model 4 reported) found for the different pathways hypothesized in our conceptual model. Solid lines indicate direct relationships; + and – indicates positive and negative relationships respectively. Dotted lines indicate hypothesized buffering effects. a Result from Statistical Model 2: Economic Pressure had a significant direct negative relationship with HLE prior to adding Depression. b Result from Statistical Model 4: Economic Pressure did not have a significant direct relationship with HLE after adding Depression. c Logistic Regression Analysis results for Parental Depression regressed on Economic Pressure. p < .05, **p < .01, ***p < .001
Chapter 5: Discussion

The purpose of this study was to examine the relationships between economic hardship (e.g. low family income), economic pressure (e.g. financial difficulty), parental depression, parental self-efficacy, parental social support, and the HLE (e.g. reading and story-telling frequency) of toddlers. We found the family stress model predicted those parents providing a higher quality HLE, but did not predict those parents providing lower quality HLE. Nevertheless, we found evidence for four of our five hypotheses; our findings indicate the HLE is negatively associated with economic hardship, economic pressure, and parental depression, and positively associated with parental self-efficacy. Contrary to two of our hypotheses, the relationship between parental social support and the HLE was not significant, and parental self-efficacy and social support did not buffer the association between parental depression and the HLE. Economic pressure was non-significant after adding parental depression. All other hypothesized relationships were statistically significant. The following chapter will discuss these key findings as they relate to each of our research questions, followed by a discussion of implications for future research and practice, strengths and limitations of the study, and conclusion.

Question 1: How are economic hardship and economic pressure associated with the HLE of toddlers after accounting for parental education and child sex? Similar to other recent studies (Hayes et al., 2018), we found our control variables, higher parental education and child female sex, were both associated with a more positive HLE before economic variables were entered. Once economic variables were entered, parental education remained the strongest predictor, but both economic hardship (income) and economic pressure (financial difficulty) had independent negative effects on the HLE of toddlers. Our results were consistent with findings by Gershoff et al. (2007), who also found the importance of accounting for both economic pressure and economic hardship (income) effects on parental investments (purchase of cognitively stimulating materials, activities outside of the home, extracurricular activities, parent involvement in school) in kindergarten-age children. Our study adds to both the HLE and family stress model literature by reporting economic pressure has an independent effect from income on the HLE (shared book reading and story-telling) specifically, and occurs not only in school-age children, but also in toddlers. As the HLE is known to have an effect on child developmental outcomes, our findings are also consistent with studies identifying independent effects of economic hardship and
economic pressure on child developmental outcomes (Zilanawala & Pilkauskas, 2012), including a large, multi-cohort, longitudinal study (J. S. Lee & Lee, 2016).

From our results, it remains unclear whether the influence of economic pressure on the HLE is specific to parents who also face economic hardship, or whether its effects are generalized among all parents, irrespective of their level of hardship. While other studies (Gershoff et al., 2007) have measured economic pressure by indicators of material hardship, our study measured reported financial difficulty, which may be more broadly experienced across levels of economic hardship (income). In our sample 27% of parents reported economic hardship (low income under $50,000), while only 16% reported economic pressure (financial difficulties once per month or more). While the two measures were moderately correlated, it may be that some families experiencing economic hardship have less economic pressure than others because they have access to additional resources, such as family instrumental support (financial assistance, child care) or access to social housing or additional societal resources that reduce their economic pressure. There is some evidence to support this: an Australian longitudinal study found that parental social support (including social/emotional support, and help with chores) was associated with reduced odds of experiencing economic pressure (material hardship) (J. S. Lee & Lee, 2016).

**Question 2: How is parental depression associated with the HLE of toddlers after accounting for parental education, child sex, economic hardship, and economic pressure?**

Parental depression was negatively associated with the HLE of toddlers over and above our control and economic variables, and was the strongest predictor of the HLE. Of note, we used a lower threshold for depressive symptoms (i.e. any reported) rather than the higher threshold (scores 3 and above) recommended for screening for clinical depression (Kroenke et al., 2003). Given our results, it appears that even a low level of parental depressive symptoms may impact the HLE. This is important because only 9% of our sample reported scores consistent with the higher threshold, whereas 38% of our sample experienced at least one depressive symptom.

Other recent studies have found mixed results for parental depression’s effect on the HLE. Our finding is consistent with C. Baker & Kuhn (2018), who found maternal depression to be directly and negatively related to the HLE (home learning stimulation) in kindergarteners. Our findings are also consistent with previous studies reporting parents who are depressed have lower levels of involvement and engagement with their children (Lovejoy et al., 2000). However, our
findings are inconsistent with C. E. Baker & Iruka (2013) who found no relationship between parental depression and the HLE in African American kindergarteners. It is unclear why their results were non-significant while ours were significant; however, it is possible that their large number of control variables reduced their statistical power to detect the relationship.

**Question 3:** *Does parental depression mediate the association between economic pressure and the HLE of toddlers, after accounting for parental education, child sex, and economic hardship?* Our findings indicate the association between economic pressure and the HLE of toddlers is mediated by parental depression. Our study adds to C. Baker & Kuhn (2018)’s finding that parental depression is negatively associated with the HLE by additionally identifying the simultaneous impact of economic factors. Our finding also adds to the broader literature reporting an association between economic pressure and parental depression (Kavanaugh et al., 2018; C.-Y. S. Lee et al., 2009), including longitudinal studies (e.g. J. S. Lee & Lee, 2016; Newland et al., 2013), as well as an association with more general parental emotional distress (Neppl et al., 2016). Similarly, low family income has also been associated with high levels of parental depression, which is in turn associated with disruptive parenting (including lower parent involvement with their children) (C.-Y. S. Lee et al., 2009).

**Question 4:** *How are parental self-efficacy and social support associated with the HLE of toddlers after accounting for parental education, child sex, economic hardship, economic pressure, parental depression?* Our finding that parental self-efficacy was positively associated with the HLE is consistent with other recent studies (Giallo et al., 2013; Peacock-Chambers et al., 2017). Unlike our study, these studies did not specifically account for economic variables, although Peacock-Chambers et al. (2017) studied a low income sample. To our knowledge, our study is the first to use parental self-efficacy to predict the HLE of toddlers within an application of the family stress model. Another recent study, however, found general domain parental self-efficacy was predictive of two different measures of the HLE, but not predictive of children’s reading and book-related activities specifically. They concluded that parental self-efficacy may be domain-specific – specifically, if a mother does not herself have high reading self-efficacy, she may be less likely to provide reading-related activities to her child (Bojczyk et al., 2018).

Our finding that parental social support was not associated with the HLE was inconsistent with studies which have found that higher parental social support predicts a better quality HLE (Chang, 2017), and is associated with more parental involvement (C.-Y. S. Lee et al., 2009).
However, both of those studies used social support measures that included broader aspects of social support, such as instrumental support, informational support, sense of belonging, self-esteem, etcetera, whereas our study focused solely on perceived social-emotional support. Broader aspects of social support may influence the HLE more than social-emotional support.

Question 5: Do parental self-efficacy and social support moderate the association between parental depression and the HLE of toddlers, after accounting for parental education, child sex, economic hardship, and economic pressure?

Neither parental self-efficacy or social support were found to moderate the association between parental depression and the HLE of toddlers, after accounting for parental education, child sex, economic hardship, and economic pressure. Our study was unique in testing moderating effects and we are therefore unable to compare these findings to other studies. Other studies have found parental self-efficacy (Giallo et al., 2013; Peacock-Chambers et al., 2017) and social support (though confounded by parental self-efficacy and parenting stress) (Chang, 2017) have mediating effects, however, did not account for the impact of economic pressure. While our study did not specifically test these mediating relationships, we also found no evidence for them. It may be that parental self-efficacy and social support may simply not be effective enough interventions to counteract the negative effects of depression on the HLE.

Although neither parental self-efficacy nor social support moderated the association between depression and the HLE, it is possible that these constructs may influence the HLE through other relationships within the family stress model. It is possible that either parental self-efficacy or social support may reduce the negative effect of economic pressure on parental depression, leading to higher quality HLE. There is also evidence that social support may influence the relationship between economic hardship (income) and parental depression (C.-Y. S. Lee et al., 2009), and economic hardship (income) and economic pressure (Kang, 2013; J. S. Lee & Lee, 2016) though results have been mixed for other parenting behaviours (McConnell et al., 2011). However, the positive effects of social support on child and parent outcomes have been found to be less for families experiencing economic pressures (material hardships) (J. S. Lee & Lee, 2016). As suggested by J.S. Lee & Lee (2016) it may be that more formal (e.g. government) supports are more effective than informal social support in reducing the negative effects of poverty on child and parent outcomes. It is also possible that parental self-efficacy and social support interact with one another to influence the HLE.
We found significant relationships between the key constructs of the family stress model and the HLE, and the model had utility in predicting those parents who provided higher quality HLEs. However, the model poorly identified parents who provided lower quality HLEs. Additional factors not reflected in the family stress model may play a role in influencing the HLE.

**Research Implications**

The results of this study indicate the HLE is influenced by parental depression, education, economic hardship (income), economic pressure, and parental self-efficacy. Future studies on the HLE should account for these significant factors. The family stress model literature commonly uses path analysis or structural equation modelling to investigate pathways between constructs in the model. We recommend that future studies use structural equation modelling to better understand the direct and indirect effects of the model’s key predictors.

The family stress model performed well at predicting parents who provided a better quality HLE, however, it poorly predicted those who provided a lower quality HLE. Other factors may play a role. For example, teaching parents how to teach young children foundational literacy and numeracy skills has been shown to improve the HLE (Niklas, Cohrssen, et al., 2016); it is likely that parental knowledge and skill in HLE-related activities may play a role. Single parent status may also play a role (Z. E. Taylor & Conger, 2017). Single parent status has been negatively correlated with HOME enrichment scores (Sarsour et al., 2011) and tends to co-vary with poverty (First Call BC Child and Youth Advocacy Coalition, 2019). It is possible single parents may have less capacity for HLE-related activities due to role overload (Nomaguchi & Milkie, 2017). As well, some studies have applied the family stress model to understanding the effect of parenting stress on child outcomes (Gershoff et al., 2007; McConnell et al., 2011; Warren & Font, 2015); it would be useful to understand whether parenting stress may additionally impact the relationship between economic pressure and the HLE, either alone or via parental depression.

Our results do, however, indicate economic pressure is an independent predictor of the HLE over and above economic hardship (income), and the influence of economic pressure on the HLE is mediated by parental depression. While we found no evidence that parental self-efficacy moderates the relationship between parental depression and the HLE, it would be beneficial for
future studies to examine how parental self-efficacy influences the relationship between other key predictors in the model and the HLE.

Whereas the family stress model considers the influence of family economic pressure on children’s outcomes indirectly through parents’ parenting behaviour, it would be worthwhile for future studies to also consider the influence of family economic pressure directly on children’s learning or ability to learn, as evidence and theory suggest possible effects of poverty on children’s developing brains through toxic stress (Knowles et al., 2016; McEwen & McEwen, 2017; Shonkoff et al., 2012; Williams Shanks & Robinson, 2013). The family stress model could potentially be further enhanced by adding parental education, parental self-efficacy, and perhaps parenting stress, as key constructs within the model.

**Practice Implications**

This study found that parents who experience economic hardship, economic pressure, and depression, and have attained less education, and have lower parental self-efficacy are less likely to provide a quality HLE. Practitioners who support toddler-age child development should screen for, and focus their efforts on, supporting families facing these challenges and reducing these negative factors.

This study also showed that higher parental education and parental self-efficacy are associated with higher quality HLEs. Interventions aimed at improving domain-specific parental self-efficacy in providing a quality HLE may be a potential intervention point (Bojczyk et al., 2018). Studies have demonstrated that teaching foundational literacy and numeracy principles to parents appears to improve children’s numeracy and literacy competencies (Niklas, Cohrssen, et al., 2016) and, in a randomized controlled trial, fluid reasoning skills (Niklas et al., 2018). A recent study recommends focusing HLE interventions on increasing parental mastery in domain-specific areas of the HLE and further suggests income and education level are demographic characteristics that are impactful to the HLE “but rarely receptive to change” (Bojczyk et al., 2018). Given the results of our study, we alternatively suggest that combining parent-focused HLE educational interventions to improve parental self-efficacy and knowledge with poverty reduction interventions may increase effectiveness of HLE interventions. Poverty reduction in families may potentially have a significant effect on the HLE via reduction of economic pressures and depressive symptoms in parents. Increasing income for families living in poverty has shown promise as a strategy for enhancing child developmental outcomes in poverty (G. J.
Duncan et al., 2014). The potential causal impact of unconditional cash transfers on early child cognitive, social-emotional, and brain development of infants and toddlers in low-income U.S. families are currently under study (Baby's First Years Study, G. Duncan, 2019).

Child development practitioners can also seek partnerships with social support/service agencies and ensure families obtain all available government supports to reduce their economic hardships and pressures to the greatest extent possible (M. K. Jones et al., 2017; Pinto & Bloch, 2017). In addition, practitioners can consider implementation of home visiting programs, such as the Nurse-Family Partnership, which have been shown to increase both parental reduction in welfare use (Olds et al., 2010) and children’s early elementary school reading and math scores in low income mothers with fewer psychological resources (Kitzman et al., 2010). Other family home visiting programs have also shown promise in improving family economic self-sufficiency, parenting, and child development (Minkovitz et al., 2016). In addition, practitioners should screen for and address parental depression. Although we do not yet know if this intervention will specifically improve the HLE, it is necessary to address family functioning and needs.

**Strengths & Limitations**

One of this study’s major strengths is that it tested the family stress model hypotheses and was able to test the model given we had the data. This study addressed each key construct of the model, with the exception of parental conflict; this should be examined in future studies.

This study was limited by a number of factors. One limitation of this study is its cross-sectional design. Descriptive correlational studies are not able to demonstrate causation because alternative interpretations of findings are possible. Participants of the original survey study were found through convenience sampling primarily in community agency settings geared towards families with young children. It is possible that self-selection bias may have occurred, if families who accessed community agency settings, or chose to participate in a survey, were inherently different to families who did not. The original Toddler Development Index study collected data from a number of BC communities and community settings (urban, rural). However, further study will be required to permit generalization to other Canadian provinces and countries.

Most of our data was not normally distributed and therefore did not meet the assumption of multivariate normality necessary for multiple regression analysis (reading/story-telling frequency, parental self-efficacy, and parental social support were positively skewed; parental depression and financial difficulty were negatively skewed). We therefore used logistic
regression analysis. Logistic regression permits analysis of data that does not meet the numerous assumptions required for multiple regression, including the use of dependent variables that are not normally distributed. However, multivariate normality and linearity among independent variables may enhance power (Tabachnick & Fidell, 2019). As most of our data was skewed, power may be affected in this study; this may explain the non-significant findings for some of our hypothesized relationships. Logistic regression also required transformation of the original ordinal outcome variable into a discrete variable, which may have reduced data precision.

Numerous factors associated with poorer HLE, beyond the ones we were able to control for with available data in our secondary data analysis, have been identified in the literature, such as low child task attention, low maternal warmth, maternal non-English speaker, and single mother status (C. L. Taylor et al., 2016). We used parental depressive symptoms as our measure of parental psychological distress, but parental psychological distress in response to economic pressure may also appear as anxiety, somatization, or hostile parenting (Newland et al., 2013), meaning we may not have captured the full effect of parental psychological distress on the HLE. We used shared book reading/story-telling as our measure of HLE; it may be that our results are specific to the home literacy environment rather than the HLE more generally. Finally, economic pressure may be better captured by indicators of material hardship (difficulty paying bills, etc.). It is possible our more general measure of reported financial difficulty may capture those parents who do not face economic hardships but still perceive financial difficulties.

**Conclusion**

Prior research has found a higher quality HLE is associated with better cognitive and academic child outcomes. It is therefore important to research the factors that impact the HLE. This study, informed by the family stress model, examined the relationships between economic hardship, economic pressure, parental depression, parental self-efficacy, parental social support, and the HLE of toddlers. Overall, the model correctly classified 96.5% of parents who provided a higher quality HLE to their toddlers, but poorly identified those parents who provided a lower quality HLE. However, we did find the HLE was negatively associated with parental depression, economic hardship, and economic pressure, and positively associated with parental education and parental self-efficacy. Parental depression was our strongest predictor and seemed to mediate the association between economic pressure and the HLE. Our findings provide important areas of focus for practitioners who support toddler-age child development in their practice.
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social structure and culture shape parental strain and the well-being of parents and children.

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