EXAMINING LONGITUDINAL BIDIRECTIONAL EFFECTS BETWEEN PARENT FUNCTIONING AND CHILD FUNCTIONING ACROSS SOCIOECONOMIC CONTEXTS

by

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Abstract

Universality with respect to reliability and validity of psychosocial constructs and models is a key area of inquiry when seeking to leverage scientific findings for the public good, such as in designing policies or interventions. This study seeks to understand whether variance exists in models of bidirectional effects between parent functioning and child functioning across socioeconomic contexts. Using data from the Early Childhood Longitudinal Study Kindergarten (ECLS-K) 2011 cohort this work examines a five-year period, beginning at the child's Kindergarten year and ending at their fifth-grade year. Confirmatory factor analysis with longitudinal and multigroup invariance tests was conducted to first assess the appropriateness of the measurement models. Next, cross-lagged panel analysis with multigroup invariance tests were performed to identify whether variations were present according to socioeconomic privilege. Results demonstrated that the measurement model for child functioning, which has been used in previous works of literature, did not fit the group with low socioeconomic privilege, though was appropriate for groups with medium and high socioeconomic privilege. Further study of the medium and high socioeconomic privilege groups demonstrated variant models of bidirectional effects between parent functioning and child functioning. This work underlines and discusses the nuances of comparing populations, both from a measurement perspective and from a qualitative perspective.

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Chapter 1 – Introduction

Studies of family processes and child development have often used relationships and environmental factors as ways in which to examine the differential development trajectories of children. However, these relationships, whether with a parent or with the environment, are often considered unidirectionally within research (i.e., the environment or the parents affects the child). Though conceptualizations of these relationships as bidirectional (i.e., there is a mutual influence between the child and the parent or environment) have long been present (Bell, 1968; Sameroff, 1972) many researchers continue to examine relationships as though they are acted upon one of the participating individuals. This may be at times strategic but introduces an endogeneity bias into the work.

Developmental studies have increasingly incorporated bidirectional effects between members of a relationship to inform work in bioecological and biopsychosocial models of child development, and early models of regulation and self-regulation. Previous studies of bidirectional effects between the functioning of children and parents have largely ignored the environment in which these relationships occur or have used narrow measures to assess these environments. One fundamental example of this is the propensity to control for effects of socioeconomic privilege rather than explicitly examine applicability of measurements and bidirectional models across multiple contexts. This work will test whether bidirectional effects between the functioning of parents and children are in fact similar across different socioeconomic contexts and will use a robust measure of socioeconomic privilege using multiple measures of social and economic advantage.

Defining Key Terms

Familial relationships are agentic processes in which each actor (i.e., person in the relationship) can influence behaviours and actions of the other while in turn being influenced by the other (Bell, 1968). This work explores reciprocal effects of functioning of parents and children across a six-year period (the child's Kindergarten year to their fifth-grade year). The term *functioning* refers generally to one's ability to achieve their goals both internally and in external environments, and incorporates the ability to manage one's behaviour, emotions, social skills, and mental health (Preedy & Watson, 2010).

In defining *child functioning*, some researchers differentiate between socioemotional functioning and academic functioning (Bhide, Sciberras, Anderson, Hazell & Nicholson, 2019; Ghide, Segers, & Verhoeven, 2018; Van der Meulen, van der Bruggen, Split, Verouden, Berkhout et al., 2014). These researchers use socioemotional functioning to refer to the child's ability to navigate the emotions of themselves and others in social settings, and academic functioning to refer to academic success of students in school settings. Other researchers (e.g., Yan & Ansari, 2017) use one unified term (child functioning) to refer to both aspects. In this work, the term *child functioning* refers to the unified term as exemplified by Yan and Ansari (2017), though alternate models of child functioning separating academic and socioemotional aspects were tested. Child functioning was measured from data collected in the following six areas: academic performance, presence of internalizing behaviours (such as sadness and anxiety), presence of externalizing behaviours (such as aggressiveness and high temper), approaches to learning, interpersonal skills, and self-control.

The term *parent functioning* in this work is defined as the social-emotional adjustment of parents, as well as the feelings, thoughts, and behaviours that characterize their parenting. Three

aspects were drawn to approximate parent functioning: presence of depressive symptoms, parenting stress, and parental warmth.

Importantly, each of these collections of variables includes a mix of indicators which measure positive adjustment (e.g., academic performance or self-control in the child, parental warmth in the parent) and indicators which measure negative adjustment (e.g., internalizing and externalizing behaviours in the child, depressive symptoms and parenting stress in the parent). Many studies of relations between parent functioning and child functioning incorporate variables which only measure the presence of negative functioning in participants (Laird, Pettit, Bates, & Dodge, 2003; Larsson, Viding, Fruhling, & Plomin, 2002; Neece, Green, & Baker, 2012; Barbot, Crossman, Hunter, Grigorenko, & Luthar, 2014). While these are useful to understanding the impact of the presence of these variables in one family member on the functioning of others, they are not able to inform on whether positive functioning is occurring. According to the World Health Organization (2004), positive and negative aspects of psychological functioning do not exist as a spectrum in that the absence of negative functioning does not necessarily indicate the presence of positive functioning. To understand functioning in a more comprehensive sense, as this study will attempt, a mix of both positive and negative aspects of functioning is necessary.

Background

Educational psychology and developmental psychology have long been interested in how children develop socially, emotionally, and cognitively, and in how their families may influence or be influenced by this development. The influence of parents on the development of their children has been a strong area of interest, with many studies exploring this in terms of differences among parents' personality and behaviour (i.e., individual differences in

characteristic patterns of thinking, feeling, and behaving; American Psychological Association, 2020). However, not only does parent functioning impact child functioning, but child functioning also impacts parent functioning (Bell, 1968; Sameroff, 1975; Patterson, 1982). The effects that parent functioning have on child functioning are referred to as *parent-driven effects*, and the effects that child functioning have on parent functioning are referred to as *child-driven effects.* When both parent-driven effects and child-driven effects are occurring (i.e., when the functioning of the child is impacting the functioning of the parent, and the functioning of the parent is impacting the functioning of the child) the relationship between parent functioning and child functioning is *bidirectional*. The study of parent functioning and child functioning as a model of bidirectional effects helps to avoid endogeneity bias by avoiding the incorrect assumption that one affects the other without also being affected by it (Duncan, Magnusson, & Ludwig, 2004).

Much of the research which suggests that the relationship between parent functioning and child functioning is bidirectional has taken a variable-centered approach, isolating one or two variables of children's and parents' overall functioning overall functioning (e.g., Neece, Green, & Baker, 2012; Laird, Pettit, Bates, & Dodge, 2003; Zadeh, Jenkins & Pepler, 2010; Gross, Shaw & Moilanen, 2008). Building on previous research which isolated and tested relations between aspects of children's functioning and of parents' functioning, this research hoped to focus on the presence and characteristics of bidirectional effects between broadly measured constructs of parent functioning and child functioning united within a single variable for each actor. This position follows the work of other researchers (e.g., Yan & Ansari, 2017) who have argued for the value of broader conceptions of functioning in the child and the parent to help generalize understandings of the ways in which family members impact each other's

development. Unfortunately, because data collection patterns for the ECLS-K 2011 cohort differed from those for the 1998 cohort, an exact replication of indicators was not available for parent functioning as many years did not include the full suite used by Yan and Ansari. Three indicators were available for the selected timepoints, though this is not enough to create a measurement model (it would be over-identified). Because this work attempted to validate the results of Yan and Ansari with a new cohort, no new indicators were added to parent functioning. The available three indicators of parent functioning were measured separately. Child functioning was possible to include using a broadly measured latent construct replicating that used by Yan and Ansari. In this sense, this work provides a step back with respect to understanding parent functioning, and a step forward with respect to understanding child functioning.

As mentioned, this variable-centered approach has largely focused on negative measures of functioning. That much of this work has also been done with vulnerable populations (e.g., at-risk youth, developmentally delayed children) is particularly problematic. This is because only seeking negative indicators within these populations creates a deficit view of these participants, in which their weaknesses or vulnerabilities are emphasized. While this work compares experiences across socioeconomic contexts and therefore will include youth considered to be at-risk due to social and economic factors, it incorporates three key differences from the majority of past research. First, it includes measures of positive functioning for both parents and children. This allows the detection of positive patterns, which is foundational to enabling strengths-based views of populations. Second, this work takes a cautioned approach to measurement. Yan and Ansari arrived at their model of child functioning through exploratory factor analysis. This work uses confirmatory factor analysis with longitudinal and multigroup invariance testing to understand the appropriateness of the measurement model, helping to ensure that conclusions

drawn about any group are based on an accurate representation that fits the context of each group appropriately. Finally, it will incorporate a more robust measure of socioeconomic privilege than a simple measure of income, recognizing the reality that socioeconomic privilege in a family unit is an accumulation of factors providing an overall economic and societal advantage.

Thesis Overview

Four chapters follow the present one in this thesis. Chapter 2 provides a review of literature pertaining to bidirectional effects between parents and children, how and why socioeconomic context has been a point of comparison in these studies, and a critical summary of work which has sought to explore differences and similarities of bidirectional effects across socioeconomic contexts. Chapter 3 outlines the characteristics of the ECLS-K dataset and the methodological approach used in this paper, with a strong focus on validating the measurement used for child functioning across socioeconomic contexts. This measurement focus is fundamental to understanding analyses seeking to compare bidirectional effects between parent functioning and child functioning across socioeconomic context. Chapter 4 presents the findings pertaining to each research question investigated in this study. The final chapter, Chapter 5, provides a more in-depth discussion of the results presented in Chapter 4, connects findings to works reviewed in Chapter 2, discusses limitations of the present study, and provides suggestions for areas of future exploration.

Chapter 2 – Literature Review

To situate the current work within the field, this chapter will provide a review of works that have sought to understand bidirectional effects between parents and children with respect to social, emotional and behavioural outcomes which are typically associated with parent or child functioning. This chapter will begin by reviewing theoretical and early empirical developments in the exploration of bidirectional effects between parents and children. The following sections then explore more recent empirical findings with respect to (1) the symmetry of effects (e.g., whether bidirectional effects between children and parents are equal or asymmetrical in strength), and (2) the timing of these effects (e.g., whether the presence and strength of these tend to change over the course of the child's development). The fourth section examines why and how works have considered differences across socioeconomic contexts while noting critical discussions for best and better practice in implementing research in this area. A comparison of definitions of socioeconomic contexts and their implications to research follows. Finally, the last section provides a critical discussion of previous research exploring bidirectional effects between parent and child functioning across socioeconomic contexts.

Bidirectional Effects between Parent and Child Functioning: Early Findings and Major Developments

In 1968, Bell widened the common view that parents' feelings, thoughts, and behaviours impact the development of their children by proposing that children's feelings, thoughts, and behaviours might also impact those of their parents. Noting that parents would differentiate their behaviours and disposition according to individual children, Bell argued that children in part elicit behaviours from their parents. Based on this perspective, Bell organized a developmental

model of child socialization in which parenting responses are organized hierarchically according to both the appropriateness of a response to a child's behaviour and the level of control the parent is able to exert in their child's behaviour. In this model, while individual parenting differences influence the behaviours and techniques which parents employ, so too do individual genetic and environmental factors influence the behaviours which the children display. These factors encourage differential elicitation of parenting along three main axes: (1) the repertoires of behaviour and technique parents activate, (2) the level of parental response, and (3) the reinforcement of the parenting behaviour which has been evoked. A landmark proposition of this reinterpretation was that the child then became an environmental variable in their own development through their effects on the parenting behaviors employed to socialize them. In this sense bidirectionality is cumulative.

The idea that children might differentially elicit parenting and parent outcomes was validated in several experimental demonstrations in the following decades (e.g., Bates, 1976; Anderson et al., 1986; Bates & Pettit, 1981; Pelham, 1997). In 1975, Sameroff took an important step in synthesizing widened perspectives on child development with the proposition of the transactional model of development. In this model, transactional effects between parent and child behaviours not only influence the other actor, but also the dyadic relationship (Paschall & Mastergeorge, 2016). Further, this model showed an ecological sensitivity, taking into account influences of culture, socioeconomic context and neighbourhood characteristics on the actors involved. These relationships (between the individual and the environment) were also considered to be transactional.

One frequently used model within the study of bidirectional effects between parent functioning and child functioning has been Patterson's model of Coercive Family Processes

(1982). Developed in the context of understanding aggressive children, Patterson notes how aversive behaviours of children frequently were not random but rather contingent upon the presence of specific adults, often within the family, with the purpose of producing a specific result. Further, he observed that the adults with whom children showed aggressive tendencies typically did not uphold consequences for the child's misbehaviour. This led Patterson to theorize that 'mismatches' between more aggressive children and more laissez-faire parents engenders coercive relationships. Patterson's Coercive model has been used as a lens in a number of studies of bidirectional parent-child effects which examine negative child characteristics (e.g., Pardini, Fite, & Burke, 2008; Burke, Pardini, & Loeber, 2008).

Since the earlier experimental demonstrations which rightfully formed the initial evidence for the presence of child-driven effects on parent functioning, the field has shifted largely toward longitudinal studies of large data sets, and more recently, of twin studies. These changes have permitted insight into developmental processes as well as the individual roles of genetic heritability and the environment, and the interactions between these (e.g., Larsson, Viding, Rijsdijk, & Plomin, 2008). Models of bidirectional effects between parent functioning and child functioning have since been integrated within biologically informed theories of development, including biopsychosocial models (Dodge & Pettit, 2003), bioecological theory (Sameroff & Mackenzie, 2003), and most recently, frameworks of evolutionary psychology (Calkins, Propper, & Mills-Koonce, 2013). Notably, for Sameroff and MacKenzie (2003), early views of the modifying role of individuals in their social experiences were important to the models of regulation and self-regulation which emerged in the early 2000s (Boekarts, Pintrich, & Zeidner, 2000; Bradley, 2000). Evidence of bidirectional effects between children and other social actors or between children and their environment promoted the perspective of the

individual as an elicitor and selector of processes both in social (e.g., cooperation) and biological (e.g., stress reactions) contexts. The concepts are fundamental to understandings of regulation and self-regulation.

As previously mentioned, much of the research in this field has employed a variable-centered approach, wherein associations between parent functioning and child functioning are examined using one or two specific aspects. As such, the research reviewed here represents a variety of bidirectional associations between aspects of parent and child psychosocial characteristics and behaviours. This work seeks to speak broadly to this research to inform readers of overall characteristics of the bidirectional influences at work in parent functioning and child functioning.

Symmetry between Parent- and Child-Driven Effects: Does 'Bidirectional' Mean 'Equivalent'?

One line of questioning which researchers have begun to investigate is whether parent-driven effects on child functioning and child-driven effects on parent functioning are equal in strength (symmetrical) or more strongly exerted in one direction than the other (asymmetrical). Several studies have found support for equivalence between parent- and child-driven effects across a wide range of negative measures of functioning (Laird, Pettit, Bates, & Dodge, 2003; Pardini, Fite, & Burke, 2008; Larsson, Viding, Frühling, & Plomin, 2002; Neece, Green, & Baker, 2012; Barbot, Crossman, Hunter, Grigorenko, & Luthar, 2014). Table 1 presents a summary of studies which have found parent- and child-driven effects to be roughly equivalent. Pardini, Fite and Burke (2008) examined bidirectional effects between a range of parenting practices and boys' conduct problems in three cohorts of children in the Pittsburgh Youth Study

(first grade cohort, n=503; fourth grade cohort, n=508, seventh grade cohort, n=506). Assessments were conducted every six months for a total of five assessments of the seventh-grade cohort, six assessments of the fourth-grade cohort, and eight assessments of the first-grade cohort. Roughly equivalent bidirectional effects existed across the range of parenting variables (parental monitoring, parent-child communication, physical punishment, timid parenting, and parental involvement) and child conduct problems in each cohort, and were robust to variations in ethnicity (Caucasian and Black students) and present over and above effects of socioeconomic and structural characteristics of the family (single parenthood, parents' working status, Hollingshead Index of socioeconomic status, parent age, number of children in the home, and parent mental health problems). Notably, the work revealed that parent reports of children's conduct problems predicted parent-driven effects on child conduct to be slightly stronger than teacher reports of child conduct problems did. As parents were also the informants of their parenting practices, this finding underscores the importance of using multiple informants in studies of bidirectional relations, which has been cited by other researchers as well (e.g., Larsson et al., 2008; Cicolla, Gerstein, & Crnic, 2013).

Of further interest, Neece and colleagues (2012) used two groups of mother-child dyads, one in which children displayed early developmental delay and a second in which children were typically-developing, to demonstrate that associations between parenting stress and child behaviour problems were (a) bidirectional, and (b) similar in nature across the two groups. Though mothers of children with developmental delays were more stressed in the first group and the children displayed more externalizing behaviors, the nature of the bidirectional effects (i.e. the degree of association) was relatively consistent across groups. However, a study by Cicolla, Gerstein and Crnic (2013) also examined mother-child dyads including either typically

developing or developmentally delayed children and found that child-driven effects were stronger than parent-driven effects when considering maternal distress and child internalizing and externalizing behaviors. The researchers also noted that the nature of the observed bidirectional effects was largely consistent across both groups in that the degree of association between variables was similar. Together, while these studies disagree on the relative strength of child-driven to parent-driven effects within bidirectional relationships, they seem to indicate that the core patterns of bidirectional effects between parent functioning and child functioning are a consistent feature across typically and atypically developing children.

Larsson and colleagues (2002) used longitudinal parent report data of 6,320 pairs of twins from the Twins Early Development Study (TEDS) at ages four and seven to build on a developing body of genetically informed studies of bidirectional effects between parent functioning and child functioning. In addition to demonstrating roughly equivalent parent- and child-driven effects between parental negativity toward the child (anger, frustration, distance) and child antisocial behaviour, they were able to provide valuable preliminary insight into the mechanisms behind each set of effects. Larsson and colleagues posit that child-driven effects on parent functioning were predominantly genetically mediated, whereas parent-driven effects on child functioning were predominantly environmentally mediated. This would suggest that parent behaviours are more malleable than child behaviours (but not that child behaviours are not malleable), lending interest to studies such as this which investigate environmental contexts of parent functioning.

Table 1.

Studies Presenting Evidence for Roughly Equivalent Bidirectional Effects of Parent and Child Functioning

Authors	Population	Parent functioning	Child functioning	Result
Neece, Green, and Baker (2012)	237 children 3-9 years old, 144 of whom were typically developing and 93 of whom were developmentally delayed	Parenting stress (reported by both mothers and fathers)	Externalizing behavior Internalizing behavior	Bidirectional effects apparent across early to middle childhood; presence of developmental delay was not a moderator of results
Laird, Pettit, Bates and Dodge (2003)	Adolescents ages 14-18 and their parents	Parent monitoring	Delinquent behavior	Negative reciprocal associations between parental knowledge and adolescent delinquent behavior
Pardini, Fite, and Burke (2008)	Caucasian and African American boys ages 6-16 and their parents	Monitoring Parent-child communication Physical punishment Timid parenting Parental involvement	Conduct problems (parent-reported and teacher-reported)	Roughly equivalent bidirectional effects
Barbot, Crossman, Hunter, Grigorenko, and Luthar (2014)	361 low-income mothers and their children between 8 and 17; 2 waves, follow-up 5 years after wave 1	Parent involvement Parent control Rejection Parenting stress	Internalizing behaviors Externalizing behaviors Social competence	Maternal parenting predicted externalizing and internalizing behaviours Child social competence predicted reduced parental stress and increased parental involvement
Larsson, Viding, Rijsdijk, and Plomin (2008)	6,320 pairs of twins and their parents, measured at ages 4 and age 7	Parental negativity toward child (anger, frustration, distance)	Antisocial behavior (parent reported)	Parent negative feelings toward child environmentally mediate the risk for child antisocial behavior Genetically influenced antisocial behavior evoke parental negativity

Note: Where the reporting participant is not the parent (for parent-level variables) or the child (for child-level variables) the reporting source has been specified. Otherwise, the reporting is done by the participant in question.

Several additional studies have demonstrated greater strengths in child-driven effects on parent functioning as compared with parent-driven effects on child functioning, which are summarized in Table 2. Overall, these findings are interesting in light of the genetically informed findings of Larsson and colleagues (2002) that child-driven effects tend to be mediated by genetics. In a study of late childhood to early-adolescent girls (aged 11-15 at baseline), Huh and colleagues (2006) found support for stronger child-driven effects on parent functioning (parental control and parental) than parent-driven effects on child functioning (externalizing behaviours and substance abuse). Interestingly, the authors also reviewed four similar studies and reported that 5/13 models provided evidence of bidirectional effects, 10/13 displayed child to parent effects, and 6/13 displayed parent to child effects, indicating that child-driven effects may be more commonly significant, though this is not an observation of the strength of effects.

However, Hipwell and colleagues (2008) found evidence that parent-driven effects may be more commonly significant, though not necessarily stronger, with a sample more similar in age to those studied in this work. Hipwell and colleagues (2008) used longitudinal data from the Pittsburgh Girls Study (n = 2, 451) to assess bidirectional effects between parental warmth and use of harsh punishment and child depression and conduct problems in girls from ages 7 through 12. Analysis revealed that both parenting behaviours (warmth and harsh punishment) were predictive of child behaviours (conduct problems and depressed mood). Conversely, only girls conduct problems, not depressed mood, predicted increased parental use of harsh punishment. The effect of girls depressed mood on parental warmth was weak. Though the child-driven effects were found to be stronger in this study, parent-driven effects were significant more often.

Work by Zadeh and colleagues (2010) also found that child-driven effects on parent functioning were stronger than parent-driven effects on child functioning when considering

mother's negativity toward the child and children's externalizing behaviors. The researchers made the important insight that the observed bidirectional relationships between parent functioning and child functioning were recursive, meaning that impacts of the parent or child on the other represented feed-forward systems in which the other then exercised a stronger impact on the first. Zadeh and colleagues note that child-driven effects in particular grew with time during the study. This increased importance of child-driven effects with maturity has been found using behavioral genetic designs (Elkins, McGue, & Iacono, 1997) and signals an important line of questioning for developmental researchers.

Table 2.

Studies Presenting Evidence for Asymmetrical Bidirectional Associations Favouring Child-Driven Effects

Authors	Population	Parent functioning	Child functioning	Result
Bagner, Pettit, Lewinsohn, Seely, and Jaccard (2013)	209 parent-child dyads, interviewed ages 4-7	Depressive symptoms	Behavior problems (externalizing and internalizing) (parent-reported)	Bidirectional effects present yet child effects stronger
Cicolla, Gerstein, & Crnic (2013)	250 families with a 3-year-old child; X waves until child 5 years of age; 110 children had a developmental delay	Maternal sensitivity (observation) Maternal psychological distress	Child internalizing behavior (mother and father reported) Externalizing behavior (mother and father reported)	Bidirectional effects between maternal psychological distress and child internalizing symptoms in group of developmentally delayed children Child driven effects of externalizing symptoms to maternal depression consistent in both groups of children
Hipwell, Keenan, Kasza, Loeber, Stouthamer-Loeber, and Bean (2008)	2, 451 girls aged 7 and their caregivers, interviewed annually for six years	Warmth Harsh punishment	Depression Conduct problems	Both parenting behaviours were uniquely predictive of girls' conduct problems and depressed affect Girls conduct problems, but not depressed affect, predicted increased harsh punishment Child-driven effects were stronger

Zadeh, Jenkins, and Pepler (2010)	1,479 children beginning at ages 10-11 and their mothers (then 12-13, 14-15)	Maternal negativity	Externalizing behaviors	Reciprocal effects found, however, child-driven effects increase over time, whereas parent-driven effects decreased over time
Burke, Pardini, and Loebel (2008)	Boys ages 7-12 and their caregivers; interviewed annually until boys were aged 17	Supervision Communication Parental involvement Timid discipline Harsh punishment	Child disruptive disorder symptoms (ADHD, ODD, CD) (teacher-reported)	Stronger child-driven effects: ODD predicted poorer communication and decreased involvement; CD predicted poorer supervision Equivalent parent-child effects: ODD symptoms and timid discipline
Gross, Shaw, and Moilanen (2008)	310 low income mother-son dyads reporting at least one instance of child behavior and maternal depression; children aged 5-10 at recruitment and assessed at ages 5, 6, 8, 10, 11,12, and 15	Depressive symptoms	Disruptive behavior (teacher-reported)	Maternal effects present at ages 5-6 and through early adolescence Child effects present at ages 5-6 and 11-12
Huh, Tristan, Wade, Stice (2006)	Adolescent girls (n=496) aged 11-15 at baseline, assessed annually across four years	Parental support (child-reported) Parental control (child-reported)	Substance use Externalizing behaviors (child-reported)	Low parental control predicted substance use but not externalizing behavior Deficits in perceived parental support predicted neither substance abuse or externalizing behavior Externalizing behavior predicted decreases in both parental support and control Substance abuse predicted decreases in control

Note: Where the reporting participant is not the parent (for parent-level variables) or the child (for child-level variables) the reporting source has been specified. Otherwise, the reporting is done by the participant in question.

Overall, there exists less evidence that parent-driven effects on child functioning may be stronger than child-driven effects on parent functioning. Some researchers have offered evidence of this (Del Vecchio & Rhoades, 2010; Fanti, Panayiotou, & Fanti, 2012; Pearl, French, Dumas, Moreland, & Frinz, 2014). One of these studies, by Del Vecchio and Rhoades (2010) is unique to others reviewed here as it consisted of a single time point of data collection rather than a

longitudinal study design. In this study, researchers reported greater parent-driven effects when examining mother's over-reactive discipline and child's negative affect (Del Vecchio & Rhoades, 2010). That this study offers conclusions which stand apart from the majority of studies in this area indicate an interesting line of inquiry around whether parent-driven effects and child-driven effects differ in immediate versus sustained impact.

On the other hand, absence of more strongly exhibiting parent-driven effects in the literature may in part be due to (a) the populations of children generally selected for study in this area, or (b) the variables chosen to examine bidirectional effects on functioning in parent-child relationships. Yan and Ansari (2017) note that "much of the empirical inquiry into child effects has been conducted using samples of children with particular characteristics that may render these effects more salient," (p. 2). Interestingly, they cite this as a bias toward observation of parent-driven effects, reasoning that researchers often choose populations of children in which child-driven effects might be more noticeable (e.g., at-risk populations, atypically developing children). Indeed, many of these studies have been conducted through the lens of Patterson's coercion model, reflecting an expectation of problematic functioning. Yan and Ansari's (2017) work strove to generalize our understanding of bidirectional effects between parent functioning and child functioning by (1) performing their work on a representative sample of children and their parents, (2) including positive as well as negative measures of functioning, and (3) employing person-centered analysis to complement variable-centered analysis. In their study, the authors found that roughly equivalent bidirectional effects between parent functioning and child functioning existed in large-scale, representative populations when more normative measures of functioning were used. This work initially sought to (a) replicate these findings in a new cohort of the same data collection effort (Early Childhood Longitudinal Study) and (b) return to

considerations of differences across at-risk families and families not at risk (as determined by socioeconomic context) while heeding their critiques of past research in this area by bringing a more sensitive approach to the study of differences across socioeconomic contexts. As mentioned, an exact replication was not possible for the larger model of bidirectional effects between parent and child functioning due to differences in data collection across the two ECLS-K cohorts. However, there exists synergy between these works, particularly with respect to the model of child functioning. Rather than considering this as a replication of Yan and Ansari's work then, it is perhaps best thought of as a suite of new considerations in the effort to understand family dynamics from a developmentally and environmentally informed perspective.

Timing of Parent and Child Effects in Transactional Models: A Developmental Perspective

Simultaneous to questions on the relative strength of child- and parent-driven effects on the functioning of the other are inquiries into whether the strengths of these effects may change over time. A developmental approach to this problem has been useful in identifying the importance of bidirectional effects between functioning in parents and children in times of transition. A number of researchers have found that both child-driven effects on parent functioning and parent-driven effects on child functioning are more prevalent during times of transition (Gross et al., 2008; Jaffee & Poulton, 2006; Pardini et al., 2008). For example, in the work of Gross and colleagues (2008), researchers found that effects were stronger at ages 5-6 and 11-12, leading the authors to posit that periods of change in the child's physical maturation and social environment heighten effects bidirectionally. This may imply an increased reliance between parent and child for functioning around transition periods. This is well-supported

theoretically (Rimm-Kauffman & Pianta, 2000; Eccles, 1999; Fiese et al., 2002) in considering young children (5-6) and middle childhood (11-12).

Young children transitioning to formal schooling make important social transitions: they begin to spend more time with other children instead of adults, and experience overall greater demands on their social skills (Rimm-Kaufman & Pianta, 2000). Using longitudinal data from the Dunedin Multidisciplinary Health and Development Study (n=850), Jaffee and Poulton (2006) specifically examined age effects on bidirectional influences between child anxious and depressed behaviour and mothers' internalizing symptoms, finding that bidirectional effects were found only when children were 5 and 7, otherwise parent-driven effects were present though child-driven effects were not. Jaffee and Poulton make an important note that because depression tends to recur in those who have experienced an initial episode, the role of parent psychosocial stressors, such as less successful child functioning, in inciting recurrences may decrease over time. Nevertheless, it is also possible that the importance of child functioning to parent functioning may be stronger when the child is in early childhood.

While middle childhood may not present a school change like early childhood, children in this group are approaching changes associated with adolescence yet are still more dependent on and directed by their parents than adolescents (Eccles, 1999). Some empirical support exists for heightened bidirectional effects at this time point as well (Pardini et al., 2008; Fanti et al., 2012). In the work of Pardini and colleagues (2008), bidirectional effects were present between parental monitoring and teacher-reported child conduct at ages 9, 11, and 13, but not at ages 7 or 15. While some confluence seems to exist around the age of 7, it is important to remember that the collection of studies discussed here explore a number of variables that represent multiple aspects of parent functioning and child functioning, and some individual differences are likely to

exist between combinations of variables. Consequently, Fanti and colleagues (2012) studied maternal depression and child problem behavior and noted that while only parent-driven effects were visible when the child was 7-9 and 12-15, bidirectional effects existed at ages 11-12.

While specificities may exist within the variables discussed, trends seem to emerge pointing to periods of transition and child development as important contexts to the consideration of bidirectional effects. Indeed, the growing use of ecological approaches to understand periods of transition and child development (Petriwskyj et al. 2005; Tudge et al. 2003) reflects similar considerations. Longitudinal study designs have been prevalent in investigations of bidirectional effects between parent functioning and child functioning and continue to help inform developmental interpretations and lines of inquiry.

Relating Socioeconomic Context to Child and Parent Functioning Meaningfully: The Added Strength of Validity Testing

A common question or point of control across many of these studies is whether and how patterns of bidirectional effects between parent functioning and child functioning might differ across socioeconomic context. Socioeconomic context is considered to be an important environmental factor within the lives of individuals, with socioeconomic disadvantage understood as posing longstanding, intergenerational barriers to a person's health and wellbeing. For example, children of parents with low socioeconomic status experience poorer health from childhood into adulthood (Bradley & Corwyn, 2002), and ultimately attain lower levels of education (Zill, Moore, Smith, Steif, & Coiro, 1995). These are in turn predictive factors of greater socioeconomic disadvantage in adulthood and parenthood (Zill, Moore, Smith, Steif, & Coiro, 1995). Common goals of these works are to understand the mechanisms through which

socioeconomic disadvantage acts to contribute to these outcomes. Such works have helped us to consider how systemic barriers act to increase risk of poor health and wellness outcomes. Examples include how rigid scheduling of schools and social support systems can limit family access and participation (Bradley & Corwyn, 2002; Zill et al., 1995), how social oppression and implicit bias towards marginalized groups alter educator expectations of these groups (Bradley & Corwyn, 2002), and the presence of 'desert zones' of services, particularly for rural populations (Zill et al., 1995). Other works have sought to understand the systemic supports that help socioeconomically privileged groups avoid such negative outcomes. These works are intended to inform equitable policy and practice which seeks to provide positive outcomes for all by intervening with resources and supports targeted to areas of greatest need.

However, while acknowledging the positive intent of these works, researchers have cautioned that studies which simply demonstrate that functioning is poorer in some groups lead to deficit view of these groups (e.g., Roubinov & Boyce, 2017). Further, some researchers (e.g., Roubinov & Boyce, 2017) argue that many works don't account for the fact that the experiences and needs of groups with low socioeconomic privilege are unique from those with greater privilege. Many studies have examined parenting differences across socioeconomic gradients, often recognizing that parents who struggle with social and economic disadvantage tend to also struggle with increased parental stress and mental health problems (Chen & Miller, 2013) leading to harsher or more negative parenting (Hoffman, 2003; Repetti & Seenman, 2002). However, careful consideration in methodological approaches is critical. Applications of middle-class ideals of parenting practices have been historically applied across socioeconomic contexts, leading to findings of poorer parenting practices in parents of low socioeconomic status while

failing to question whether middle class standards even apply across socioeconomic contexts (Roubinov & Boyce, 2017).

To research outcomes for any socioeconomic privilege group meaningfully therefore, there must be an understanding in the design of the research that the experiences of families, not simply the variables that are measured, differ across these contexts. Raver, Gershoff, and Aber (2007) provide an example of how researchers might inquire more sensitively about socioeconomic contexts in their work by performing equivalence testing of mediating models of income, parenting, and school readiness across ethnic contexts. Raver and colleagues demonstrate how models are differentially mediated within the context of ethnicity, providing evidence that paths to school readiness must then be considered within this context, or at least not ignorant of it. In their explanation of their methodological approach, the researchers explain the limitations of variables-centered approaches which explore only mean-level associations without considering applicability of a model across social contexts.

Measuring Socioeconomic Context: A Matter of Definitions

The multifaceted nature of both social and economic contexts has led to numerous measurements of socioeconomic context to be conceptualized and used by researchers. While some measures focus on social indicators of class-based positioning, such as occupation or highest level of education achieved, others focus on economic factors relating to resources and materials, such as income. Many researchers use combinations of these variables, sometimes to draw an individual-level measure of socioeconomic context, and other times to draw group-level measures of socioeconomic context (e.g. neighbourhood or school socioeconomic context). Further, some researchers have sought to acknowledge the subjectivity of the experience and

have consequently used self-perception measures (White & Rogers, 2000). Within the parenting literature, typical measures of socioeconomic context have focused on objective measures of parental income, education, and occupation (Roubinov & Boyce, 2017). Because relations between socioeconomic context and parenting may differ depending on the aspect of socioeconomic context being addressed (Callahan & Eyberg, 2010), it is important to define within the work and to select a measurement which reflects the definition well. As such, socioeconomic context will be defined as a network of social and economic factors which confer either social or economic advantage to a family.

As this research will focus on families, an individual-level measure of socioeconomic context representing each household will be sought. Further, because this work seeks a person-centered approach to bidirectional effects in parent and child functioning, it is important to recognize both theoretical and empirical arguments of researchers who assert that controlling for family structures to isolate income does not adequately articulate the experience of economic disadvantage because family structure often informs experiences of social or economic disadvantage (McLanahan, 2004; Crosnoe & Cooper, 2010). For example, single-parent families are more exposed to income loss through job loss or may have more difficulty accessing extracurricular opportunities at a school because logistics and transportation to the school outside of regular hours is more likely sourced from one rather than two adults. As such, this work will use a modified version of the measurement proposed by Crosnoe, Mistry, & Elder (2002) in their work on family economic disadvantage done with an earlier cohort of the Early Childhood Longitudinal Study data set. A family's level of socioeconomic privilege will be scored as an accumulation of factors, namely non-use of food stamps in the past year, a double-parent family structure, parent education, the age of the biological mother at the first child, and absence of

welfare. In this way, the definition of socioeconomic privilege as a clustering of factors inferring advantage is honored in the measurement used within this work.

Bidirectional Effects Between Parent functioning and Child functioning in the Socioeconomic Context

Some researchers who study the bidirectional impacts of parent functioning and child functioning have attempted to probe the question of the interaction of socioeconomic context by focusing on samples drawn primarily from socially and economically disadvantaged families (Barbot et al., 2014; Pearl, French, Dumas, Moreland, & Prinz, 2014; Gross et al., 2008). In Barbot and colleagues' (2014) work, bidirectional effects were demonstrated between parenting adjustment (involvement, control, rejection, and stress) and child adjustment (internalizing problems, externalizing problems, and social competence) in a sample of 361 low-income mother-child dyads. Gross and colleagues' (2008) sample of 310 low-income mother-son dyads found bidirectional effects between mothers' depressive symptoms and children's disruptive behaviors, and noted that though maternal effects were weaker, they were also present at more timepoints than child-driven effects. That this was done with a predominantly low-income sample offers a portrait of this particular set of circumstances, and further raises the question of whether the timing or symmetry of bidirectional effects is similar across socioeconomic contexts.

A more critical review of the two studies discussed above would note that socioeconomic context is somewhat superficially defined through a sole measure of income in the study by Barbot and colleagues (2014). Though Gross and colleagues discuss their sample as a low-income sample, the measure they use is far more robust, employing the Hollingshead Socioeconomic Index, which compiles a single score from multiple factors measuring marital

status, working status, occupational prestige, and educational attainment. Because single factors such as income or marital status can vary greatly year-to-year for families, relying on a sole measure to indicate a family's experience with poverty is insufficient (Crosenoe & Cooper, 2010), as has already been discussed in the previous section.

Importantly, one of few studies reviewed in this paper which reported parent-driven effects on child functioning as stronger than the reverse (Pearl et al., 2014) was completed with a sample of socioeconomically disadvantaged households (qualified by single-parent structure and income) in the context of ethnicity (African American and White). The authors further noted that the strength of child-driven effects on parent functioning decreased with time, while parent-driven effects on child functioning increased with time. That these findings stand out from others listed in this study offers reason to explore how bidirectional associations may vary both by strength and timing across multiple contexts. However, by sampling only socioeconomically disadvantaged families, it can be hard to tell how bidirectional effects might vary across contexts, or whether features of parent functioning and child functioning appear to be differentially adaptive across these.

Additional studies of bidirectional effects between parent functioning and child functioning have taken the approach of collecting demographic variables from their participants and checking for effects of these in the results (Pardini, Fite, & Burke, 2008; Hipwell et al., 2008; Burke, Pardini and Loebel, 2008; Huh, Tristan, Stice, & Wade, 2006). Hipwell and colleagues (2008) used a neighbourhood classification of socioeconomic context when checking for interaction effects in their bidirectional model of parent functioning (warmth, harsh punishment) and child functioning (depression, conduct problems). This longitudinal (7 year) study of 2,451 girls (age 7 at start of study) and their caregivers revealed an interaction effect

between poverty and low parental warmth on girls conduct problems, wherein parental warmth did not influence girls' conduct problems in families with low socioeconomic status. However, girls from more advantaged socioeconomic contexts demonstrated decreased conduct problems as parental warmth increased. Similarly, in their study of bidirectional influences between child depressive symptoms and parenting behaviours, Burke, Pardini, & Loebel (2008) noted that many of the parent-driven effects were no longer predictive of child functioning after controlling for covariates, including socioeconomic context. That the effects of socioeconomic disadvantage seem to have swamped effects of parent functioning (but not child functioning) in both studies is indicative that socioeconomic context may strongly vary the nature of bidirectional effects of parent functioning and child functioning observed in a family. Understanding how family processes are differential according to circumstance is a first step toward understanding which process patterns may be adaptive to these circumstances.

One study (Huh et al., 2006) found that two common measures of socioeconomic context (maternal and paternal education), did not show significant relations to the child and parent functioning measures selected for study. This is different from all other work reviewed. However, it should be noted that participants were between the ages 11 and 15 at baseline of a four-year longitudinal study - a different age group than what is discussed here (early childhood to early adolescence, roughly ages 5-12). Additionally, this is the only study reviewed in this work in which children were the reporting source for both child-level and parent-level variables. Nevertheless, it is important to be aware of exceptions within the field.

Applying a critical lens to the collection of studies in the previous two paragraphs, each of these projects measures only negative variables in the child (e.g., conduct problems, depression). It is a serious shortcoming that this body of research has not sought to understand

whether (a) positive indicators of adjustment might exist in these populations also, and (b) some measures traditionally identified as negative (e.g., depression) may actually be adaptive in contexts outside of a normative, middle-class perspective. Together, this body of research leans towards deficit views of experiences of poverty, wherein poverty itself is a symptom of deficiencies in the individuals and communities experiencing it (Gorski, 2016). It is informative that each of these studies reported that though bidirectional effects existed, child-driven effects on parent functioning were stronger than parent-driven effects on child functioning.

A final study worth discussing is Crosnoe and Cooper's (2010) work comparing the impacts of economic disadvantage on child academic performance. Though this work was not a study of bidirectional effects between parent functioning and child functioning, it did explore the impact of family socialization, which included measures for parent adjustment and child adjustment across socioeconomic contexts. Further, this work was done using the Early Childhood Longitudinal Study 1998 cohort. Though it represents a parent-driven view which this work hopes to expand, its findings are certainly able to inform research proposed here. As such, Crosnoe and Cooper found that family socialization mattered more when children were younger (Kindergarten- Grade 1), and that as they grew older (Grade 3) economic disadvantage mattered increasingly. This finding suggests that family processes at younger ages are the foundation upon which economic disadvantage acts. These authors arguably use the most robust measure of socioeconomic context of the literature reviewed.

While efforts have been made to consider bidirectional effects between parent functioning and child functioning within socioeconomic contexts, these have largely failed to consider socioeconomic context in robust terms. Further, these works have implicitly assumed that elicitation effects of one actor's functioning on another actor is similarly adaptive (or

maladaptive) across all socioeconomic contexts, thereby privileging standards of middle-class parenting. Work is needed which begins with a questioning of this assumption using a robust measure of socioeconomic risk.

Chapter 3 – Methodology

Purpose and Research Questions

Yan and Ansari's (2017) work provides much-needed evidence for generalizability of parent-child bidirectional models of development. Verifying this work across socioeconomic contexts contributes to the development of a more responsibly nuanced understanding of families. The purpose of this study is to gain insight into whether bidirectional effects between parent and child functioning vary across socioeconomic context. As such, the following research questions guide this work:

1. Are the measurement models of child functioning and parent functioning appropriate across all groups of socioeconomic privilege at all timepoints?
2. Do bidirectional effects between parent functioning and child functioning exist within each socioeconomic privilege group across early to middle elementary school grades?
3. Are these bidirectional effects similar and significant across all groups of socioeconomic privilege?

Participants

This research uses data from the Early Childhood Longitudinal Study Kindergarten 2010-2011 cohort (ECLS-K 2011). This is a federally funded study in the United States through the National Center for Education Statistics (NCES), a group within the Institute of Education Sciences of the U.S. Department of Education. According to the NCES, ECLS-K 2011 is "designed to provide comprehensive and reliable data that can be used to describe and to better understand children's development and experiences in the elementary grades, and how children's early experiences relate to their later development, learning, and experiences in school," (NCES, n.d.). Previously, researchers analyzed data from the ECLS-K 2011 database to describe

associations between school and home environments, instructional factors, and student achievement, adjustment and executive function (e.g., Lubienski, Robinson, Crane, & Ganley, 2013; Cimpian, Lubienski, Timmer, Makowski, & Miller, 2016; Little, 2017; McNeill, 2017).

The ECLS-K 2011 database includes repeated observations of a nationally representative sample of 20,000 U.S. students who were in kindergarten in the 2010-2011 school year. The study made biannual (spring and fall) observations of these students in kindergarten and grade 1, and annual (spring) observations from second grade until eighth grade. Because processing such large amounts of data takes time, release of each wave of observations is often made available a few years after they were collected. Currently, data from ECLS-K 2011 is available from the kindergarten to fifth grade year, with the most recent wave of available data (fifth grade) being publicly released in 2019.

Data were collected on a wide range of topics about the students' learning, environment and adjustment, with observations collected from students' teachers, parents/caregivers, and school administrators, as well as through direct assessment of the students. 1,310 schools participated in ECLS-K 2011. Children from these schools were randomly selected from a list of all kindergartners attending that school with stratified multistage sampling. The sample in this study includes all children and parents who participated in the spring kindergarten and fifth-grade waves of data collection.

Measures

As the construct of child functioning is a composite of multiple variables (as described in the following sections) a summary is provided in Table 3 as an overview of measures.

Table 3.

Summary of Constructs by Variables and Measures Used

Construct	Variables	Measures
Child functioning	Internalizing behaviours	Social Skills Rating Scale (SRSS)*
	Externalizing behaviours	
	Interpersonal skills	
	Self-control	
	Approaches to learning	Approaches to Learning Scale
	Academic skill	Standardized tests developed for ECLS-K

*Note: Items marked with a * used abbreviated versions of the listed scales*

Child Functioning

Six areas of child functioning were measured (internalizing behaviours, externalizing behaviours, interpersonal skills, self-control, approaches to learning, and academic skill) from four instruments (abbreviated Social Skills Rating Scale, Approaches to Learning, and standardized tests developed for math and reading). Variables drawn from these instruments are described in the following sections.

Social Skills Rating Scale

Internalizing behaviour (four items), externalizing behaviour (six items), interpersonal skills (five items), and self-control (four items) are measured from a modified version of the Social Skills Rating System developed by Gresham and Elliott (1990; Najarian, Tourangeau, Nord, & Wallner-Allen, 2018a; Najarian, Tourangeau, Nord, & Wallner-Allen, 2018b; Najarian, Tourangeau, Nord, Wallner-Allen, & Vaden-Kiernan, 2019). The SRSS is used to provide insight into children's overall cooperation, self-control, responsibility, independence, and interactions with teachers and peers at school. The SRSS demonstrates strong invariance across genders and ethnicities in the United States (Walthall, Konold, & Pianta, 2005). The modified scale was administered to the child's classroom teacher in kindergarten, and to their reading and language arts teacher in fifth grade. The scale asks teachers to report subjective frequencies of

students' use of certain social skills and behaviours and employs a four-point Likert scale ranging from "never" to "very often", with an option to select that they had not had the opportunity to observe the child appropriately to judge a response. Scores for each subscale were only computed when respondents provided a rating on a predetermined minimum number of items of each subscale (as determined by ECLS conventions; Najarian, Tourangeau, Nord, Wallner-Allen, & Vaden-Kiernan, 2019): self-control (three of four items), interpersonal skills (four of five items), externalizing problem behaviors (four of six items), internalizing problem behaviors (three of four items). Internal reliability statistics (Cronbach's alpha) of each subscale in each year of data collection are presented in Table 4. To facilitate interpretation of the child functioning construct, internalizing behaviours and externalizing behaviours were reverse scored such that high scores indicated absence of these behaviours.

The importance of noting the source of the ratings used in studies of bidirectional effects has been discussed in the literature review. For the SRSS and Approaches to Learning scales, children's teachers provided the ratings. Demographic information for the teachers is presented in Table 6.

Table 4.

Highest and Lowest Values for Reliability, Weighted Mean and Standard Deviations of All SRSS Subscales Across All Timepoints

	Externalizing		Internalizing		Self-Control		Interpersonal Skills	
	Reliability	Weighted mean (SD)	Reliability	Weighted mean (SD)	Reliability	Weighted mean (SD)	Reliability	Weighted mean (SD)
Lowest-highest across all waves	0.86-0.89	1.61-1.78 (0.59-0.64)	0.76-0.79	1.47-1.62 (0.48-0.58)	0.79-0.82	3.07-3.29 (0.59-0.64)	0.85-0.88	2.98-3.14 (0.61-0.67)
Kindergarten	0.89	1.64 (0.64)	0.78	1.51 (0.50)	0.82	3.18 (0.64)	0.87	3.14 (0.65)
Fifth Grade	0.88	1.63 (0.59)	0.79	1.57 (0.52)	0.80	3.29 (0.61)	0.86	3.13 (0.65)

Approaches to Learning Scale

The approaches to learning variable was measured by the *Approaches to Learning (AtL) Scale*. This scale was developed for ECLS-K and designed to measure the ways in which children approach learning situations, including emotional and behavioural aspects of their self-regulation, initiative, curiosity, and creativity. It was administered in the same question block as the Social Skills Rating System questions in all rounds of data collection. This scale uses the same response format as the SSRS, employing a four-point Likert-scale ranging from 1 = never to 4 = very often with an option to select not having had appropriate time to observe the behavior in question in the child. Approaches to Learning includes seven items asking about children's learning behaviors (keeps belongings organized, eager to learn new things, works independently, able to adapt to changes in routine, task persistence, pays attention, follows classroom rules). Scores were computed when respondents answered at least four of seven items. Highest and lowest internal reliability statistics (Cronbach's alpha), weighted means, and standard deviations of the Approaches to Learning scale across all years of data collection are presented in Table 5.

Table 5.

Highest and Lowest Values for Reliability, Weighted Mean and Standard Deviations of the Approaches to Learning Scale Across All Timepoints

	Approaches to Learning	
	Reliability	Weighted Mean (SD)
Lowest-highest across all years	0.91-0.92	2.93-3.11 (0.68-0.71)
Kindergarten	0.91	3.09 (0.69)
Fifth Grade	0.92	3.11 (0.70)

Table 6.

Demographic characteristics of teachers who rated children

	Self-Control		Interpersonal Skills		Externalizing Problems		Internalizing Problems		Approaches to Learning	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Total Sample	15,800	10,235	15,800	10,224	15,900	10,359	15,870	10,294	15,980	10,403
Sex										
Male	8,030	5,229	8,020	5,203	8,100	5,291	8,070	5,255	8,130	5,311
Female	7,710	4,996	7,720	5,011	7,750	5,058	7,740	5,029	7,790	5,082
Race										
White, non-Hispanic	7,680	5,081	7,680	5,085	7,710	5,133	7,710	5,123	7,730	5,149
Black, non-Hispanic	2,060	968	2,060	965	2,070	977	2,060	964	2,090	982
Hispanic	3,820	2,849	3,810	2,842	3,850	2,899	3,850	2,871	3,890	2,916
Asian, non-Hispanic	1,240	781	1,240	775	1,260	789	1,240	777	1,260	793
Hawaiian	100	49	100	49	100	49	100	49	100	49
American Indian, Alaska	150	94	150	95	150	95	140	93	150	93
Two or more races, non-Hispanic	700	404	710	404	700	408	710	408	710	410
School type										
Public	13,760	9,290	13,780	9,277	13,870	9,404	13,830	9,340	13,940	9,448
Private	2,040	945	2,020	947	2,030	955	2,040	954	2,040	955

Standardized Tests of Reading and Math

The final measure of child functioning, academic skills, is a combination of scores from the mathematics and reading standardized assessments developed for the ECLS-K:2011. The decision to create a composite score of reading and math assessments is consistent with decisions of past researchers who cited the high correlations between the subscales as rationale for this decision (Yan & Ansari, 2017; Crosnoe, Bonazzo, & Wu, 2015). In all rounds of data collection, the direct child assessments of reading, mathematics and science were designed to take one hour in total, with reading approximately half this time (30 minutes), and mathematics approximately 15-20 minutes of this time (Najarian et al., 2018a; Najarian et al., 2018b; Najarian et al., 2019).

These tests were designed to be adaptive in nature, such that after a routing block of items, each child was administered a second block containing a set of items most appropriate for that child's level of knowledge and skills. This procedure increases reliability per unit of testing time, reduces the time burden on the child, and decreases the likelihood of the child becoming frustrated by being asked questions either too easy or too difficult for them (Najarian et al., 2018a; Najarian et al., 2018b; Najarian et al., 2019). Further, adaptive measures reduce likelihood of floor and ceiling effects, which can affect the measurement of longitudinal gain. Prior to distribution of the academic skills tests, a language screener was completed. If children spoke another language at home and failed the screener, they were either administered the remainder of the tests in Spanish (if Spanish-speaking) or testing stopped. By fifth grade, 99.9% of children were administered the English versions of the tests (Tourangeau et al., 2019).

Content for the reading assessments was largely based on the 2009 Reading Frameworks for NAEP (National Assessment Governing Board, 2008). Because this is aimed at the fourth-grade level and above, the assessments were adapted to each of the grade levels prior as far back as the kindergarten year. The reading assessments measured basic skills (phonological awareness, familiarity with print, sound and letter recognition, sight words), vocabulary (both expressive and receptive), and comprehension questions within three broad categories (locating/retrieving information, integrating/interpreting information, and critiquing/evaluating information). The distribution of items within reading assessment by content category and grade level is summarized within the psychometric reports (Najarian et al., 2018a; Najarian et al., 2018b; Najarian et al., 2019).

Content for the mathematics assessment was largely based on the ECLS-K 1998 framework developed for kindergarten, first, and third grades, and adapted to fit the fifth grade.

Across all grades, the test was designed to measure conceptual knowledge, procedural knowledge, and problem solving through content areas of number properties and operations, measurement, geometry, data analysis and probability, and algebra. The distribution of items within the mathematics assessment by content category and grade is summarized within the psychometric reports (Najarian et al., 2018a; Najarian et al., 2018b; Najarian et al., 2019). Questions were displayed on a computer, and children were offered pencil and paper with which to help prepare answers before entering them. Further, question text was read to students to reduce the chance that reading ability impacted mathematics scores (Najarian et al., 2018a; Najarian et al., 2018b; Najarian et al., 2019). Descriptive statistics for the academic skill variable are presented in Table 7.

Table 7.

Weighted Mean and Standard Deviation of Academic Skill Across Timepoints

	Academic Skill	
	Kindergarten	Fifth Grade
Weighted Mean (SD)	59.99 (12.73)	128.38 (15.08)

Parent Functioning

All measures of parent functioning were obtained from items in the parent interviews. In all rounds of data collection, parent ID codes were linked to student ID codes to permit pairing of parents to their children during analysis. In each round of data collection, the average length of the parent interviews lasted less than one hour, and the vast majority were conducted by phone, with the remaining interviews (less than 5%) conducted in-person. When interviewers phoned the household, they asked to speak to the person in the household who was the parent or guardian. If there was more than one person who fit this description, the field agent asked to

speak with the person who knew the most about the child's care, education and health. In all interviews following the first wave of data collection, field agents attempted to complete the interview with the parent or guardian who responded in the prior interviews, where possible. The interview had been translated into Spanish prior to data collection for those who preferred to communicate in Spanish. Where parents spoke other languages, interviews were completed with the assistance of an interpreter who translated the English version during the interview.

Yan and Ansari's (2017) initial work with the 1998 cohort of the ECLS-K included five aspects of parental health, wellbeing, style, and practice to measure parent functioning. These aspects were depressive symptoms, parenting stress, parental warmth, harshness, and spanking. Unfortunately, in the 2011 cohort of ECLS-K, the harshness and spanking indicators were not collected in the fifth-grade wave, leaving three of Yan and Ansari's parent functioning indicators available for examination. While a three-factor model could be estimated with the use of item-level statistics, this would be qualitatively different than the parent functioning measure used by Yan and Ansari. To avoid giving the impression that these would be comparable models, individual indicators were used instead. Descriptive statistics of these indicators are presented in Table 8. The following sections describe the scales used to measure the included variables (depressive symptoms, parental warmth, parenting stress).

Center for Epidemiological Studies Depression Scale

The first indicator, depressive symptoms, was accumulated from a set of twelve items from the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) developed by the National Institute of Mental Health. This scale asks parents to report the frequency during the past week with which they've experienced specific depressive symptoms. The CES-D has been validated in the United States with samples of people self-identifying as

White, Black and Mexican American (Roberts, 1980). In the abbreviated version of the CES-D used in ECLS-K 2011, each item is scored using a four-point scale, corresponding to labels of *never*, *some of the time*, *a moderate amount of the time*, and *most of the time*. Total scores for this subscale range from zero to 36, with higher scores representing increased levels of depression. Items included in the ECLS survey demonstrated equal validity for both men and women (Ross & Mirowsky, 1984). To facilitate interpretation with other indicators and the child functioning construct, this was reverse scored in this work such that a high score indicates low expression of depressive symptoms.

Parenting Stress Index

The second indicator, parenting stress was calculated from a set of six items which had been included from the Parenting Stress Index (Abidin, 1983). This scale is designed to measure the magnitude of stress in the parent-child system. The items measure how truly (1 = *completely true*, 4 = *not at all true*) parents felt statements described their experiences with parenting (e.g., "Being a parent is harder than I expected"). The Parenting Stress Index has been validated for use with participants from lower socioeconomic status contexts and participants who identify as members of a racial minority in the United States (Reitman, Currier, & Stickle, 2002; Hutcheson & Black, 2010). Total scores for this measure range from zero to 36, with higher scores representing increased parenting stress. Again, to facilitate interpretation with other indicators and the child functioning construct, this was reverse scored in this work such that a high score indicates low expression of parenting stress.

Home Observation for Measurement of the Environment Scale

The third indicator, parental warmth, measures parents' affection and sensitivity toward the emotional needs of their child (e.g., "Even when I'm in a bad mood, I show {child} a lot of

love"). This was calculated from four items from the Home Observation for Measurement of the Environment scale (HOME; Caldwell & Bradley, 1984). Test-retest reliability has been shown to be strong for HOME at 12 months in a normative sample and moderate in samples of low-income families (Totsika & Sylva, 2004). The scale uses the same four-point likert scale as the *parenting stress* items (1=never, 4=most of the time), with higher scores representing greater agreement with the construct title.

Table 8.

Descriptive Statistics of Parent Indicators

	Absence of Depressive Symptoms		Parental Warmth		Absence of Parental Stress	
	Reliability	Weighted mean (SD)	Reliability	Weighted mean (SD)	Reliability	Weighted mean (SD)
Kindergarten	0.84	3.19 (0.41)	0.67	3.29 (0.38)	0.57	3.13 (0.48)
Fifth Grade	0.87	3.16 (0.43)	0.72	3.26 (0.37)	0.57	3.11 (0.50)

Social and Economic Privilege

A scale using multidimensional socioeconomic markers was adapted from past ECLS-K researchers (Crosnoe, Mistry & Elder, 2002; Crosnoe & Cooper, 2010). In this work the original scale, which measured socioeconomic risk, has been reverse scored to measure socioeconomic privilege. The scale used in this work is structured so that a family received one point on the scale for demonstrating each of the following statuses: (1) there was no history of food stamp receipt in the past twelve months, (2) there was a dual-guardian family structure; (3) the custodial parent graduated from high school, (4) the custodial parent did not have their first child as a teenager, and (5) there was no history of welfare receipt in the past twelve months. The sum

of these five parent-reported items serves as the final privilege score, which was calculated for both timepoints for all cases.

Covariates

All models controlled for a theoretically relevant set of child and household variables: household language, child's sex, child's age, ethnicity, region, and urbanicity. All covariates were drawn from the Kindergarten year.

Household language reflects the primary language(s) spoken in the home. This data is collected form parents during the parent interview. The household language variable has three categories: (1) parents who report any language other than English is regularly spoken in the home, or that a language other than English is spoken in the home but the primary language of the household is English, (2) parents who report that both English and another language were spoken in the home, and that these languages are spoken equally or a primary language cannot be chosen, or (3) parents who report that a language other than English is spoken either solely or primarily in the home.

Data on children's sex is collected from the schools at the time of sampling, and later confirmed by parents in parent interviews. Children are classified as either male or female. The authors of the present study recognize that this is a narrow collection of information about children's experience of sex and gender, and that the use of this variable, as it is currently constructed, is a blunt tool in this regard.

Children's ethnicity is collected from schools and confirmed by parents. The categories developed by ECLS-K 2011 ask parents to indicate to which of five race categories their child belongs (White, Black or African American, Asian, Native Hawaiian or another Pacific Islander,

American Indian or Alaskan Native). Parents may indicate belonging more than one category; in these cases, the child is recorded as multiracial in the composite variable used in this study.

Region of the child's school is divided across four categories: Northeast (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, and Pennsylvania), Midwest (Illinois, Indiana, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Montana, New England, North Dakota, and South Dakota), South (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, and Texas) and West (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Alaska, California, Oregon, Washington, and Hawaii).

Classification of urbanicity employed thirteen categories. These categories and definitions are listed in Appendix A. Child's age is determined as the child's age at assessment in months.

Analytic Procedures

Data Preparation

Data were screened for assumptions of confirmatory factor analysis and cross-lagged panel analysis in SPSS version 26. A weighting variable developed by NCES staff for the ECLS-K:2011 data set was applied which weighted cases based on non-responses by children, parents, and their teachers at the Kindergarten and fifth grade timepoints. Cases which were assigned a weight of zero were eliminated, yielding 6,933 cases with weights greater than zero assigned.

Socioeconomic privilege scores at each timepoint for each parent-child dyad were ranked as tertiles. A crosstabs analysis was then performed to identify which dyads remained within the same tertile across measurement waves. Those who had switched tertiles were excluded, leaving

a total final sample of n = 4,358, composed of 1,350 parent-child dyads in the low privilege group (Group 1), 905 parent-child dyads in the middle privilege group (Group 2), and 2,103 parent-child dyads in the high privilege group (Group 3).

Tests of confirmatory factor analysis and cross-lagged panel analysis were performed in MPlus version 8.5 (Muthén & Muthén, 2020). When applying a weighting variable in MPlus, robust maximum likelihood estimation with robust (Huber-White) standard errors (MLR) is required. Therefore, this estimator was employed for all analyses conducted in MPlus. This estimator is robust to non-normally distributed data (Bertsimas & Nohadani, 2019). With MLR, MPlus generates a scaled test statistic that permits calculation of a Sartorra-Bentler chi-square (S-B X^2) fit statistic that more accurately captures the appropriate amount of misfit in a model estimated with MLR (Sartorra & Bentler, 2010).

Measurement Model

Prior to estimating the structural model, a measurement model was developed for each group through confirmatory factor analysis for the latent construct, child functioning, and the six associated indicator variables. This is a common first step in structural equation modeling (SEM) when latent variables are employed as it tests the appropriateness of the expected relations and constraints between the measured indicators and underlying latent variables (Brown, 2015). A measurement model was created for each socioeconomic privilege group to allow groups to be independently examined for appropriateness of measurement at each timepoint. Completing this is necessary prior to attempting to make comparisons across groups to ensure that any differences or similarities observed are the result of group differences and not measurement differences (Kline, 2015).

As the baseline model of child functioning in this study replicates the one used by Yan and Ansari (2017), I refer to this as the Yan-Ansari Model of Child Functioning, presented in Figure 1. However, in reviewing literature on child functioning, it was noted that some scholars of child functioning differentiate between socio-emotional functioning, which is the child's ability to navigate the emotions of themselves and others in social settings, and academic functioning, which is the academic success of children in school settings (Bhide, Sciberras, Anderson, Hazell & Nicholson, 2019; Ghide, Segers, & Verhoeven, 2018; Van der Meulen, van der Bruggen, Split, Verouden, Berkhout et al., 2014). As five of the six indicators (externalizing behaviours, internalizing behaviours, self-control, approaches to learning, and interpersonal skills) relate to socio-emotional functioning and only one (academic skill) relates to academic functioning, an alternate model was tested (M2) in which the academic skill indicator was removed. This is presented in Figure 2 and is referred to as the Five-Factor Model of Child Socio-Emotional Functioning. By title alone it may appear that approaches to learning is more closely related to academic functioning. However, this in fact measures the ways in which children approach learning situations through emotional and behavioural aspects of their self-regulation, initiative, curiosity, and creativity, which is based in a socio-emotional view of the child's relationship with learning.

Additionally, previous theoretical and empirical work suggests that valued behaviours within U.S. classrooms embody White middle-class ways of knowing and being and reinforce conservative behaviours of speech, movement, and communication (Hatt, 2012). Further, teachers appear to discipline students from marginalized groups (by class, race, gender, and sexual orientation) more harshly for infractions of these behavioural expectations than their White, middle-class peers (Hatt, 2012), leading to cultural conformity in which standing out

behaviorally and functioning effortlessly within the rules of the classroom lead to teacher approval and positive labelling, such as ‘being smart’ (Hatt, 2012). Because teachers provided the ratings of student externalizing behaviours and interpersonal skills used in this work, it was therefore proposed that this bias may be present within their assessment of externalizing behaviours and interpersonal skills of students with low socioeconomic privilege, such that interpersonal skills (speech, movement and communication) not conforming to White middle-class worldviews were interpreted according to their teachers’ bias as inappropriate externalizing behaviours. This work therefore tested a third model integrating a covariance of measurement error between externalizing behaviours and interpersonal skills within the low privileged group (M4). This model is presented in Figure 3 and is referred to in this work as the Covariant Five-Factor Model of Socio-Emotional Child Functioning. Because this covariance is applied to correct behavioural measurement error based on an inability to measure *non-middle-class* ways of knowing and being, this was only tested within group 1, the low socioeconomic privilege group.

Because large volumes of items negatively affect model fit (Ding, Velicer, & Harlow, 1995; Wang & Wang, 2012), I used parceling. Parceling is the use of a mean average score of multiple items. It is used most often when researchers are focused on testing structural models and are seeking information on the direct and indirect effects between factors (Gibson & Schoemann, 2013). The indicator variables of child functioning each had between 4 and 12 items (interpersonal skills: five items; self-control: four items; externalizing behaviours: six items; internalizing behaviours: four items; approaches to learning: seven items; academic skills: two scores) which were summed and a weighted mean average was used. This approach is superior to using item-level data for large groups of items because parcels demonstrate higher

reliability, reduced number of parameter estimates within a model, and reduced sources of sampling error (Nasser & Wisenbaker, 2003; Litte, Rhemtulla, Gibson & Schoemann, 2013).

To guide decisions on which model was more appropriate and whether each was appropriate for all groups at all timepoints, tests of longitudinal and multigroup invariance were conducted. General procedures for factorial invariance testing followed in this work are described in the following section, with specific comments to longitudinal and multigroup factorial invariance testing made in the sections after that. Benchmarks and general principles used in this work to evaluate model fit and guide decisions on appropriateness of measurement models are described in the Model Evaluation section.

Figure 1. *Yan-Ansari Model of Child Functioning*

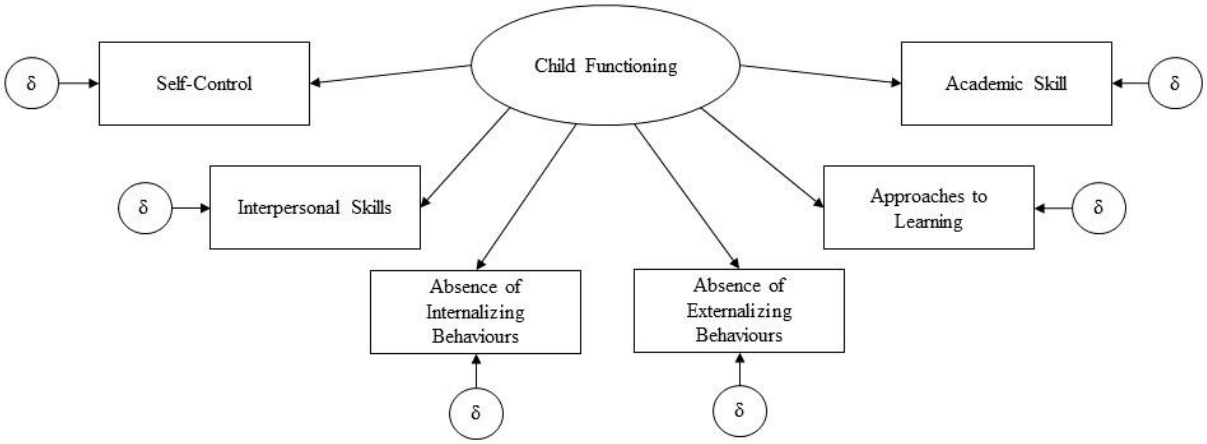


Figure 2. *Five-Factor Model of Child Socio-Emotional Functioning*

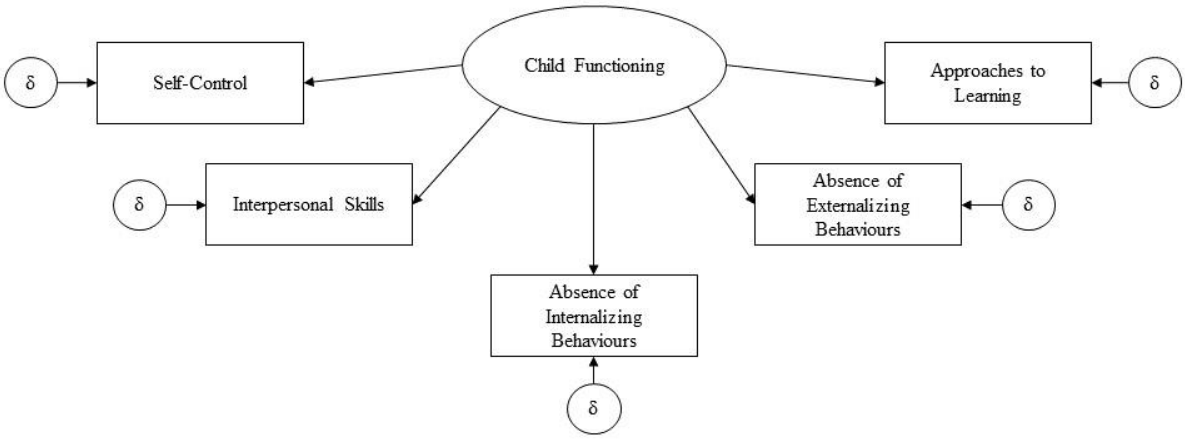
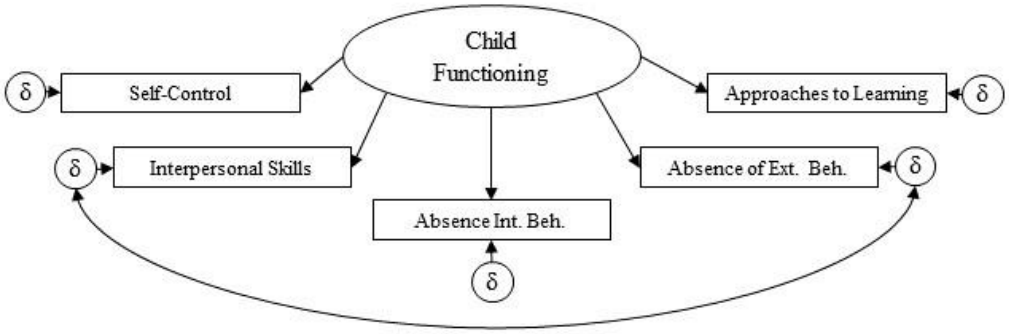


Figure 3. *Covariant Five-Factor Model of Socio-Emotional Child Functioning*



Factorial Invariance

Comparisons of the same constructs across time or groups assume that the measurements are factorially invariant with respect to both time and group characteristics (Brown, 2015). In longitudinal research, age, maturation, and experience are all factors that can influence change in measures over time. Likewise, in research comparing groups, social, environmental, and personal choices are all factors that can affect change in a measure across groups. Researchers must investigate whether it was these influences which resulted in a change in the measured latent construct or if the change was a result of measurement error within that construct. Therefore, this

work used tests of factorial invariance to investigate whether measurement error was present within socioeconomic groups or across time. The basic factorial invariance procedure used in this study is described in this section, with comments specific to longitudinal and multigroup invariance made in the following sections.

Three levels of testing for factorial invariance were completed. These were conducted in the typical order: tests of weak factorial invariance first, followed by tests of strong factorial invariance, and finally by tests of strict factorial invariance (Brown, 2015). These tests were conducted one after another until either all tests were complete or a test was failed (Brown, 2015).

The first test which was conducted in all instances of invariance testing was weak factorial invariance. This investigated the invariance of factor loadings of the model. Determining weak factorial invariance permits comparisons of the variance of the latent construct with other constructs across time or groups (depending on which invariance characteristic is being tested). To test weak factorial invariance two models were run, one in which factor loadings were fixed to equivalence (across time or groups, depending on whether group or longitudinal invariance was being investigated) and a second in which these were freed. A chi-square difference test was then performed to determine whether the models showed a significant difference. If no significant different was present, then weak factorial invariance was established, and tests of strong factorial invariance were performed. When significant differences were present, CFI change was examined. In all levels (weak, strong strict) or factorial invariance, small invariances can be significantly different by chi square tests even though the difference may not be meaningful with respect to effect size (Brown, 2015). Studies with large sample sizes ($n > 500$) are particularly susceptible to this (Brown, 2015). In this case, it is acceptable to

examine whether a change in CFI occurs, with changes of 0.01 or less considered indicative of invariance (Cheung & Rensvold, 2002). Because all sub-samples within this work were greater than the sample size guide provided by Brown (2015), CFI was examined in invariance tests where the chi square value was significant.

If weak factorial invariance was determined, tests of strong factorial invariance were then conducted. Tests of strong factorial invariance investigate the intercepts of the model. Determination of strong factorial invariance permits comparisons of latent mean scores of the latent construct. Where strong invariance tests were conducted, two models were run: one in which the intercepts were fixed (across time or groups, depending on the invariance characteristic being tested) and another in which they were freed. In both models, factor loadings remained fixed to equivalence following determination of weak factorial invariance. Chi-square difference tests were then performed to determine whether the models showed significant difference, with no significant difference determining strong factorial invariance. In instances where chi-square tests were significant, CFI change was examined, with changes of 0.01 or less accepted as determining strong factorial invariance.

Finally, if strong factorial invariance was determined, tests of strict factorial invariance were conducted. Strict factorial invariance examines invariance of residual errors across timepoints or groups. To test strict factorial invariance, one model is generated in which residual variances are allowed to vary freely, and another in which they are fixed to equivalence, with a difference of chi-square test then performed. Similar to the previous stage of invariance testing, the strong factorial invariance model is nested within each of models generated to test strict invariance. Strict factorial invariance was considered achieved if the chi-square test is non-significant, or if the change in CFI was 0.01 or less.

Longitudinal Factorial Invariance

Tests of longitudinal factorial invariance were the first set invariance tests conducted. These examined whether the measurement model was invariant across time within each socioeconomic privilege group (each group was examined individually). Longitudinal factorial invariance testing was necessary to test the assumption that the construct of child functioning is fundamentally similar, and therefore comparable, across time within each group. Establishing longitudinal factorial invariance within groups demonstrates that cross-time differences in the expression of a construct within a group are likely due to factors other than measurement differences of the latent construct (Brown, 2015).

Longitudinal invariance tests were conducted for each group (low privilege, medium privilege, high privilege) following the invariance testing procedures described above. Parameters were fixed and freed across time (e.g., the Kindergarten timepoint to the Grade 5 timepoint) within each group.

Multigroup Factorial Invariance

Tests of multiple group factorial invariance were conducted after tests of longitudinal factorial invariance. Establishing multigroup factorial invariance demonstrates that any difference observed among groups is likely due to factors other than the measurement of the latent construct (Brown, 2015). Tests of multigroup factorial invariance were conducted with a sample composed of all sub-sample groups with identical measurement model structures. Again, these tests followed the factorial invariance testing procedure described. However, in this case parameters were fixed and freed across groups.

Structural Model

Because child functioning and indicators associated with parent functioning were expected to be covary (Yan & Ansari, 2017), an approach was required which permits control for autoregressive effects, within-timepoint correlations, and temporal effects between the latent child functioning construct and the indicators of parent functioning. Cross-lagged panel models of longitudinal, reciprocal effects were well suited to investigate the nature of change among these because they allow for an exploration of the direction of the effects of child functioning and indicators of parent functioning while controlling for previous measures of these same constructs (Newsom, 2015). Therefore, cross-lagged panel analysis was used to test the study's hypotheses. Panel models allow researchers to examine questions of bidirectionality and of the relative weight of directionality (Newsom, 2015). As a way of ameliorating measurement error, a latent variable approach was used where possible (Shadish, Cook & Campbell, 2002).

Panel data consists of at least two variables measured at two or more time-points in the same set of subjects. This analysis included indicators of child functioning latent constructs and indicators associated with parent functioning from when the children of the families were in Kindergarten (time one) and Grade 5 (time two). The model can be seen in Figure 2. The observed variables (boxes) are indicators. In the case of child functioning, the observed variables are indicators of the latent variable of child functioning (circle). Unidirectional arrows from the latent variable to the indicators represent factor loadings. The structural model specifies the hypothesized pattern of influence between child functioning and indicators of parent functioning across time. Two-headed arrows represent the hypothesized covariance or correlations within each timepoint. Time two two-headed arrows represent the covariance (correlations) among the residual variances of the latent variables.

Tests of measurement invariance revealed variant measurement effects in the low socioeconomic privilege group which resulted in the addition of an error covariance among the indicators (described in the results section). Multigroup cross-lagged panel analysis was run for the middle and high privilege groups to test assumptions of whether correlations and autoregressive and cross-lagged effects among variables were equivalent across groups. To do this, two models were tested and compared. The first model was a semi-restrictive model which assumed measurement invariance of factor loadings based on results of the CFA trials, but freely estimated covariance and regression coefficients. This model was then nested within a second, more restrictive model in which regression and covariance coefficients were fixed to equivalence. These models were compared using X^2 difference tests and CFI changes (Sartorra & Bentler, 2001; Brown, 2015).

Model Evaluation

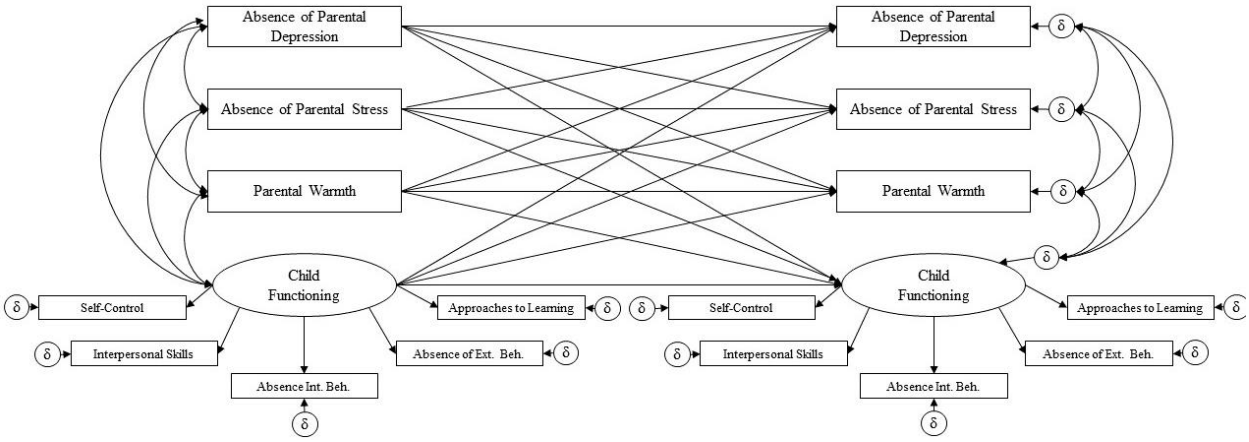
The sample variance-covariance matrices for measurement models and structural models were analyzed in Mplus version 8.5 (Muthén & Muthén, 2020). Global goodness of fit was evaluated by using the standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), comparative fit index (CFI) and the Tucker-Lewis index (TLI).

Multiple indices were used because they provide different information about model fit. Used together, these indices provided a more complete and reliable evaluation of the solution. The RMSEA provides an index of the amount of misfit per degrees of freedom in the model. An RMSEA that is 0.08 or lower is considered to suggest acceptable model fit, with 0.05 or lower suggesting good fit (Little, 2013). Both CFI and TLI test the ratio of misfit of the tested model to the misfit of the null model, though TLI includes a penalty for the overall number of constraints, thereby helping to reduce the number of Type II errors (Kline, 2015). A CFI or TLI above 0.90 is

considered to indicate acceptable fit, with a CFI or TLI above 0.95 suggesting a good fit (Little, 2013). The SRMR value is the square-root of the difference between the residuals of the sample covariance matrix and the hypothesized model. Values equal to or less than 0.08 are considered acceptable, with values equal to or less than 0.05 considered indicative of good fit. While values for the chi-square (X^2) test are included with each model, X^2 values in models with more than 400 cases are nearly always significant (Kenny, 2015) and therefore not a reliable source of evaluation in any of the models evaluated in this work, which are all based on sample sizes of more than double the n=400 threshold.

In addition to global fit indices, models in each iteration were examined for evidence of localized strain. Two outputs informed this: (1) the standardized residual covariance matrices of the models, and (2) the modification indices. These were used to identify localized points of ill fit. Though not typically reported within publications, standardized residual covariance matrices of models are provided in the appendix section of this work to provide additional transparency in instances where I was deciding whether to accept a model.

Figure 4. *Structural Model of Child Functioning and Indicators of Parent Functioning, Covariates Not Shown*



Chapter 4 – Findings

To facilitate the thinking of the reader, findings are presented by research question in this section. Table 9 provides a summary of research questions, measures, and analysis procedures. Findings from all research questions will be critically integrated in the discussion section.

Table 9.

Summary of Research Questions, Measures and Analyses

Research Question	Measures	Analyses
Are the measurement models of child functioning and parent functioning appropriate across all groups of socioeconomic privilege at all timepoints?	**Child Functioning:** Social Skills Rating System*; Approaches to Learning Scale; Standardized tests developed for ECLS-K	Within-group longitudinal invariance testing of latent constructs Multigroup longitudinal invariance testing of latent constructs
	Indicators of Parent Functioning	
Do bidirectional effects between parent functioning and child functioning exist within each socioeconomic privilege group across early to middle elementary school grades?	**Parent Warmth:** Home Observation for Measurement of the Environment Scale*	Cross-lagged panel analysis
Are these bidirectional effects similar and significant across all groups of socioeconomic privilege?	**Parent Depression:** Center for Epidemiological Studies Depression Scale	Cross-lagged panel analysis
	Parenting Stress: Parenting Stress Index*	

*Note –abbreviated version was used for all instruments marked with **

RQ1: Are the measurement models of child functioning and parent functioning appropriate across all groups of socioeconomic privilege at all timepoints?

Descriptive Statistics

Data were screened relative to the assumptions of SEM procedures (Kline, 2005) using SPSS version 26 statistical software. For both parent and child indicators at both timepoints the skewness and kurtosis scores varied from small to extreme (Aidley, 2019). These are presented

in Table 10 (child functioning indicators) and Table 11 (indicators of parent functioning). Consequent to (a) the skewness and kurtosis of indicator variables, and (b) the MPlus program requirements in analyses where weighting variables are applied, robust maximum likelihood estimation was employed which is robust to instances of non-normality. Bivariate correlations across all variables at both timepoints can be found in Table 12.

Table 10.

Skewness and Kurtosis in Child Functioning Indicator Variables Across Timepoints

	Self-Control	Interpersonal Skills	Approaches to Learning	Absence of Internalizing Behaviours	Absence of Externalizing Behaviours	Academic Composite
Time 1						
Skewness	-0.391	-0.304	-0.250	-1.045	-1.115	0.441
Kurtosis	-0.682	-0.673	-0.885	1.196	0.444	1.137
Time 2						
Skewness	-0.587	-0.258	-0.159	-1.153	-1.069	-0.498
Kurtosis	-0.409	-0.804	-0.927	1.377	0.837	0.084

Table 11.

Skewness and Kurtosis in Indicators of Parent Functioning Across Timepoints

	Absence of Depressive Symptoms	Parental Warmth	Absence of Parental Stress
Time 1			
Skewness	-0.479	-0.755	-0.489
Kurtosis	-0.592	-0.286	-0.713
Time 2			
Skewness	-0.505	-0.726	-0.477
Kurtosis	-0.671	-0.170	-0.791

Table 12.

Bivariate Correlations of All Indicator Variables, Time One

	AtL	Self-Control	Inter-personal	Abs. Int. Beh	Abs. Ext. Beh	Abs. Depression	Warmth	Abs. Stress
Time One								
AtL	1.00							
Self-Control	0.719	1.00						
Interpersonal	0.743	0.803	1.00					
Abs. Int Beh	0.316	0.278	0.303	1.00				
Abs. Ext Beh	0.606	0.734	0.603	0.306	1.00			
Abs. Depression	0.418	0.440	0.432	0.168	0.453	1.00		
Warmth	0.362	0.416	0.332	0.132	0.461	0.423	1.00	
Abs. Stress	0.581	0.444	0.446	0.191	0.441	0.713	0.441	1.00
Time Two								
AtL	1.00							
Self-Control	0.730	1.00						
Interpersonal	0.735	0.814	1.00					
Abs. Int Beh	0.216	0.301	0.326	1.00				
Abs. Ext Beh	0.617	0.729	0.633	0.259	1.00			
Abs. Depression	0.433	0.409	0.433	0.216	0.427	1.00		
Warmth	0.375	0.385	0.360	0.222	0.398	0.428	1.00	
Abs. Stress	0.579	0.423	0.432	0.290	0.424	0.478	0.433	1.00

Note – AtL = Approaches to Learning; Abs. Int. Beh. = Absence of Internalizing Bheaviours; Abs. Ext. Beh. = Absence of Externalizing Bheaviours, Abs. Depression = Absence of Depsression; Abs. Stress = Absence of Parental Stress

Measurement Model

Measurement models were examined through confirmatory factor analysis (CFA) to respond to RQ1 (*Are the measurement models of child functioning and parent functioning appropriate across all groups of socioeconomic privilege at all timepoints?*) and increase confidence that specified indicators for child functioning were appropriately capturing existing constructs in the sample data. This first involved verification and evaluation of the baseline model and alternate models for child functioning (Figures 1 and 2) in each group. Once a model was selected, longitudinal invariance testing was completed for each construct in each group. Finally, equivalence testing across groups was performed.

Child Functioning

The first research question focused on whether the child functioning model was appropriate across all groups of socioeconomic privilege. Based on prior evidence and theory bearing on child functioning (Yan & Ansari, 2017), a single-factor model was specified in which self-control, interpersonal skills, absence of internalizing behaviours, absence of externalizing behaviours, approaches to learning and composite academic scores loaded onto the latent variable of child functioning. Figure 1 depicts the complete specification of the latent factor model. This model was overidentified with 5 degrees of freedom.

Group 1

Group 1 contained a sample of 1,350 parent-child dyads. At both timepoints the initial run of the Yan-Ansari (M1) model (Figure 1) revealed nearly universal poor fit, particularly at the first timepoint. Global fit statistics are presented in Table I. Examination of localized strain revealed that at both timepoints the academic composite factor showed unacceptably high standardized residual covariances with multiple indicators, indicating multiple areas of under and over estimation and overall poor fit within the construct. Standardized residuals of covariances of the M1 model are presented in Appendix A. As mentioned in the Methods section, though these are not typically reported in academic journals due to overall word count limits, they do provide insight into localized areas of model ill fit (Brown, 2015) and are included here to provide additional transparency to readers on decisions to accept or reject models.

To further examine fit of academic skill within the model, parameter estimates for the construct at both timepoints were examined which are presented in Table J. At both timepoints the parameter estimate for academic skill were weak (time one: $\beta = 0.311$, $b = 0.036$, $p < 0.001$;

time two: $\beta = 0.263$, $b = 0.031$, $p < 0.001$) implying that this indicator did not contribute greatly to the latent construct.

Three factors supported my decision to test the alternative model (M2) in which the academic skill indicator was removed: the observed localized strain, weak parameter estimates, and the tendency in the literature to separate socio-emotional functioning and academic functioning. The Approaches to Learning scale was retained as this scale focused more on a child's self-regulation and motivation within the classroom than discrete academic achievement. The alternative model (M2) led to unanimous improvement in global model fit indices at both timepoints (CFI, TLI, RMSEA, SRMR; Table 13). A Sartorra-Bentler chi-square difference test yielded a significant result at both timepoints (time one: X^2 183.76, cd 1.34; time two: X^2 96.55, cd 1.54) with a CFI improvement greater than 0.01 observed in each case (time one: CFI_{M1} = 0.88, CFI_{M2} = 0.95; CFI_{M1} = 0.94, CFI_{M2} = 0.97). Additionally, multiple points of localized strain were reduced to within guideline values.

Because another indicator, absence of internalizing behaviours, also demonstrated a weaker factor loading (see Table 14), a third model (M3) was tested in which the baseline model was modified by removal of the absence of internalizing behaviour indicator. However, this modification does not have a wide precedence in the literature and showed much less strain in localized fit when examining the residual covariances (Appendix A). Therefore, results that globalized model fit indices unanimously worsened upon its removal at time one and across TLI and RMSEA scores at time two were unsurprising.

Table 13.

Global Model Fit Statistics for Child Functioning in the Low Socioeconomic Privilege Group

	X^2 (df), p	CFI	TLI	RMSEA	SRMR
Kindergarten					
M1	263.70 (9), p<0.001	0.88	0.81	0.15	0.051
M2	101.00 (5), p< 0.001	0.95	0.89	0.12	0.029
M3	289.20 (5), p< 0.001	0.87	0.73	0.21	0.056
M4	22.28 (4), p< 0.001	0.99	0.98	0.06	0.018
Grade 5					
M1	158.03 (9) p<0.001	0.94	0.89	0.11	0.046
M2	64.97 (5), p<0.001	0.97	0.94	0.10	0.028
M3	6907.93 (5), p< 0.001	0.98	0.94	0.12	0.017
M4	37.06 (4) p<0.001	0.98	0.96	0.07	0.026

Table 14.

Parameter Estimates of Group 1 Child Functioning at Each Time Point

	M1		M2		M3	
	Unstandardized	Standardized	Unstandardized	Standardized	Unstandardized	Standardized
Kindergarten						
Self-Control	1.00	0.90	1.00	0.91	1.000	0.91
	(0.00)	(0.01)	(0.000)	(0.01)	(0.000)	(0.01)
Interpersonal	0.95	0.87	0.93	0.86	0.94	0.86
Skills	(0.03)	(0.02)	(0.03)	(0.02)	(0.05)	(0.02)
Absence of	0.30	0.34	0.29	0.34	n/a	n/a
Internalizing	(0.03)	(0.03)	(0.03)	(0.03)		
Behaviours						
Absence of	0.87	0.76	0.86	0.77	0.86	0.76
Externalizing	(0.03)	(0.012)	(0.03)	(0.02)	(0.03)	(0.02)
Behaviours						
Approaches to	0.98	0.83	0.95	0.81	0.97	0.82
Learning	(0.03)	(0.02)	(0.03)	(0.016)	(0.03)	(0.02)
Academic	5.82	0.31	n/a	n/a	5.69	0.31
Composite	(0.70)	(0.04)			(0.70)	(0.04)
Grade 5						
Self-Control	1.00	0.93	1.00	0.91	1.000	0.91
	(0.000)	(0.01)	(0.000)	(0.01)	(0.000)	(0.01)
Interpersonal	0.99	0.88	0.93	0.86	0.94	0.86
Skills	(0.03)	(0.01)	(0.03)	(0.02)	(0.05)	(0.02)
Absence of	0.27	0.28	0.29	0.34	n/a	n/a
Internalizing	(0.04)	(0.03)	(0.03)	(0.03)		
Behaviours						
Absence of	0.79	0.74	0.86	0.77	0.86	0.76
Externalizing	(0.03)	(0.018)	(0.03)	(0.02)	(0.03)	(0.02)
Behaviours						
Approaches to	0.99	0.82	0.95	0.81	0.97	0.82
Learning	(0.03)	(0.01)	(0.03)	(0.02)	(0.03)	(0.02)
Academic	7.06	0.26	n/a	n/a	5.70	0.31
Composite	(0.91)	(0.03)			(0.70)	(0.04)

Next, the Covariant Five-Factor Model of Socio-Emotional Child Functioning was tested. Global fit tests of this model (see Table I) showed strong improvement over Model 2 with respect to RMSEA values (time one: $RMSEA_{M2} = 0.12$, $RMSEA_{M4} = 0.06$; time two: $RMSEA_{M2} = 0.10$, $RMSEA_{M4} = 0.07$). A Sartorra-Bentler chi-square difference test was significant at Kindergarten (S-B $X^2 = 122.56$, df = 1) and Grade 5 (S-B $X^2 = 28.04$, cd = 1.76). Examination for

localized strain showed a great reduction in the number of modindices suggested, and improvement across multiple areas of local strain. Standardized residuals for covariances for this model are presented in Appendix C. Overall model fit was acceptable and this model was retained for this group going forward.

Next, longitudinal invariance was tested. Tests of weak longitudinal factorial invariance showed a significant difference in the Sartorra-Bentler chi-square value (S-B X^2 = 24.43, df = 2). However, with large sample sizes this test was susceptible to detecting significant but non-meaningful differences. An examination of the CFI for the fixed and freed models showed both exhibited CFI of 0.95, indicating that the assumption of weak factorial invariance is acceptable. In tests of strong factorial invariance, CFI change of greater than 0.01 was observed, indicating strong factorial invariance could not be assumed. Therefore, testing of the model permits examination of the covariance structure of the latent construct with other constructs across time, but examinations of latent mean scores are unadvisable and therefore not included in subsequent discussions.

Group 2

Group 2 contained a sample of 905 parent-child dyads. At Kindergarten, initial run of the Yan-Ansari Model (M1) demonstrated poor fit in TLI and RMSEA global fit statistics (TLI = 0.88, RMSEA = 0.11). At grade 5, the TLI improved to acceptable fit (0.93), however, the RMSEA was still unacceptable (0.09). Global fit statistics for both timepoints are presented in Table 15. Examination of localized strain via standardized residual covariances matrices revealed that, as in the low socioeconomic privilege group, the academic skill score showed inappropriately strong residual covariances with both approaches to learning and externalizing behaviours at both timepoints. Standardized residual covariance matrices for each timepoint are

presented in Appendix D. Again, the parameter estimates for academic skill were weak at each timepoint implying that this parameter did not contribute meaningfully to the latent construct. Parameter estimates are presented in Table 16.

Tests of the Five-Factor Model of Socio-Emotional Child Functioning (M2) demonstrated unanimously improved global fit indices (Table K) and yielded a significant Sartorra-Bentler chi-square difference test at both timepoints (time one: $X^2 = 57.61$, cd = 1.57; time two: $X^2 = 69.35$, cd = 1.55). This also improved areas of localized strain. These are presented in Appendix E.

Again, the absence of internalizing behaviour indicator demonstrated a weaker factor loading (see Table 16), and therefore a third model was tested in which the baseline model was modified by removal of the absence of internalizing behaviour indicator (M3). However, it is important to note that this indicator again showed less issues in the residual covariances (see Appendix D). Therefore, results that globalized model fit indices unanimously worsened upon its removal at both Kindergarten and Grade 5 (Table 15) were unsurprising and this indicator was retained.

There were no additional a priori specifications as there were for the low socioeconomic privilege group, and therefore because the five-factor model of socio-emotional child functioning showed acceptable fit at both timepoints the model was retained.

Table 15.

Global Fit Statistics for Child Functioning in the Mid-Socioeconomic Privilege Group, Both Timepoints

	X^2 (df), p	CFI	TLI	RMSEA	SRMR
Kindergarten					
M1	113.12 (9), p < 0.001	0.93	0.88	0.11,	0.041
M2	56.91 (5), p < 0.001	0.96	0.92	0.08	0.024
M3	116.93 (5), p < 0.001	0.92	0.84	0.16	0.046
Grade 5					
M1	61.13 (9), p < 0.001	0.96	0.93	0.09	0.037
M2	15.79 (5), p < 0.001	0.99	0.98	0.05	0.018
M3	71.30 (5), p < 0.001	0.94	0.88	0.12	0.045

Table 16.

Parameter Estimates of Group 2 Child Functioning at Each Time Point

	Baseline (M1)		M2		M3	
	Unstandardized	Standardized	Unstandardized	Standardized	Unstandardized	Standardized
Kindergarten						
Self-Control	1.00	0.91	1.00	0.93	1.00	0.93
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)
Interpersonal	1.09	0.88	0.96	0.87	0.96	0.87
Skills	(0.04)	(0.02)	(0.04)	(0.01)	(0.04)	(0.01)
Absence of	0.40	0.44	0.29	0.34	n/a	n/a
Internalizing	(0.04)	(0.04)	(0.04)	(0.05)		
Behaviours						
Absence of	0.80	0.74	0.83	0.76	0.83	0.76
Externalizing	(0.06)	(0.02)	(0.04)	(0.02)	(0.04)	(0.02)
Behaviours						
Approaches to	1.02	0.80	0.92	0.79	0.93	0.79
Learning	(0.05)	(0.02)	(0.04)	(0.02)	(0.04)	(0.02)
Academic	2.92	0.13	n/a	n/a	5.12	0.24
Composite	(0.49)	(0.04)			(0.49)	(0.04)
Grade 5						
Self-Control	1.00	0.92 (0.014)	1.00	0.91	1.00	0.91
	(0.00)		(0.000)	(0.01)	(0.00)	(0.01)
Interpersonal	0.97	0.869 (0.013)	1.087	0.88	1.08	0.88
Skills	(0.04)		(0.042)	(0.020)	(0.05)	(0.02)
Absence of	0.29	0.339 (0.045)	0.395	0.44	n/a	n/a
Internalizing	(0.04)		(0.040)	(0.04)		
Behaviours						
Absence of	0.84	0.758 (0.021)	0.804	0.75	0.80	0.74
Externalizing	(0.04)		(0.062)	(0.02)	(0.06)	(0.02)
Behaviours						
Approaches to	0.94	0.795 (0.019)	1.018	0.80	1.02	0.79
Learning	(0.04)		(0.050)	(0.02)	(0.05)	(0.02)
Academic	5.17	0.244 (0.039)	n/a	n/a	5.05	0.20
Composite	(0.95)				(1.04)	(0.04)

Tests of longitudinal factorial invariance were then conducted. Tests of weak factorial invariance yielded a significant Sartorra-Bentler chi-square value (X^2 = 10.74, cd = 1.97). However, examinations of CFI showed that no change took place between models (CFI 0.94). Because chi square tests are susceptible to large sample sizes (n > 400) and no CFI change was observed, the assumption of weak longitudinal factorial invariance was accepted. Tests of strong

longitudinal factorial invariance showed a CFI change of greater than 0.01, therefore strong longitudinal factorial invariance could not be assumed. Similar to Group 1, this model is appropriate to longitudinal examinations of the covariance structure of this construct with other constructs, but longitudinal comparisons of mean values for latent mean constructs are not advisable and therefore not discussed in this work.

Group 3

Group 3 contained a sample of 2,103 parent-child dyads. At Kindergarten and Grade 5, initial run of the Yan-Ansari model (M1) demonstrated poor RMSEA fit ($RMSEA_{M1, M2} = 0.10$). Global fit statistics for both timepoints are presented in Table 17. Examination of localized strain via standardized residual covariances matrices revealed that the academic skill score showed inappropriately strong residual covariances with both approaches to learning and interpersonal skills indicators at both timepoints, as well as to self-control at Kindergarten. Standardized residual covariance matrices for each timepoint are presented in Appendix F. As in the other groups, the parameter estimates for academic skill were weak at each timepoint implying that this parameter did not contribute meaningfully to the latent construct. Parameter estimates are presented in Table N.

Tests of the alternate model, the Five-Factor Model of Socio-Emotional Child Functioning (M2), showed unanimous improvement global fit indices and yielded a significant Sartorra-Bentler chi-square difference test at both timepoints (time one: $X^2 = 148.55$, cd = 1.39; time two: $X^2 = 114.47$, cd = 1.88). This also improved areas of localized strain. These are presented in Appendix G for the M2 model.

Again, the absence of internalizing behaviour indicator also demonstrated a weaker factor loading (see Table 18), and therefore a third model was tested in which the baseline model was

modified by removal of the absence of internalizing behaviour indicator (M3). However, it is important to note that this indicator again showed less issues in the residual covariances (see Appendix F). Therefore, results that globalized model fit indices unanimously worsened upon its removal at both Kindergarten and Grade 5 (Table 17) were unsurprising and this indicator was retained.

There were no additional a priori specifications, and therefore because the five-factor model of socio-emotional functioning showed acceptable fit at both timepoints the model was retained.

Table 17.

Global Fit Statistics for Child Functioning in the High-Socioeconomic Privilege Group, Both Timepoints

	X^2 (df), p	CFI	TLI	RMSEA	SRMR
Kindergarten					
M1	198.65 (9), p < 0.001	0.94	0.91	0.10	0.038
M2	66.93 (5), p < 0.001	0.98	0.96	0.08	0.022
M3	190.49 (5), p < 0.001	0.94	0.89	0.13	0.041
Grade 5					
M1	207.83 (9), p < 0.001	0.94	0.90	0.10	0.036
M2	88.31 (5), p < 0.001	0.98	0.95	0.08	0.025
M3	175.66 (5), p < 0.001	0.95	0.90	0.13	0.041

Table 18.

Parameter Estimates of Group 3 Child Functioning at Each Time Point

	M1		M2		M3	
	Unstandardized	Standardized	Unstandardized	Standardized	Unstandardized	Standardized
Kindergarten						
Self-Control	1.00	0.92	1.00	0.92	1.00	0.92
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)
Interpersonal	0.99	0.88	0.98	0.88	0.98	0.88
Skills	(0.02)	(0.01)	(0.021)	(0.01)	(0.02)	(0.01)
Absence of	0.40	0.31	0.253	0.30	n/a	n/a
Internalizing	(0.04)	(0.030)	(0.028)	(0.03)		
Behaviours						
Absence of	0.74	0.73	0.74	0.73	0.73	0.73
Externalizing	(0.03)	(0.02)	(0.029)	(0.02)	(0.03)	(0.02)
Behaviours						
Approaches to	0.93	0.80	0.92	0.80	0.92	0.80
Learning	(0.03)	(0.01)	(0.026)	(0.01)	(0.03)	(0.01)
Academic	6.00	0.24	n/a	n/a	5.90	0.24
Composite	(0.70)	(0.01)			(0.69)	(0.03)
Grade 5						
Self-Control	1.00	0.91	1.00	0.91	1.00	0.91
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)
Interpersonal	1.08	0.86	1.07	0.86	1.07	0.86
Skills	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)
Absence of	0.33	0.38	0.35	0.26	n/a	n/a
Internalizing	(0.03)	(0.03)	(0.03)	(0.02)		
Behaviours						
Absence of	0.78	0.78	0.78	0.86	0.78	0.77
Externalizing	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Behaviours						
Approaches to	1.04	0.80	1.03	0.79	1.03	0.79
Learning	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)
Academic	4.99	0.21	n/a	n/a	4.79	0.21
Composite	(0.90)	(0.04)			(0.89)	(0.04)

Tests of longitudinal factorial invariance were then conducted. Tests of weak factorial invariance yielded a significant Sartorra-Bentler chi-square value (X^2 = 18.06, cd = 1.70). However, examinations of CFI showed that no change took place between models (CFI 0.94). Because chi square tests are susceptible to large sample sizes (n > 400) and no CFI change was observed, the assumption of weak longitudinal factorial invariance was accepted. Tests of strong

longitudinal factorial invariance showed a CFI change of greater than 0.01, therefore strong longitudinal factorial invariance could not be assumed.

Multigroup Factorial Invariance: Group 2 and Group 3

Next, tests of factorial invariance were performed across groups (multigroup factorial invariance). Importantly, the measurement model retained for group 1 differed structurally (via addition of covariance of error between interpersonal skills and externalizing behaviours) from the measurement models for groups 2 and 3 (which were identical). That the group 1 model differs structurally from the model for groups 2 and 3 implies a qualitative difference between constructs, inhibiting direct comparisons between latent constructs. Quantitative conclusions based on analyses which treat structurally distinct models as identical are flawed, and as such only groups 2 and 3 could be considered for multigroup factorial invariance testing.

Sartorra-Bentler chi-square difference tests between groups 2 and group 3 were significant (X^2 = 28.59, cd = 1.76). However, again there was no change to CFI value (0.94) and so weak factorial invariance across groups was established. Tests of strong factorial invariance showed change in CFI greater than 0.01 and so this assumption was not held. Therefore, examinations of the differences between the covariances of the child functioning latent construct with other indicators is permissible across Groups 2 and 3, but inferences based on differences of expression of latent construct means are not and therefore are not discussed in this work.

RQ2: Do bidirectional effects between parent functioning and child functioning exist within each socioeconomic privilege group across early to middle elementary school grades?

Cross-Lagged Panel Analysis

The second research question asked about the temporal relationships between parent functioning and child functioning. In response to the development of appropriate measurement models, indicator variables related to parent functioning were used instead of a latent measurement model. A structural model was estimated to investigate the temporal relations within and between child functioning and parental warmth, depression, and stress. Figure 5 shows the structural model for Group 1 with the retained model of child functioning for that group, and Figure 6 shows the structural model for Groups 2 and 3 with their retained models of child functioning.

Figure 5. *Structural Model of Child Functioning and Indicators of Parent Functioning, Group 1, Covariates Not Shown*

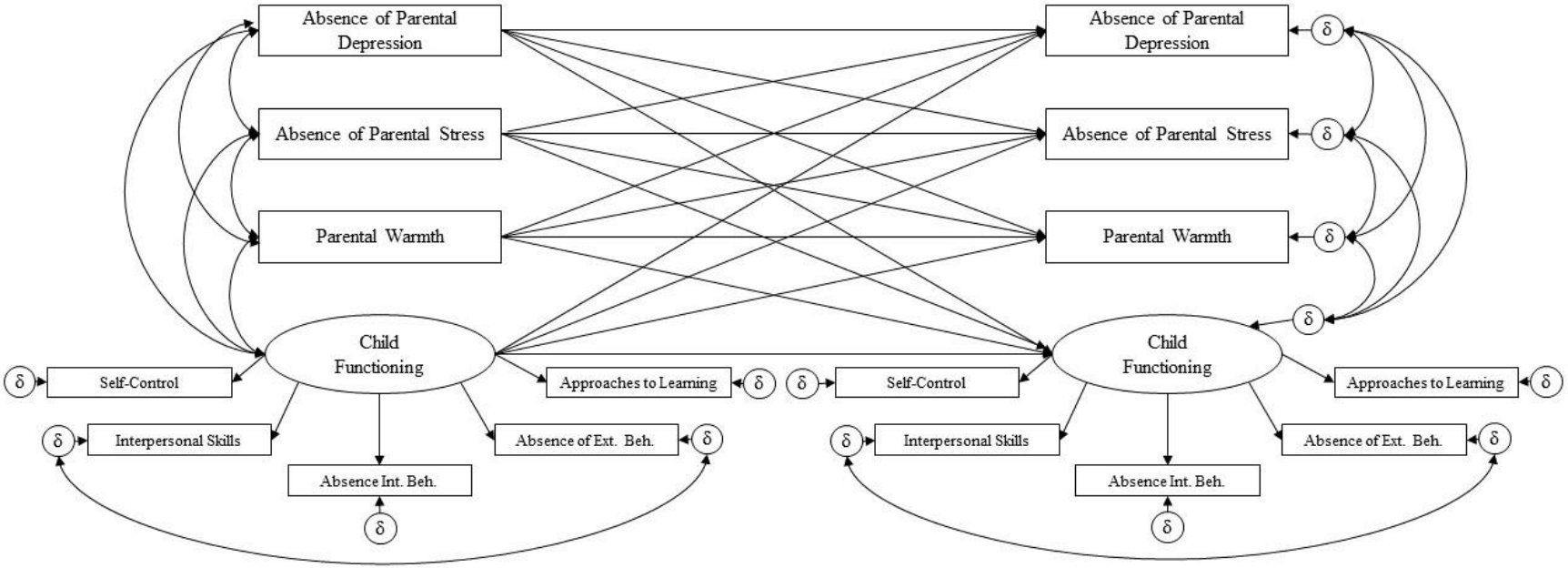
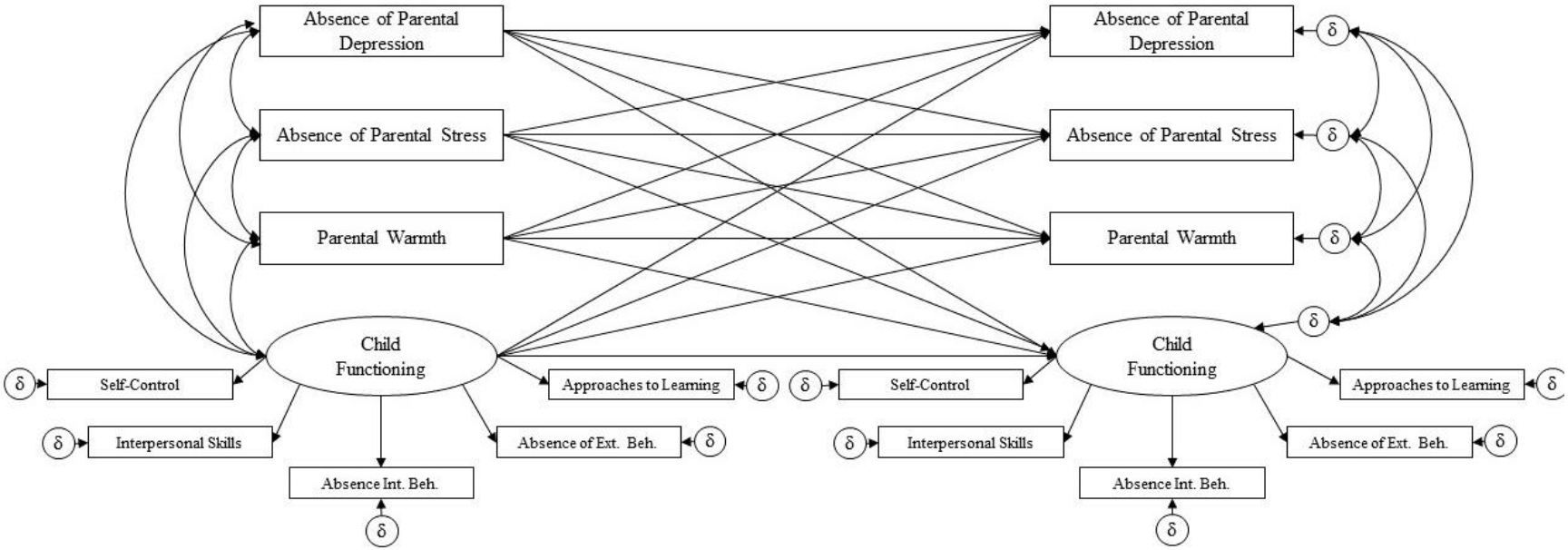


Figure 6. *Structural Model of Child Functioning and Indicators of Parent Functioning, Groups 2 and 3, Covariates Not Shown*



Group 1

Tests of the structural model within group 1 demonstrated acceptable to strong global fit. These statistics are presented in Table 19.

Table 19.

Model Fit Statistics for Group 1 Structural Model

	X^2 (df), p	CFI	TLI	RMSEA	SRMR
Group 1 Structural Model	323.83 (80), p<0.001	0.96	0.93	0.05	0.04

Unstandardized and standardized regression weight estimates and results of the statistical significance tests within constructs over time are reported in Table 20. Child functioning (β = 0.41, b = 0.03, p < 0.001), parental depression (β = 0.46, b = 0.04, p < 0.001) and parental stress (β = 0.40, b = 0.04, p < 0.001) showed similar stability across the five-year period. In contrast, parental warmth was relatively unstable from the child's Kindergarten year to their fifth-grade year (β = 0.25, b = 0.04, p < 0.001).

Table 20.

Unstandardized and Standardized Regression Weight Estimates Within Constructs Across Time, Group 1

	Unstandardized (Standard Error)	Standardized (Standard Error)_
Child Functioning	0.41 (0.03)*	0.41 (0.03)*
Parental Depression	0.47 (0.04)*	0.46 (0.04)*
Parental Warmth	0.31 (0.05)*	0.25 (0.04)*
Parental Stress	0.40 (0.04)*	0.40 (0.04)*

*Note - * indicates statistical significance*

In addition, unstandardized and standardized regression weight estimates and results of the statistical significance tests between constructs over time are reported in Table 21. When examining Pearson correlations, a correlation of 0.1, 0.2, and 0.3 are considered a small, medium, and large effect size, respectively (Gignac & Szordorai, 2016). The strongest temporal

relationships between constructs was between parents' depression in their child's kindergarten year and their stress in their child's fifth grade year (β = 0.13, *b* = 0.03, *p* = 0.03), and parents stress at the child's kindergarten year and their warmth in the child's grade 5 year (β = 0.10, *b* = 0.04, *p* = 0.006). A small effect temporal relationship noted between child functioning at the kindergarten year and parents' stress at the fifth-grade year (β = 0.09, *b* = 0.03, *p* < 0.001). These relationships show small to medium effect sizes and are typical of those found in individual differences in research (Gignac & Szordorai, 2016).

Table 21.

Unstandardized and Standardized Regression Weight Estimates Across Time Between Constructs, Group 1

	Unstandardized B (*b*)	Standardized β (*b*)
Child Functioning→ Parental Warmth	-0.03 (0.03)	-0.03 (0.03)
Child Functioning → Parental Depression	0.01 (0.02)	0.01 (0.03)
Child Functioning → Parental Stress	0.01 (0.03)*	0.09 (0.03)*
Parental Warmth → Child Functioning	-0.02 (0.04)	-0.01 (0.03)
Parental Warmth → Parental Depression	-0.05 (0.04)	-0.04 (0.03)
Parental Warmth → Parental Stress	0.03 (0.05)	0.02 (0.03)
Parental Depression → Child Functioning	0.05 (0.05)	0.04 (0.04)
Parental Depression → Parental Warmth	0.01 (0.04)	0.01 (0.04)
Parental Depression → Parental Stress	0.17 (0.04)*	0.13 (0.03)*
Parental Stress → Child Functioning	0.004 (0.03)	0.01 (0.04)
Parental Stress → Parental Warmth	0.08 (0.03)*	0.10 (0.04)*
Parental Stress → Parental Depression	0.05 (0.02)*	0.07 (0.03)*

*Note - * indicates statistical significance*

There were numerous instances of statistical insignificance. None of the parent variables at time one (depression, stress, warmth) demonstrated a statistically significant effect on child functioning at time two (stress: β = 0.01, *b* = 0.04, *p* = 0.90; depression: β = 0.04, *b* = 0.04, *p* = 0.265; warmth: β = -0.01, *b* = 0.03, *p* = 0.684). Similarly, between parent indicators, warmth at time one did not significantly predict depression (β = -0.04, *b* = 0.03, *p* = 0.173) or stress (β = 0.02, *b* = 0.03, *p* = 0.49) at time two, and depression at time one did not significantly predict

warmth at time two (β = 0.01, *b* = 0.04, *p* = 0.83). Child functioning at time one did not demonstrate statistical significance at time two for parental depression (β = 0.01, *b* = 0.03, *p* = 0.82) or parental warmth (β = -0.03, *b* = 0.03, *p* = 0.372). No evidence of longitudinal bidirectionality was found given no indicators of parent functioning demonstrated significant effects on child functioning. Child-driven effects however were present. Correlations between indicators of parent functioning and child functioning were present at each timepoint. The structural model without insignificant paths is presented in Figure 7.

Group 2

Tests of the structural model in group 2 showed acceptable to strong across global fit. These statistics are presented in Table 22.

Table 22.

Model Fit Statistics for Group 2 Structural Model

	X^2 (df), p	CFI	TLI	RMSEA	SRMR
Group 2 Structural Model	299.813 (82), p<0.001	0.94	0.92	0.05	0.03

Unstandardized and standardized regression weight estimates and results of the statistical significance tests within constructs over time are reported in Table 23. Child functioning (β = 0.49, *b* = 0.04, *p* < 0.001) and parental stress (β = 0.50, *b* = 0.04, *p* < 0.001) showed similar stability across the five-year period. In contrast, parental depression (β = 0.39, *b* = 0.05, *p* < 0.001) and parental warmth (β = 0.36, *b* = 0.04, *p* < 0.001) showed less stability between the first and second timepoints.

Table 23.

Unstandardized and Standardized Regression Weight Estimates Within Constructs Across Time, Group 2

	Unstandardized B (*b*)	Standardized β (*b*)
Child Functioning	0.47 (0.04)*	0.49 (0.04)*
Parental Depression	0.37 (0.05)*	0.39 (0.05)*
Parental Warmth	0.39 (0.07)*	0.36 (0.04)*
Parental Stress	0.49 (0.04)*	0.50 (0.04)*

*Note - * indicates statistical significance*

In addition, unstandardized and standardized regression weight estimates and results of the statistical significance tests between constructs over time are reported in Table 24. No effects between any indicators across timepoints reached statistical significance or threshold effect sizes to be considered meaningful. No evidence of longitudinal bidirectionality was found given no indicators of parent functioning demonstrated significant effects on child functioning. Additionally, neither child-driven nor parent-driven effects were present. Correlations between indicators of parent functioning and child functioning were present at each timepoint. The structural model without insignificant paths is presented in Figure 8.

Table 24.

Unstandardized and Standardized Regression Weight Estimates Across Time Between Constructs, Group 2

	Unstandardized B (*b*)	Standardized β (*b*)
Child Functioning→ Parental Warmth	-0.03 (0.04)	-0.03 (0.04)
Child Functioning → Parental Depression	0.01 (0.02)	0.02 (0.04)
Child Functioning → Parental Stress	0.04 (0.04)	0.03 (0.04)
Parental Warmth → Child Functioning	-0.09 (0.05)	-0.06 (0.03)
Parental Warmth → Parental Depression	-0.05 (0.04)	-0.05 (0.04)
Parental Warmth → Parental Stress	0.04 (0.067)	0.03 (0.04)
Parental Depression → Child Functioning	0.02 (0.06)	0.01 (0.04)
Parental Depression → Parental Warmth	0.03 (0.06)	0.02 (0.04)
Parental Depression → Parental Stress	0.07 (0.06)	0.04 (0.04)
Parental Stress → Child Functioning	-0.02 (0.04)	-0.02 (0.04)
Parental Stress → Parental Warmth	0.03 (0.03)	0.04 (0.04)
Parental Stress → Parental Depression	0.01 (0.02)	0.04 (0.04)

*Note - * indicates statistical significance*

Group 3

Tests of the structural model within group 3 demonstrated acceptable to strong global fit. These statistics are presented in Table 25.

Table 25.

Model Fit Statistics for Group 3 Structural Model

	X^2 (df), p	CFI	TLI	RMSEA	SRMR
Group 3 Structural Model	561.813 (82), p<0.001	0.94	0.92	0.05	0.04

Unstandardized and standardized regression weight estimates and results of the statistical significance tests within constructs over time are reported in Table 26. Parental stress showed the strongest stability over the five-year period (β = 0.53, b = 0.02, p < 0.001), followed by child functioning (β = 0.47, b = 0.03, p < 0.001), parental warmth (β = 0.43, b = 0.02, p < 0.001), and finally parental depression (β = 0.36, b = 0.04, p < 0.001).

Table 26.

Unstandardized and Standardized Regression Weight Estimates Within Constructs Across Time, Group 3

	Unstandardized B (*b*)	Standardized β (*b*)
Child Functioning	0.43 (0.03)*	0.47 (0.03)*
Parental Depression	0.36 (0.04)*	0.36 (0.04)*
Parental Warmth	0.48 (0.04)*	0.43 (0.02)*
Parental Stress	0.49 (0.02)*	0.53 (0.02)*

*Note - * indicates statistical significance*

In addition, unstandardized and standardized regression weight estimates and results of the statistical significance tests between constructs over time are reported in Table 27. Multiple weak but significant temporal relationships between constructs existed: parental depression at time one with parental stress at time two ($\beta = 0.10$, $b = 0.02$, $p < 0.001$), parental warmth at time one with parental stress at time two ($\beta = 0.07$, $b = 0.02$, $p < 0.001$), parental warmth on parental depression ($\beta = 0.10$, $b = 0.03$, $p < 0.001$), and child functioning at time one with parental stress at time two ($\beta = 0.07$, $b = 0.03$, $p < 0.001$). No evidence of longitudinal bidirectionality was found given no indicators of parent functioning demonstrated significant effects on child functioning. Child-driven effects however were present. Correlations between indicators of parent functioning and child functioning were present at each timepoint. The structural model without insignificant paths is presented in Figure 9.

Table 27.

Unstandardized and Standardized Regression Weight Estimates Across Time Between Constructs, Group 3

	Unstandardized B (*b*)	Standardized β (*b*)
Child Functioning→ Parental Warmth	-0.02 (0.02)	-0.02 (0.02)
Child Functioning → Parental Depression	0.02 (0.02)	0.03 (0.03)
Child Functioning → Parental Stress	0.08 (0.03)*	0.07 (0.03)*
Parental Warmth → Child Functioning	-0.03 (0.03)	-0.02 (0.02)
Parental Warmth → Parental Depression	0.10 (0.03)*	0.10 (0.03)*
Parental Warmth → Parental Stress	0.11 (0.04)*	0.06 (0.02)*
Parental Depression → Child Functioning	0.01 (0.05)	0.01 (0.03)
Parental Depression → Parental Warmth	0.04 (0.04)	0.03 (0.03)
Parental Depression → Parental Stress	0.12 (0.02)*	0.10 (0.02)*
Parental Stress → Child Functioning	0.01 (0.02)	0.01 (0.02)
Parental Stress → Parental Warmth	0.04 (0.02)*	0.06 (0.02)*
Parental Stress → Depression	0.03 (0.01)*	0.06 (0.03)*

*Note - * indicates statistical significance*

Two temporal relationships associated with parental stress at time one demonstrated significance but not a meaningful effect size (depression at time two: $\beta = 0.06$, $b = 0.03$, $p < 0.001$; warmth at time two: $\beta = 0.06$, $b = 0.03$, $p < 0.001$). Additionally, there were numerous instances of statistical insignificance. None of the parent variables at time one (depression, stress, warmth) demonstrated statistically significant effects on child functioning at time two (stress: $\beta = 0.01$, $b = 0.03$, $p = 0.710$; depression: $\beta = 0.01$, $b = 0.03$, $p = 0.838$; warmth: $\beta = -0.02$, $b = 0.02$, $p = 0.470$). Child functioning at time one did not demonstrate statistical significance at time two for parental depression ($\beta = 0.03$, $b = 0.03$, $p = 0.388$) or parental warmth ($\beta = -0.02$, $b = 0.02$, $p = 0.481$).

RQ3: Are these bidirectional effects similar and significant across all groups of socioeconomic privilege?

Because the measurement model for the low privilege group was different from that of the middle and high privilege groups, this could not be directly compared. However, a multigroup cross-lagged panel analysis was run between the middle and high privilege groups to examine whether assumptions of equivalence between autoregressive and cross-lagged effects were appropriate.

To ensure that differences actually exist between the middle and high socioeconomic privilege group, two models were tested. The first semi-restricted model assumed measurement invariance and freely estimated covariance and regression coefficients between the two groups. This model exhibited good fit ($\chi2(180) = 869.30$, $p(\chi2)<0.001$; CFI = 0.944, TLI = 0.927, RMSEA = 0.050, SRMR = 0.041). This model was then nested within a second more restricted model in which covariance and regression coefficients were held to equivalence. This model failed to converge, indicating that assumptions of equivalence across groups are not applicable to the sample population.

Figure 7.

Structural Model for Group 1, Significant Paths Only, Covariates Not Shown

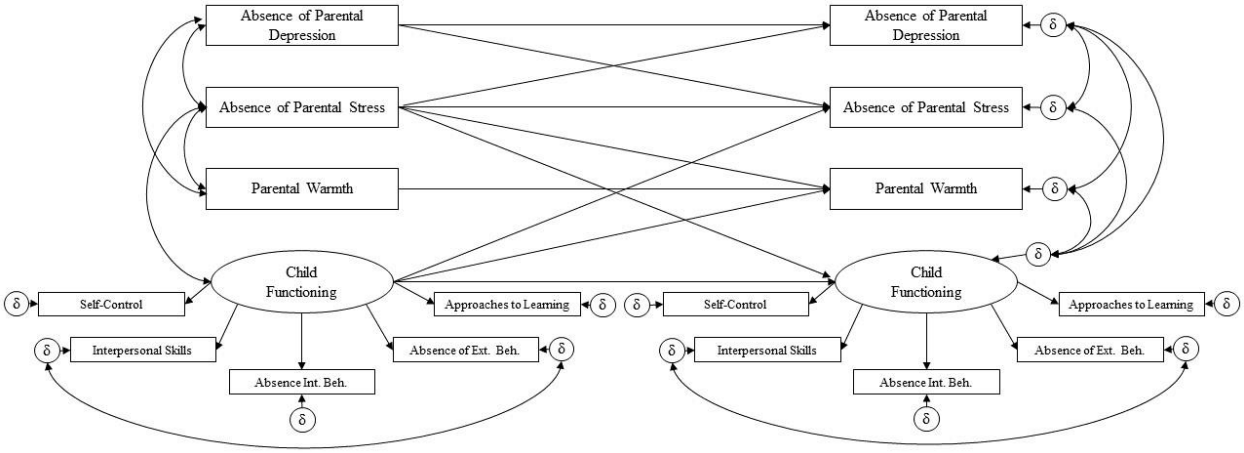


Figure 8.

Structural Model for Group 2, Significant Paths Only, Covariates Not Shown

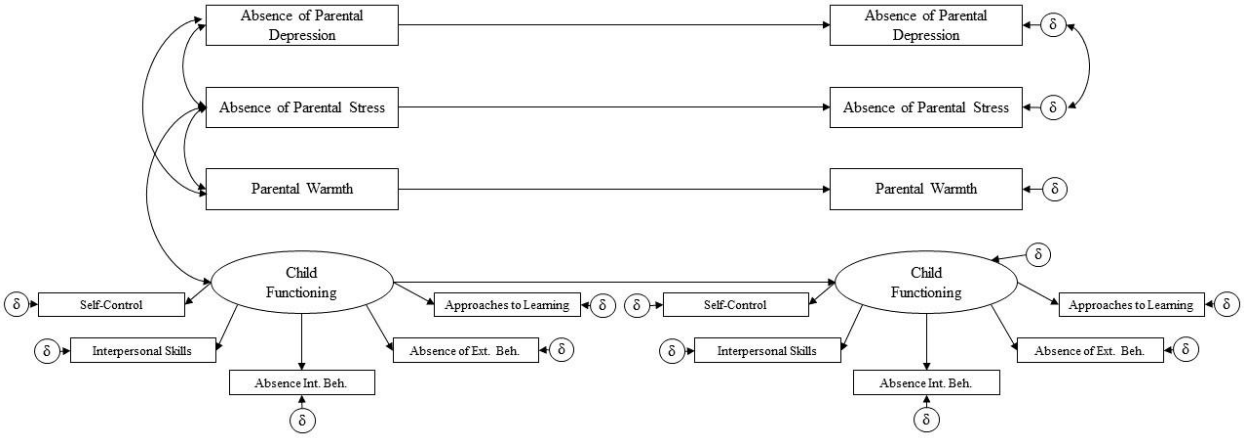
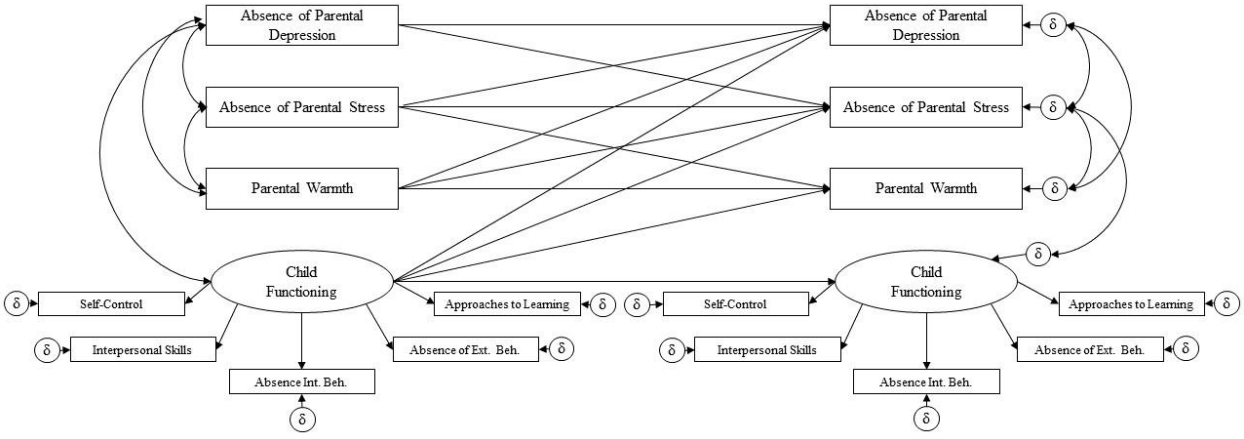


Figure 9.

Structural Model for Group 3, Significant Paths Only, Covariates Not Shown



Summary of Key Findings

While these findings will be brought together and expanded upon in depth within the discussion section, to support the readability of this work key findings are summarized beneath each research question.

RQ1: Are the measurement models of child functioning and parent functioning appropriate across all groups of socioeconomic privilege at all timepoints?

1. The measurement of child socioemotional functioning did not represent the low socioeconomic privilege well and an error correction was presented to account for teachers' implicit bias
2. The middle and high privilege groups were appropriately represented by the child socioemotional functioning measurement

RQ2: Do bidirectional effects between parent functioning and child functioning exist within each socioeconomic privilege group across early to middle elementary school grades?

3. Longitudinal bidirectional effects do not exist between child functioning and indicators of parent functioning in any privilege group
    a. Child-driven effects were present in group 1 (child functioning on parenting stress)
    b. No longitudinal effects existed between child functioning and indicators of parent functioning in the middle privilege group
    c. Child-driven effects were present in group 3 (child functioning on parenting stress)

RQ3: Are these bidirectional effects similar and significant across all groups of socioeconomic privilege?

4. The model failed to demonstrate weak factorial invariance between groups 2 and 3, indicating significant differences in the model between these groups. Group 1 could not be compared in this aspect because it used a different measurement model for child functioning.

These findings impact our understanding of how we research and discuss populations, provide insight into systematic error and bias within early and elementary school classrooms, and challenge some understandings of family systems. Deeper discussion of this is provided in the following chapter.

Chapter 5 – Discussion

This chapter begins by discussing the findings pertaining to each research question in connection with the literature reviewed in Chapter 2. Next, key findings are summarized and implications to practice are outlined. Limitations of this work are then presented before final conclusions and directions for future research are summarized.

RQ1: Are the measurement models of child functioning appropriate across all groups of socioeconomic privilege at all timepoints?

To respond to the first research question, measurement models of child functioning were tested first within groups at each timepoint, and then across time and groups to determine whether the measurements accurately captured child functioning across time and privilege groups. This work was heavily based upon that of Yan and Ansari (2017), who used exploratory factor analysis to arrive at their measurement of child functioning. The research in this paper provided a progressive step in understanding the measurement by using confirmatory factor analysis to assess the measurement fit of the model. Confirmatory factor analysis within each group revealed the model to be inappropriate for all groups, with the academic skills indicator causing localized strain within each group and timepoint. Because a body of literature exists documenting the distinction between academic functioning and socio-emotional functioning (Bhide, Sciberras, Anderson, Hazell & Nicholson, 2019; Ghide, Segers, & Verhoeven, 2018; Van der Meulen, van der Bruggen, Split, Verouden, Berkhout et al., 2014), an alternate model was tested which dropped the academic skills indicator. The remaining indicators reflect socio-emotional functioning in school environments. The specificity of the school as the environment for this measure is a justifiable addition due to (a) the teacher-based ratings used for child

behaviours, and (b) the use of the *Approaches to Learning* scale, which indicates a child's emotional and behavioural approaches to classroom learning situations. This model showed improvement over the Yan-Ansari model, which is unsurprising as it functionally is the Social Skills Rating Scale with an added indicator of Approaches to Learning. For the middle and high-privilege groups, this model fit appropriately and demonstrated weak factorial invariance across time and groups.

However, the five-factor model of socio-emotional functioning was not an appropriate fit within the low socioeconomic privilege group. The present work was driven by a theoretical viewpoint that cautions against the tendency of variables-centered studies to consider only mean-level associations among variables without considering their applicability across contexts (Raver, Gershoff, Aber, 2007). In particular, Roubinov and Boyce (2017) signaled concerns about applying middle-class views and expectations in parenting across different socioeconomic contexts. Critical application of these theoretical concerns during testing of measurement models led to a consideration of the fact that, once the academic skills variable was excluded, all child-level indicators in this study were based on ratings provided by teachers, who were predominantly White and teaching within private schools (see Table 6). Multiple researchers have found that discrepancies between parent- and teacher-ratings were more frequent in groups of children deemed 'at-risk' or low socioeconomic status (Stone, Speltz, Collett, & Werler, 2013; Achenbach, McConaughy, & Howell, 1987; McConaughy, Stanger, & Achenbach, 1992; Konold, Walthall, & Pianta, 2004). Indeed Hatt (2012) in a year-long ethnographic study of a U.S. Kindergarten classroom found that teachers' disciplinary and reward systems reinforced socially conservative behaviours of speech, movement, and communication, consistent with White middle-class ways of knowing and being. Other researchers have found empirical support

for disproportionate judgements of inappropriate student behaviours based on socioeconomic factors (Souchon, Kermarec, Trouilloud, & Bardin, 2020; Skiba, Chung, et al., 2014). Based on the evidence from these works, a covariation of measurement error was included for externalizing behaviours and interpersonal skills in the low socioeconomic privilege group to account for teachers' implicit bias in measuring these. This led to appropriate fit of the model at each timepoint, which was then demonstrated to be weakly factorially invariant across time.

The key impact of the findings corresponding to research question one is that any intervention or policy decision based upon the initial tested model of child functioning risks being poorly suited to groups with low socioeconomic privilege. Simply stated, the information we have about them from this measurement is a poor representation of the population and therefore cannot be expected to accurately inform policy decisions. This is particularly sobering given that school interventions and policy decisions are often implemented with the express purpose of helping these populations achieve better outcomes.

Additionally, this work hints to the importance of teacher beliefs and expectations of their students. Previous research has shown that teachers' beliefs and expectations impact behavioural (Timmons, 2019; Rubie-Davies, 2010) and academic student outcomes (Timmons, 2019; Jussim, Madon & Chatman, 1994 Rubie-Davies & Peterson, 2010). In this work it is hypothesized that implicit teacher bias impacted the measurement of the low socioeconomic privilege group. A useful illustrative example of this is the implementation of school discipline, as this is a practice largely enacted based on teachers' judgements of students' behaviours (Hatt, 2012). Unfortunately, evidence appears to indicate that teachers perceive a cultural deficit when explaining the relations between race, socioeconomic status, and disproportionately administered school discipline. Gregory and Mosely (2004) found that teachers were more likely to blame

larger systemic issues when explaining discrepancies across punishments in their classrooms than to consider the influence of the school culture or their own belief systems. If teachers are to be informants in measurements of student behaviours, or in this case, child functioning, then a critically relevant covariant may be to measure the implicit beliefs of these teachers, such that they can be explicitly controlled for in measurements. The process of improving the accuracy with which populations of low socioeconomic status are measured fits into larger strides to achieve a more equitable society – as we discover and question implicit biases in our raters and ourselves, we can replace them with more honest, or accurate, beliefs, measurements, and systems.

RQ2: Do bidirectional effects between parent functioning and child functioning exist within each socioeconomic privilege group across early to middle elementary school grades?

In considering the second research question, no group revealed parent-driven effects in the cross-lagged panel analysis. The medium-privilege group showed no effects between parents and children at all, while the low- and high-privilege groups demonstrated child-driven effects of child functioning on parental stress. All groups showed evidence of cross-sectional correlations between child functioning and indicators of parent functioning at the first timepoint, though only the low-privilege group demonstrated cross-sectional correlations at the second timepoint between child functioning and indicators of parent functioning (parental stress). While correlational relationships cannot indicate the direction of effects, this does indicate that for groups with low socioeconomic privilege, parent functioning (with respect to parental stress) and child functioning are interdependent in later years of the child's schooling in that variance in one predicts variance in the other. In the middle- and high-privilege groups, a lack of correlational

relationships indicates a lack of interdependence among these variables as the child ages. While it is tempting to comment on these differences with respect to socioeconomic privilege (e.g., group differences), it is important to be cautious in making direct comparisons to the low-socioeconomic privilege group because a different measurement model was used in that group.

One important difference of this study from others reviewed is the length of time between observations. The timepoints in this study were selected as a result of two forces: (1) the desire to pick similar indicators to those of Yan and Ansari in order to lend comparability (but not replicability) across their work and this one, and (2) the annual availability of the data collected for the ECLS-K 2011 cohort. This and the parceling of parent functioning into indicator variables rather than a latent construct may partially account for the lack of parent-driven effects, which may have been present at shorter time intervals but too weak to show a significant effect across the study period. Some researchers (e.g., Zadeh, Jenkins, & Pepler, 2010) have found that child-driven effects appear to increase with time. This may mean that child-driven effects were privileged in this study design. That child functioning did demonstrate child-driven effects across the long period for the low-privilege and high-privilege groups is still noteworthy. In their work examining bidirectional effects between parent functioning and child functioning, Larsson and colleagues (2002) used data from twins to show that parent-driven effects tend to be environmentally mediated while child-driven effects tend to be genetically mediated. In fact, behavioural genetic designs have also shown an increase in child-driven effects with maturity of the child (Elkins, McGue & Iacono, 1997). The dominance of child-driven effects across a variety of socioeconomic privilege groups in this work appears to align with these findings in that they appear across a range of environments.

Findings that parent-driven effects were not present within any group also align to several previous works. Firstly, other researchers have noted that parent-driven effects are weaker but more consistent (Hipwell, et al., 2008), which, if this is the case, may mean they were less likely to appear in a longer interval such as the one in this study. Further, it is interesting as well to consider these findings in light of works demonstrating that parent-driven effects tend to be more environmentally mediated (Larrson et al., 2002). Burke, Pardini and Loebel (2008) noted that many of the parent-driven effects were no longer predictive of child functioning after controlling for covariates, including socioeconomic context. This study separated the sample based on socioeconomic privilege, which is a major factor in the environment of a child (see Bradley & Corwyn, 2002, Zill, Moore, Smith, Steif, & Coiro, 1995). Because of this, environmental differences were likely to be less present within each subsample than if they had been treated as one overarching group. The lack of parent-driven effects in each group therefore may indicate that differences among groups are a function of larger environmental variables. In light of this, it appears that it is not the parenting then which differentiates outcomes in child functioning but the environment at large.

RQ3: Are these bidirectional effects similar and significant across all groups of socioeconomic privilege?

In considering the final research question I will unpack the differences between the medium- and high-privilege groups, as these used identical measurement models of child functioning. Multigroup variance testing of the model failed to show that the model fit these groups similarly well. One area of difference between the models is the independence of the indicators of parent functioning in the medium-privilege group with respect to both longitudinal

effects and cross-sectional correlations at the later timepoint. For the medium-privilege group, variance in each of these indicators over time and in the child's later years appears to be more influenced by external factors (i.e., factors not represented in this model) than by the other indicators of parent functioning. In the high-privilege group, these indicators demonstrate weak but significant effects partially accounting for variance in this group over time and demonstrating temporal covariance in the second timepoint. Additionally, there are no effects present between parents and children in the medium-privilege group. Overall, the relative independence in the middle-privilege group (a) between parents and children, and (b) among indicators of parent functioning is striking and indicates that there is much variance not accounted for by this model.

These groups are differentiated based on access to resources – the high group having greater access to social and economic resources (such as a partner to coordinate parenting duties with, or greater food security) than the middle group, though both groups having an overall stable access (on a scale of five indicating socioeconomic privilege, the middle group has scores of four, and the high group has scores of five). It is interesting to see such a difference conferred by a single point on the scale. A potential explanation for this may be the concern of parents in developing human capital within their children and the subjective experience of financial stress. Human capital can be understood as the knowledge and skills which an individual possesses which make them relevant within the labour market (Goldin, 2014). Research has shown that parents with greater financial resources invest more in the human capital of their children (Kim, Sherraden, & Clancy, 2013). School choice research is a useful stream to exemplify the social and economic resources which parents may choose to invest in their children's human capital through their children's education. For example, Kim and Fram (2009) used latent profile analyses to understand the school choices of parents and noted that more advantaged parents (as

evidenced by income, educational achievement of the mother, and two-parent households) tended to belong to a 'learning-focused' class which prioritized the educational quality of the school over factors such as practicality. Another example is school choice via the residential market, wherein parents buy houses in predetermined neighbourhoods to ensure access of their child to a particular school or school district (Holme, 2002). Because socioeconomic advantage tends to increase parents' expectations of human capital development in their children (Kim, Sherraden, & Clancy, 2013), parents may actually begin to experience feelings of economic disadvantage in their efforts to make these investments, particularly larger ones like tuition to a private school or a more expensive home, which, notably, are only considered when a certain level of privilege is conferred. Ponnet (2014) explains how the choices which become available to parents at different socioeconomic privilege strata can be experienced as equally stressful. For example, while a low privilege family struggles to pay rent, a medium-privilege family may stress about paying a mortgage and may carry larger debt because they were able to access a mortgage financing. Ponnet (2014) argues that "the subjective experience of economic disadvantage might lead to psychological distress, more so than the objective experiences of being poor." These more intense feelings of economic hardship have real consequences within families. Running a series of models relating financial stress, parent functioning, and adolescent problem behaviour in low-, middle- and high-income families, Ponnet (2014) showed that high-income families experienced more depressive symptoms than middle-income families as a result of financial stress, which in turn had greater impacts on conflict with their partner and greater indirect effects on negative behaviours in their adolescents. This aligns to findings in this work that indicators of parent functioning were more predictive in the high socioeconomic privilege group than the middle socioeconomic privilege group.

Summary and Implications to Practice

In summary, the major findings of this work were:

(1) the inappropriateness of the measurement model of child functioning to the low socioeconomic privilege group,

(2) the absence of parent-driven effects across the study period, and

(3) the relative independence in the model of parents and children in the middle socioeconomic privilege group.

Each of these findings is informed by the socioeconomic privilege conferred in the groups and speak to the importance of understanding privilege as an environmental context, including the beliefs and expectations it may engender in others and within families.

It is interesting to consider the implications to practice of findings in this work that the measurement model of child functioning was problematic when measuring groups of low socioeconomic privilege. It is possible that this measurement was inappropriate due to implicit bias of the reporters of child functioning, who in this case were educators. In this line of thought, the implicit biases carried by educators, or more widely in society, are exposed as a confounding variable in understanding the experiences and outcomes of people with low socioeconomic privilege. It is critical that measuring these becomes routine such that two implications can be realized. Firstly, for researchers, making implicit bias measurable and commonly collected in large datasets such as the ECLS-K so they can be appropriately accounted for will improve the quality of insight they are able to provide. Secondly, for educators, making implicit biases measured, and therefore visible to the educator, is a good initial step in dismantling these same biases.

The second major finding of this work (absence of parent-driven effects across the time period studied) is useful in design of interventions which aim to leverage an ecological approach to improving functioning within families. The findings in this work reinforce the child as a central input node in family networks, as the functioning of the child seems to impact that of their parents, but not vice versa, when considered across the early to middle elementary school period. For practitioners, this offers the optimistic indication that interventions targeted at the child will have downstream positive effects on their family. For policymakers with limited resources to assign, this finding presents child-focused interventions as a strategic policy lever for resource allocation.

On this note, the third major finding of this work (the relative independence in the model of parents and children in the middle socioeconomic privilege group) presents an exception to the above. For interventions considering groups of middle socioeconomic privilege, interventions seeking to improve functioning across families should provide explicit resources for both parents and children without expecting downstream effects throughout families. The reasoning behind the relative independence has been theorized upon within this discussion section, but it should be clear that a deep understanding of this is beyond the scope of these findings and perhaps an excellent area for future research.

Limitations

One limitation of this work comes from tensions faced between use of secondary data and attempting to closely follow previous works which have used alternate cohorts of the same program. While the data examined for this work are certainly high quality with respect to sample size, collection methods and breadth of information, there were some changes between collection

patterns at the cohort level which made replication works impossible. This led to an inability to test Yan and Ansari's (2017) model of parent functioning, as described in the methods section. Similarly, time periods in this study were different than those examined in the Yan and Ansari work. The inability to validate the parent functioning measure longitudinally and across groups stands out in particular as a limitation given the discoveries made in undergoing this process with the child functioning measure.

A second limitation which should be noted comes from consideration of the child functioning measure. It is important to step back and consider how the circumvention of direct child measures impacted this study. While self-report data have well known vulnerabilities with respect to validity and reliability, the homogeneity of the educator pool (and, by extension, of educators) likely introduced a separate validity threat in this work via implicit bias. While this study strived for consistency with past work with respect to child functioning measures, future studies might explore triangulating information from multiple informants, including family members and the child, to explore whether this leads to improved validity.

Conclusions and Future Directions

Findings in this work point toward how privilege can confound the measurements used in our research, and the subjective experiences of a family. These implications have real consequences. In the case of measurement, appropriate measurement is fundamental to an accurate self-awareness of our educational and family systems. I would argue that the process of improving our measurements is a process of improving our self-awareness. This is a critical arena in which to question how our implicit beliefs and expectations cause true consequences, for example, through development interventions flawed because of inaccurate information. In the

case of subjective experiences of families, the psychology of privilege may in fact become pathological for those who invest so heavily in their children that they experience true financial stress as a result. Other researchers have coined the term ‘opportunity hoarding’ to describe the process of vying for excess opportunities when a child already access to a reasonable range.

Future work in this area should begin with a re-examination of the child functioning measure. It may be beneficial to attempt to control for teachers’ implicit biases in a more explicit way to validate the alternate model proposed in this work. Further, this work discusses privilege with respect to socioeconomic resources, though a wider view of privilege would include gender, sex, and ethnicity. If implicit biases are influential in measurements, as they were proposed to be in this work, then an investigation is warranted along each of these dimensions of privilege, and others which are not mentioned here. Further, this work consisted of variables-centered analyses. Future works may consider including person-centered analyses, such as latent profile analysis, to investigate latent common factors among the individuals within the study.

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Appendix A – Standardized Residuals for Covariances of the Initial Model (M1) in Group 1

Standardized Residuals for Covariances of Model M1 at Kindergarten, Group 1

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour	Academic Skill
Approaches to Learning	-0.006*					
Self-Control	-3.338	-0.444				
Interpersonal Skills	0.858*	0.172*	-0.017*			
Abs. Int. Behaviour	1.052	-2.621	0.279	0.172		
Abs. Ext. Behaviour	-1.173	1.309*	-5.413	2.485	0.269	
Academic Skill	5.780*	-5.765	0.518*	1.722	-3.707	0.005*

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Standardized Residuals for Covariances of Model M1 at Grade 5, Group 1

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour	Academic Skill
Approaches to Learning	0.142					
Self-Control	-4.054	-0.006*				
Interpersonal Skills	0.727	0.100*	0.725			
Abs. Int. Behaviour	7.354	-4.253	1.377	0.283		
Abs. Ext. Behaviour	-1.977	0.863*	-3.375	-1.471	0.195	
Academic Skill	14.170	-4.416	-4.427	3.512	-1.809	0.238

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Appendix B – Standardized Residuals for Covariances after Removal of Academic Composite (M2) in Group 1

Standardized Residuals for Covariances for Model M2 at Kindergarten, Group 1

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour
Approaches to Learning	0.196				
Self-Control	-3.032	-0.334			
Interpersonal Skills	1.398*	0.026*	0.149*		
Abs. Int. Behaviour	1.629	-2.854	0.749	0.149	
Abs. Ext. Behaviour	-0.539	0.908*	-5.321	2.576	0.220

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Standardized Residuals for Covariances for Model M2 at Grade 5, Group 1

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour
Approaches to Learning	-0.001*				
Self-Control	-3.569	-0.009*			
Interpersonal Skills	0.922*	0.059	0.467		
Abs. Int. Behaviour	7.207	-4.089	1.638	0.306	
Abs. Ext. Behaviour	-1.497	0.742*	-3.436	-1.362	0.178

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Appendix C – Standardized Residuals for Covariances after Error Correlation Added (M4) in Group 1

Standardized Residuals for Covariances for Model M4 at Kindergarten, Group 1

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour
Approaches to Learning	0.097				
Self-Control	0.139*	-0.004*			
Interpersonal Skills	0.685*	-1.850	-0.227		
Abs. Int. Behaviour	1.158	-2.501	1.292	0.000	
Abs. Ext. Behaviour	-3.253	3.174	-0.004*	1.611	-0.001*

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Standardized Residuals for Covariances for Model M4 at Grade 5, Group 1

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour
Approaches to Learning	0.000				
Self-Control	-0.030*	-0.001*			
Interpersonal Skills	3.627	-1.734	-0.008*		
Abs. Int. Behaviour	2.285	-2.803	1.257	0.010	
Abs. Ext. Behaviour	-3.485	0.410*	0.002	-1.121	0.005

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Appendix D – Standardized Residual Covariance Matrix for Baseline Models in Group 2

Standardized Residual Covariance Matrix for Model M1 at Kindergarten, Group 2

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour	Academic Skill
Approaches to Learning	0.000					
Self-Control	-3.498	-0.029*				
Interpersonal Skills	1.007*	0.626	0.566			
Abs. Int. Behaviour	1.823	-0.407	0.111	-0.001*		
Abs. Ext. Behaviour	-0.427*	0.655	-1.258*	0.365	-0.002*	
Academic Skill	10.238	-3.553	0.694	-0.464	-4.105	0.238

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Standardized Residual Covariance Matrix for Model M1 at Grade 5, Group 2

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour	Academic Skill
Approaches to Learning	-0.005					
Self-Control	-1.805	0.005*				
Interpersonal Skills	0.282*	1.198	0.666			
Abs. Int. Behaviour	3.142	-2.136	0.254	-0.005*		
Abs. Ext. Behaviour	-0.178	0.389*	-0.999	-0.210	-0.000	
Academic Skill	8.037	-1.483	-2.455	0.850	-3.208	-0.006*

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Appendix E – Standardized Residuals for Covariances after Removal of Academic Composite (M2) in Group 2

Standardized Residuals for Covariances for Model M2 at Kindergarten, Group 2

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour
Approaches to Learning	0.000				
Self-Control	-3.156	-0.023*			
Interpersonal Skills	1.253*	0.043	0.467		
Abs. Int. Behaviour	1.893	-0.430*	0.201	-0.001*	
Abs. Ext. Behaviour	-0.350*	0.529*	-1.266*	0.360	-0.003*

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Standardized Residual Covariance Matrix for Model M2 at Grade 5, Group 2

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour
Approaches to Learning	0.000				
Self-Control	-1.599	0.002*			
Interpersonal Skills	0.314*	0.516	0.360		
Abs. Int. Behaviour	3.220	-2.127*	0.274	-0.005*	
Abs. Ext. Behaviour	-0.126	0.358*	-1.073	0.208	0.000

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Appendix F – Standardized Residuals for Covariances of the Initial Model (M1) in Group 3

Standardized Residual Covariance Matrix for Model M1 at Kindergarten, Group 3

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour	Academic Skill
Approaches to Learning	-0.009*					
Self-Control	-3.280	0.213				
Interpersonal Skills	0.626*	0.996	0.023*			
Abs. Int. Behaviour	2.322	-1.180	0.844	0.001		
Abs. Ext. Behaviour	-1.014	0.751	-1.040*	1.455	-0.003*	
Academic Skill	13.970	-7.301	-4.650	-1.891	-1.891	0.003

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Standardized Residual Covariance Matrix for Model M1 at Grade 5, Group 3

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour	Academic Skill
Approaches to Learning	0.828					
Self-Control	-5.066	-0.025*				
Interpersonal Skills	29.673	0.315*	0.005*			
Abs. Int. Behaviour	7.639	-1.013	-0.658	0.332		
Abs. Ext. Behaviour	0.275	0.495	-5.897	0.164	-0.002*	
Academic Skill	10.041	-1.321	-6.041	3.005	-2.516	0.092

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Appendix G – Standardized Residuals for Covariances after Removal of Academic Composite (M2) in Group 3

Standardized Residual Covariance Matrix for M2 at Kindergarten, Group 3

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour
Approaches to Learning	-0.003				
Self-Control	-2.701	0.026			
Interpersonal Skills	0.802*	0.250	0.038*		
Abs. Int. Behaviour	2.411	-1.158*	0.991	0.000	
Abs. Ext. Behaviour	-0.755	0.653*	-1.078*	1.481	-0.010*

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*

Standardized Residual Covariance Matrix for M2 at Grade 5, Group 3

	Approaches to Learning	Self-Control	Interpersonal Skills	Abs. Int. Behaviour	Abs. Ext. Behaviour
Approaches to Learning	0.000				
Self-Control	-0.638	-0.015*			
Interpersonal Skills	0.550	0.249*	0.053		
Abs. Int. Behaviour	0.395	0.415	-1.053	0.000	
Abs. Ext. Behaviour	2.708	-0.992	-0.165	0.145	0.017

*Note – * Indicates normalized residual value used instead of standardized residual values. Where standardized residuals for covariances cannot be calculated, normalized residuals can be used (Muthén & Muthén, 2007)*