SOCIAL-EMOTIONAL FUNCTIONING IN EARLY CHILDHOOD: INVESTIGATING DEVELOPMENTAL PATTERNS IN CHILDHOOD MENTAL HEALTH AND WELL-BEING

by

Kimberly Catherine Thomson

M.A., University of British Columbia, 2010

B.A., Queen's University, 2007

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

in

The Faculty of Graduate and Postdoctoral Studies

(Population and Public Health)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

April 2018

Abstract

Early childhood is a critical developmental period when children form social and emotional sensitivities that will support or undermine their mental health throughout their lives. It is estimated that over half of lifetime mental health problems develop before the age of fourteen, and yet early identification and intervention efforts are often hindered by limited recognition of early mental health indicators and a general absence of population-level monitoring systems. This dissertation addresses these gaps, applying a novel approach (person-centered analysis) to identify latent profiles of social-emotional functioning within population cohorts of children entering Kindergarten in British Columbia from 2001 to 2012. Early childhood social-emotional functioning was measured using the teacher-rated Early Development Instrument (EDI) population health survey that includes measures of internalizing and externalizing behaviours (readiness to explore, aggression, hyperactivity) as well as social competence. Latent profile analysis was used to identify distinguishable profiles of early childhood social-emotional functioning at a population-level. Unique profiles of social-emotional functioning were identified consistently across the three analyses included in this dissertation, with over 55% of children demonstrating overall high social-emotional functioning, over 40% of children demonstrating relative vulnerabilities in internalizing and externalizing behaviours, and approximately 3% of children experiencing multiple comorbid vulnerabilities on nearly all measures. Chapter 2 identifies social gradients in the severity of early childhood social-emotional vulnerabilities, with boys and lower income children over-represented in lower functioning social-emotional profiles. Chapter 3 examines children's likelihood of depression, anxiety, conduct disorder, attention deficit hyperactivity disorder, and multiple conditions, and finds that the profile group to which children belong in Kindergarten is predictive of their

experience of mental health conditions up to ten years later. Chapter 4 demonstrates that children's Kindergarten social-emotional profile group is also predictive of their self-reported well-being in middle childhood, with evidence that supportive relationships with adults and peers partially mediates these associations. These studies inform our understanding of patterns of early childhood social-emotional functioning by identifying social conditions and behaviour patterns predictive of children's future mental health outcomes that can be targeted earlier in the life course to help mitigate mental health problems and promote well-being.

Lay Summary

Research investigating health across the life course consistently shows that many adult mental health problems begin developing early in life. Investigating population differences in early childhood social-emotional functioning may be fundamental to identifying patterns of behaviour that indicate higher vulnerability of later problems with mental health and well-being. This dissertation examined population patterns of children's social-emotional functioning in Kindergarten (including social competence, emotional maturity, and behaviour problems) to assess how these may be related to sociodemographic characteristics, physician-assessed mental health conditions, and self-rated well-being. Unique patterns of children's early social-emotional functioning were identified at school entry and were shown to predict children's likelihood of future mental health conditions and well-being by early adolescence. Supportive relationships with adults and peers partly explained these associations, promoting well-being. The findings have potential to inform policies and interventions to promote child mental health at a population-level.

Preface

This dissertation was conceptualized, conducted, and written by Kimberly Thomson under the guidance of co-supervisors Dr. Jean Shoveller (PhD, University of British Columbia [UBC]) and Dr. Martin Guhn (PhD, UBC), as well as committee member Dr. Chris Richardson (PhD, UBC). Research questions, literature reviews, and all data analyses were developed and conducted by Kimberly Thomson with input from the dissertation committee. Ethics approval was obtained from the UBC Behavioural Research Ethics Board. Permission to access linked Early Development Instrument and provincial health insurance data in Chapters 2 and 3 was approved under application H09-01962 ("Developmental Trajectories"). Access to the linked child development monitoring data analyzed in Chapter 4 was approved under applications H07-00257 ("Early Childhood Development Program of Research") and H09-00416 ("Middle Childhood Development Program of Research"). Kimberly Thomson was supported by a Canadian Institutes of Health Research Doctoral Award (GSD-134926) entitled, "Social-Emotional Health Trajectories from School Entry to Adolescence: A Population-Level Analysis."

A version of Chapter 2 was published as, Thomson, K.C., Guhn, M., Richardson, C.G., Ark, T., & Shoveller, J.A. (2017). Profiles of children's social-emotional health at school entry and associated income, gender, and language inequalities: A cross-sectional population-based study in British Columbia, Canada. *BMJ Open*, *7*:e015353. Dr. Tavinder Ark was included as an additional co-author for her guidance interpreting model fit results of the latent profile analysis. A version of this chapter was also presented at the *Pathways to Health Equity Conference* in May 2015. A manuscript version of Chapter 3 has been submitted for publication and is currently under review. This manuscript includes Dr. Anne Gadermann as a co-author for her role in

defining the data cohort and interpreting mental health outcomes captured within the dataset. An oral presentation based on this chapter has been accepted at the *23rd World Congress of the International Association for Child and Adolescent Psychiatry and Allied Professions* taking place in July 2018. A conference abstract based on Chapter 4 has been submitted to the *25th Annual Meeting of the International Society for Quality of Life Research* taking place October 2018. All manuscript writing and data analyses were conducted by the lead author, Kimberly Thomson, with critical revisions and feedback from the co-authors. All inferences, opinions, and conclusions drawn from this research are those of the authors, and do not reflect the opinions or policies of the data stewards.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

aBIC: adjusted Bayesian Information Criterion

ADHD: Attention Deficit Hyperactivity Disorder

BC: British Columbia

BLRT: Bootstrap Likelihood Ratio Test

CI: Confidence Interval

DSM-V: Diagnostic Statistics Manual – 5th Edition

EDI: Early Development Instrument

ESL: English-as-a-Second Language

ICD-9: International Classification of Diseases – 9th Revision

LPA: Latent Profile Analysis

MDI: Middle Years Development Instrument

MSP: Medical Services Plan

OR: Odds Ratio

UBC: University of British Columbia

ZIP: Zero Inflated Poisson

Acknowledgements

This dissertation would not have been possible without the support of my incredible dissertation committee, Drs. Jean Shoveller, Martin Guhn, and Chris Richardson, who contributed their time, knowledge, and enthusiasm for this research and were a joy to get to work with and learn from every day. I especially want to thank my co-supervisors, Jeannie and Martin, for taking me on and committing to a new project during a difficult transitional time. Your guidance and mentorship have been invaluable. I would also like to acknowledge my friends and colleagues at the Human Early Learning Partnership who create the most fun and enriching environment for learning, supporting each other, and endeavoring to explore complex and important research questions. I am also grateful to my personal friends and family for their encouragement, patience, and good humour. In particular to my family – my parents, and Alexis, Tristan, Trevor – thank you for enabling me to pursue this aspiration and supporting me all along the way. Lastly, I would like to express my profound gratitude to the late Dr. Clyde Hertzman who inspired and encouraged me to pursue this PhD. To be able to contribute in any small way to the vision of creating fair and healthy foundations for children is a great honour.

Dedication

For Clyde

Chapter 1: Introduction

1.1. Background

Mental health problems are estimated to be the most common disabling condition among adolescents worldwide, affecting an estimated 10% to 20% of young people globally (Canadian Mental Health Association, 2016; Kieling et al., 2011). Within North America, internalizing disorders including depression and anxiety are estimated to affect approximately 2% to 10% of children and adolescents within a given year (Kessler et al., 2012; Merikangas, Nakamura, & Kessler, 2009). Comparatively, an estimated 2% to 9% of young people are affected by externalizing disorders including conduct problems and hyperactivity (Kessler et al., 2012; Merikangas et al., 2009). Diminished feelings of self-worth combined with pervasive social stigma prevent many children and adolescents from informing others of their suffering or seeking treatment (Chandra & Minkovitz, 2006; Mukolo, Heflinger, & Wallston, 2010), increasing their risk of social isolation, substance use, school failure, lifelong clinical conditions, and in worst cases, suicide ideation and premature death (Bittner et al., 2007; Danese et al., 2009; Fergusson & Woodward, 2002; Mann, Hosman, Schaalma, & De Vries, 2004). Yet despite the prevalence and magnitude of these outcomes, the early detection and prevention of mental health problems remain poorly addressed for a variety of reasons, including low levels of recognition of early childhood subclinical indicators, and a sparse knowledge base regarding effective interventions for promoting child mental health at a population-level (McGorry et al., 2014; Pescosolido et al., 2008).

Over the past decade in British Columbia (BC), children's vulnerabilities in key areas of developmental health have been increasing, in particular in areas of social and emotional

development related to mental health (Human Early Learning Partnership, 2016). For example, from 2004 to 2016 the proportion of BC children experiencing vulnerability in the area of emotional health increased from 12% to 16%, with aggressive and anxious/fearful behaviour driving these increases (Human Early Learning Partnership, 2016). The increasing prevalence of social-emotional vulnerabilities in early childhood presents a significant public health concern, as early problems with anxiety, depressive symptoms, hyperactivity and aggression, can severely impact children's social and psychological well-being both concurrently and throughout the life course (Bornstein, Hahn, & Haynes, 2010; Castelao & Kröner-Herwig, 2013; Dekker et al., 2007; Schinka, van Dulmen, Mata, Bossarte, & Swahn, 2013). Research has found that early indicators of social-emotional vulnerabilities can be identified in young children under the age of five (Bornstein et al., 2010; Dekker et al., 2007). Yet, few studies have been able to investigate these patterns at a population-level, nor have had the capacity to examine the heterogeneity in *combinations* of social-emotional strengths and vulnerabilities and their associated outcomes throughout childhood.

The current dissertation sought to address pertinent gaps in the existing knowledge base regarding the early identification of children's social-emotional functioning patterns, their sociodemographic distribution within the population, and predictive capabilities of early profile patterns for future mental health and well-being outcomes. Drawing on life course theory (Ben-Shlomo & Kuh, 2002; Elder, 1998; Hertzman & Power 2003), this research takes a developmental perspective, postulating that mental health outcomes often observed in later adolescence and adulthood are largely influenced by events and experiences incurred in the earliest years of life.

1.2. Social-Emotional Health from a Life Course Perspective

It has been well-documented that exposures to both beneficial and adverse conditions during early life contribute to an individual's experience of health and well-being over the life course (Currie, 2009; Hertzman & Power, 2003; Pearlin, Schieman, Fazio, & Meersman, 2005). While in some cases early exposures directly and concurrently affect child development, more often the effects of early exposures develop over time either through accumulated disadvantage, delayed expression, or through a sequence of adverse events (Hertzman & Power, 2003). For example, although most clinical mental health disorders are not diagnosed before the second decade of life, over 50% of clinically diagnosed adults report their anxiety and impulse control disorders began by age eleven (Kessler et al., 2005). Other studies have found that gender differences in depressive symptoms begin to be observed by age twelve (Nolen-Hoeksema, 2006). Furthermore, research shows that vulnerabilities in early social and emotional functioning are not limited to future mental health problems, but also have implications for lower lifetime academic achievement, employability, physical health, and life satisfaction (Bittner et al., 2007; Danese et al., 2009; Fergusson & Woodward, 2002).

Early childhood has frequently been identified as a critical period when social and structural factors such as income and education affect brain development including social-emotional sensitivities that can support or undermine children's future health and well-being (Davidson & McEwen, 2012; Heim & Binder, 2012; Hertzman & Boyce, 2010; Shonkoff, Boyce, & McEwen, 2009; Shonkoff & Garner, 2012). A life course framing suggests at least three patterns through which this may occur (Ben-Shlomo & Kuh, 2002; Hertzman & Power, 2003). The latency pattern describes when an early exposure triggers a biological reaction that eventually expresses itself later in life, regardless of exposures experienced in between (i.e., during the latent period).

For example, heightened brain sensitivity in the first five years of life may increase children's susceptibility to stress and create lasting changes in the nervous system that affect future stress sensitivity through a process of "biological embedding" (Davidson & McEwen, 2012; Heim & Binder, 2012; Hertzman & Boyce, 2010; Shonkoff et al., 2009; Shonkoff & Garner, 2012). Similarly, exposures can have a cumulative effect, such that recurring exposures over time or the experience of multiple different exposures may multiplicatively increase one's probability of an adverse health outcome. In this model, cumulative stress may again trigger biochemical changes in the body, contributing to depression, inflammation, and metabolic risks (obesity, high blood pressure) that will adversely affect children as they age (Danese et al., 2009; Miller et al., 2009; Miller & Chen, 2013). Finally, a pathway pattern has also been observed whereby an early exposure may imply an elevated probability of particular experiences and consequent health outcomes. For example, early antisocial behaviour may elevate the probability of experiencing peer rejection, difficulty in school, and feelings of loneliness and low self-esteem, which may subsequently increase the likelihood of experiencing anxiety and depression (Obradovic, Burt, & Masten, 2010). Although any one of these patterns may elicit the development of a mental health problem, these pathways also often operate concurrently (Hertzman & Power, 2003), adding to the complexity of understanding the etiology of children's mental health and well-being. However, these pathways also indicate potential common causes of diminished lifetime mental health (such as insecure infant-caregiver attachment; Bowlby, 1973; Groh & Bakermans-Kranenburg, 2014; Sroufe, 2005), as well as key points in the life course when intervention may be most effective, including the transition to school when numerous opportunities for social and emotional growth are presented (Alexander, Entwisle, & Olson, 2007).

1.3. Social-Emotional Indicators in Early Childhood

By the time of Kindergarten school entry (age five), children are expected to possess multiple social and emotional aptitudes that facilitate adaptive functioning within classrooms including following routines, getting along with peers, controlling emotional outbursts, and focusing on instructed activities (Alexander et al., 2007). Applying a life course perspective, vulnerabilities in any of these aptitudes may indicate susceptibility for future mental health problems. For one, deficiencies in social-emotional functioning may indicate an underlying vulnerability – possibly resulting from a genetic predisposition or early exposure – that foreshadows a susceptibility to future mental health problems (Nivard et al., 2015; Savage et al., 2015). For example, a consensus across epidemiology, psychology, and psychiatry disciplines is that the conditions that predispose one to mental illness develop long before recognizable indicators are observed or a diagnosis is made (Hertzman & Boyce, 2010; McGorry et al., 2014; Shonkoff & Garner, 2012). Secondly, an early social-emotional vulnerability may not indicate a predisposition, but may still lead to unfavourable outcomes through pathway models, with children experiencing failure, reprimands, and social rejection (Fanti & Henrich, 2010; Hannigan, Mcadams, Plomin, & Eley, 2016; Patterson, Degarmo, & Knutson, 2000).

A central objective of the current dissertation was to examine typical patterns of co-occurring social-emotional strengths and vulnerabilities among children at Kindergarten school entry, for the purpose of identifying population trends in early childhood social-emotional functioning that can be used to inform earlier interventions (i.e., during sensitive periods of brain and biological development), potentially enhancing their effectiveness (Davidson & McEwen, 2012; McGorry et al., 2014; Onise, Lynch, Sawyer, & McDermott, 2010; Wise, 2009). A second objective was then to investigate how early social-emotional functioning patterns may be related to later

internalizing, externalizing, and subjective well-being outcomes in middle childhood and adolescence.

1.3.1. Indicators of childhood internalizing problems

Prospective cohort studies that have monitored changes in children's internalizing (depressive and anxiety) symptoms over time have consistently demonstrated that early indicators such as heightened irritability and emotionality can be detected in young children before the age of five (Bongers, Koot, van der Ende, & Verhulst, 2003; Bornstein et al., 2010; Côté et al., 2009; Dekker et al., 2007; Gilliom & Shaw, 2004; Sterba, Prinstein, & Cox, 2007). Although irritability and emotionality among young children are not necessarily indicative of pathology, some research suggests that dispositional differences in negative emotionality can be observed at birth and that these differences remain relatively stable throughout childhood (Rothbart & Bates, 1998). Other research has shown that early depressive and anxiety symptoms (including nervousness, worry, and difficulty having fun) can be identified in children as young as 18 months old (Côté et al., 2009). Furthermore, although most studies have found that internalizing symptoms reportedly increase during adolescence, stable and decreasing trajectories have also been observed among subgroups of children and adolescents, depending on their social competence, self-efficacy, gender, and family characteristics (Bongers et al., 2003; Bornstein et al., 2010; Côté et al., 2009; Gilliom & Shaw, 2004).

Although social withdrawal (avoiding social situations) and negative affect (chronic irritability, sadness) may be the most commonly identifiable indicators of internalizing mental health problems, these behaviours are typically exhibited among older children and adolescents (Bernstein & Victor, 2011; McCauley, Gudmundsen, Rockhill, & Banh, 2011). In contrast, research with very young children (age two) has identified children's fearfulness in new

situations as a particularly informative predictor of children's future internalizing behaviours (Gilliom & Shaw, 2004). For example, in one study, two year-olds who exhibited heightened fearfulness/inhibition in new situations (and who additionally displayed high negative emotionality) were more likely to experience rapid and steep internalizing trajectories when followed up to age six (Gilliom & Shaw, 2004). Other research has suggested that an overactive behavioural inhibition system is a common risk factor associated with both anxiety and depression (Cummings, Caporino, & Kendall, 2014).

Whether behavioural inhibition is a pathway to both anxiety and depression raises a common debate in the literature regarding the distinctiveness of these conditions in early childhood. Anxiety and depression are not always examined concurrently, but their symptoms in children under age five overlap to the extent that some researchers have argued that they can be considered one construct (Achenbach, 1991; Sterba, Egger, & Angold, 2007). Other research has suggested that anxiety symptoms precede depressive symptoms (Kovacs, 1996). Several models have been proposed to explain the etiology and comorbidity of anxiety and depressive symptoms including the tripartite model, which suggests anxiety and depression share a common underlying factor (negative affect) but are differentiated by physiological hyperarousal (unique to anxiety) versus low affect/anhedonia (unique to depression; Cummings et al., 2014; McCauley et al., 2011). Conversely, the multiple pathways model offers more specificity in the types of anxiety that may be related to depression (e.g., generalized anxiety disorder rather than panic disorder), and suggests that shared risk factors including genetic and environmental conditions may account for their frequent comorbidity (Cummings et al., 2014). Many clinicians argue in favour of distinguishing the two conditions for the purpose of more effectively treating symptoms and their causes. For example, some research indicates that cognitive behaviour

therapy for anxiety is effective at treating depressive symptoms, but that treatments for depression inconsistently reduce anxiety symptoms (Cummings & Fristad, 2012; Kendall, Safford, Flannery-Schroeder, & Webb, 2004). Similarly, it has been suggested that depressive symptoms accompanying a primary anxiety diagnosis may be less severe than those experienced among adolescents experiencing a primary depression diagnosis, and that distinct interventions are needed to treat the more severe cases (Olino, Klein, Lewinsohn, Rohde, & Seeley, 2010).

1.3.2. Indicators of childhood externalizing problems

In contrast with internalizing disorders which have been associated with high inhibition, a high *lack* of inhibition (i.e., overactive behavioural *activation* system) has been associated with externalizing disorders (Cummings et al., 2014; Gilliom & Shaw, 2004). While fearlessness and high energy are desirable in many contexts, at extremes they can be problematic for children who may experience difficulty maintaining friendships, following rules and routines, and controlling impulses (Cormier, 2008; Perpletchikova, 2011; Stubbe, 2011). Indicators of heightened externalizing problems are also observable in infancy and early childhood, but unlike internalizing symptoms that tend to increase as children age, many externalizing behaviours (including temper tantrums, physical aggression, and defiance) typically decrease after age two (Achenbach, Howell, Quay, & Connors, 1991; Tremblay, 2000). That said, up to 16% of adolescents continue to struggle with externalizing problems in the forms of attention deficit hyperactivity disorder (ADHD), conduct disorder, and oppositional defiant disorder (Kessler et al., 2012). Among these conditions, ADHD is typically the earliest to be diagnosed, with chronic and consistent developmentally inappropriate behaviour beginning to be observed around age three (Cormier, 2008). ADHD is commonly split into three subtypes, featuring either predominant inattention, hyperactivity/impulsivity, or combination of the two (Cormier, 2008).

These subtypes in turn have been suggested to be differentially related to comorbid vulnerabilities and future mental health outcomes including oppositional defiant disorder, anxiety, and depression (Cormier, 2008; Jarrett & Ollendick, 2008; Lavigne et al., 2001; Meinzer, Pettit, & Viswesvaran, 2014). Other research suggests a longitudinal continuum for ADHD, reflecting that hyperactivity is more common in younger children, whereas inattention is more common among adolescents (Trott, 2006). Oppositional defiant disorder (characterized by chronic irritability and hostility) is often considered a precursor to conduct disorder, which can involve hostile actions such as fire setting, stealing, and conning others (Perpletchikova, 2011). Conduct disorders, in turn, are thought to precede personality disorders, adolescent antisocial behaviour, substance use, and mania (Perpletchikova, 2011). Notably, externalizing and internalizing problems frequently co-occur within the same children (Basten et al., 2013; Fanti & Henrich, 2010; Hill, Degnan, Calkins, & Keane, 2006; Janson & Mathiesen, 2008; Kamphaus et al., 1999; Wiggins, Mitchell, Hyde, & Monk, 2015). For example, it has been hypothesized that ADHD specifically may share common causes with anxiety, and that anxious impulsivity may often be misclassified as hyperactivity, especially in boys (Jarrett & Ollendick, 2008; Nigg, Goldsmith, & Sachek, 2004; Steinberg & Drabick, 2015). More is discussed on this topic throughout this dissertation.

1.3.3. Indicators of childhood well-being

Finally, concurrent with the investigations into the symptomatology of childhood mental health disorders, there is growing interest within the psychology literature in investigating the indicators and trajectories of positive mental health and well-being (Barry, 2009; Howell, Keyes, & Passmore, 2013; Keyes, 2009; Orpana, Vachon, Dykxhoorn, McRae, & Jayaraman, 2016; Sesma, Mannes, & Scales, 2012). Distinct from the absence of mental illness, mental health has

been defined by the World Health Organization as the ability to realize one's full potential, cope effectively with stress, work productively, and contribute to one's community (World Health Organization, 2016). Notably, this conceptualization emphasizes subjective well-being and regards mental health as distinct from psychopathology. Research finds that children's experiences with mental health problems such as anxiety and depression are related but only moderately correlated with their well-being, with changes in one dimension not always affecting the other (Greenspoon & Saklofske, 2001; Trompetter, Lamers, Westerhof, Fledderus, & Bohlmeijer, 2017). Research on positive psychological health has further identified several psychological attributes associated with enhanced subjective well-being including optimism and self-determination, as well as promotive contextual assets such as supportive social relationships (Seligman & Csikszentmihalyi, 2000; Sesma et al., 2012). Relatedly, several investigations in the resilience literature have suggested that it is the interactions between psychological and contextual factors that best predict children's positive mental health, with well-being optimized when children's strengths are supported by the people and opportunities within their surrounding environments (Ben-Arieh, 2008; Theokas et al., 2005; Thomson, Oberle, & Schonert-Reichl, 2015).

1.3.4. Social determinants of childhood mental health

In addition to individual developmental indicators of emerging mental health in early childhood, it is also important to recognize the substantive influence of child sociodemographic characteristics and contexts both on the biological etiology and likelihood of diagnosis of mental health conditions. As it stands, social determinants of health, defined as the conditions in which people are born, grow, live, work, and age, account for the largest differences in non-communicable disease outcomes (Marmot & Bell, 2012; Stringhini et al., 2017). Likewise, with

childhood mental health, social factors including family socioeconomic status, child gender, and ethnic minority status are associated with disparities in the observation, severity, and course of early social-emotional indicators as well as mental health outcomes (Amone-P'Olak et al., 2009; Berger, Paxspn, & Waldfogel, 2009; Dearing, McCartney, & Taylor, 2006; Nicholson, Lucas, Berthelsen, & Wake, 2012; Reiss, 2013). Gene-environment interactions, unequal opportunities, and chronic stress affecting biological systems have been shown to put some groups of children at higher risk than others for poor mental health outcomes either concurrently or later in life (Hertzman & Boyce, 2010; Shonkoff et al., 2009; Shonkoff & Garner, 2012). This observation is consistent with life course theory and is supported by population health research showing that the social conditions in which children develop, including household income, family social status, and parent educational attainment are predictive of children's life course mental health outcomes, and furthermore, that these conditions appear to have the greatest impact early in life (Crosnoe & Elder, 2004; Hertzman & Boyce, 2010; Phelan, Link, & Tehranifar, 2010; Yoshikawa, Aber, & Beardslee, 2012). At the same time, it is also possible that the same behaviours and symptoms indicating childhood mental health problems are perceived differently by adult duty-bearers as well as young people themselves, depending on children's gender, ethnicity/culture, and household socioeconomic background (Bruchmüller, Margraf, & Schneider, 2012; Chandra & Minkovitz, 2006; Narad et al., 2015; Sciutto, Nolfi, & Bluhm, 2004). For example, there is some evidence that teachers and mental health professionals are more likely to refer boys for externalizing problems when both boys and girls present symptoms of hyperactivity (Bruchmüller et al., 2012; Sciutto et al., 2004) and that children who speak English as a second language may be perceived by teachers as having lower social skills (Kang, Haddad, Chen, & Greenberger, 2014).

1.4. New Methodologies: Analyzing Childhood Mental Health Indicators from a Person-Centered Approach

Understanding early childhood mental health poses methodological challenges because of the proposed common causes of multiple mental health outcomes, and relatedly, the similar symptoms used to predict and distinguish childhood mental health disorders. For example, the considerable overlap of symptoms across classifications of disorders (e.g., irritability), as well as a tendency to focus on a singular disorder or set of symptoms (e.g., assessing a child for ADHD), may mask important sources of heterogeneity in children's mental health conditions, while also obscuring comorbidities and associated interactions. In response to these limitations, new research is emerging that uses person-centered analytical approaches to group children according to the pattern of symptoms they have in common (such as shared strengths and vulnerabilities, severity of symptoms, or age of onset of symptoms; Berlin, Parra, & Williams, 2014a; Lubke & Muthén, 2005). That is, rather than define population subgroups based on artificial thresholds on a particular scale or measure, person-centered analyses consider the combination of traits across multiple given indicators for each child, ultimately to determine the number and configuration of distinct patterns of profiles in the population (e.g., Denham et al., 2012; Egger & Angold, 2006; Flouri & Sarmadi, 2016; Kjeldsen, Janson, Stoolmiller, Torgersen, & Mathiesen, 2014; Rettew, Althoff, Dumenci, Ayer, & Hudziak, 2008). For example, whereas variable centered models might compare outcomes for children depending on their score on a depressive symptoms scale, person-centered models would be able to identify groups of children based on their level of depressive symptoms in the context of their other social and emotional behaviours, thus enabling comparisons between subgroups of children who may share high depression in common, but differ in their levels of anxiety, social competence, or externalizing behaviour. Being able to

distinguish between subgroups provides a more accurate and holistic picture of children's development, as well as a more comprehensive representation of the population for the purpose of assessing the breadth and severity of social-emotional vulnerabilities and determining distinct intervention strategies for distinct problem patterns (Nandi, Beard, & Galea, 2009).

1.4.1. Heterogeneity and prevalence of symptom patterns in early childhood

Cross-sectional studies that have used person-centered analyses to explore internalizing, externalizing, and mental health symptoms in school-aged children have generally identified three to ten unique patterns of symptoms (Basten et al., 2013; Cannon & Weems, 2006; Denham et al., 2012; Janson & Mathiesen, 2008; Kamphaus, DiStefano, & Lease, 2003; Kamphaus et al., 1999; King et al., 2005; Kuny et al., 2013; López-Romero, Romero, & Luengo, 2012; Mindirila, 2016). Using techniques including cluster modeling, latent class analysis, and latent profile analysis, the largest "profile group" (i.e., subgroup of children sharing similar patterns of symptoms) in these studies has been a group exhibiting overall high social-emotional functioning, with population prevalence ranging from 45% to 86% (Basten et al., 2013; Cannon & Weems, 2006; Denham et al., 2012; Kuny et al., 2013; Mindirila, 2016). The next most prevalent group has varied across studies depending on sample demographics and the types of symptoms included in the model. Studies that have examined both internalizing and externalizing symptoms concurrently seem to suggest that among four to seven year-olds, profiles characterized by predominant externalizing symptoms (7% to 23%) are more prevalent than predominant internalizing symptoms (5% to 11%), but that children ages eight to twelve are more likely to exhibit predominant internalizing symptoms (Basten et al., 2013; Janson & Mathiesen, 2008). The least prevalent group has typically included children with comorbid internalizing and externalizing symptoms, ranging in prevalence from 13% (children with

comorbid moderate-to-high shyness and emotionality; Janson & Mathiesen, 2008), to 1% to 4% for children exhibiting extreme inhibition, withdrawal, aggression, irritability, and hyperactivity (Basten et al., 2013; Kamphaus et al., 2003; Kamphaus et al., 1999). Studies that have further examined heterogeneity within internalizing and externalizing symptoms have found that anxiety symptoms are more predominant than depressive symptoms in a population sample (Cannon & Weems, 2006), defiance symptoms are slightly more prevalent than irritability symptoms (Kuny et al., 2013), and that ADHD-inattention symptoms are more predominant than hyperactivity or aggressive symptoms (King et al., 2005). The few studies that have included indicators of positive mental health in their analyses have additionally been able to distinguish unique subgroups of children exhibiting high social skills, leadership, confidence, and expressivity (10% to 29% prevalence; Denham et al., 2012; Janson & Mathiesen, 2008; Kamphaus et al., 1999).

1.4.2. Development of social-emotional functioning from childhood to adolescence

Person-centered methodology also has been used to follow cohorts of children longitudinally to identify population subgroups according to the trajectories of early mental health indictors to adolescence and adulthood (e.g., Bongers et al., 2003; Dekker et al., 2007; Korhonen et al., 2014; Nantel-Vivier, Pihl, Cote, & Tremblay, 2014; Sterba et al., 2007; Wiggins et al., 2015). From this body of research, several insights can be discerned as especially relevant to the current dissertation. First, consistent with the prevalence patterns observed in cross-sectional studies, most children (up to 68%) within population-based samples can be clustered into a low symptomatology/adaptive group that is largely stable over time (Côté et al., 2009; Korhonen et al., 2014; Sterba et al., 2007; Van den Akker, Deković, Asscher, Shiner, & Prinzie, 2013; Weeks et al., 2014). Second, these studies corroborate that internalizing problems generally increase as children grew older while externalizing problems decrease, although

patterns of trajectories vary substantially by gender (Bongers et al., 2003; Gilliom & Shaw, 2004; Leve, Kim, & Pears, 2005; Van den Akker et al., 2013). For example, in one study, nearly twice as many girls were represented in a high-stable internalizing trajectory than boys (Sterba et al., 2007), whereas boys have typically been over-represented in high-stable externalizing groups (Keiley, Bates, Dodge, & Pettit, 2000; Silver, Measelle, Armstrong, & Essex, 2005). A third key finding is that children with multiple co-occurring symptoms typically have the most stable (high-chronic) trajectories over time (Fanti & Henrich, 2010; Hill et al., 2006; Wiggins et al., 2015). Across studies, high-chronic trajectories have predicted higher risk of negative outcomes over the life course, including risky adolescent behaviour and peer rejection (Fanti & Henrich, 2010), school drop-out (Duchesne, Vitaro, Larose, & Tremblay, 2008; Pingault et al., 2011), criminal delinquency and violence (Nagin & Tremblay, 1999), as well as adulthood mental and physical health problems, use of health services, and low socioeconomic status (Odgers et al., 2008; Qualter et al., 2013).

Positive mental health indicators including social competence have rarely been included in these studies, however studies that have included positive indicators reveal some interesting findings. Although positive indicators were more commonly observed in profiles characterized by the highest social-emotional functioning/lowest vulnerability, children included in the "lower functioning" profile groups also exhibited characteristics that would be considered relative strengths (Nantel-Vivier et al., 2014; Van den Akker et al., 2013). For example, in a study conducted by Van den Akker et al. (2013), children categorized as "under-controlled" (lacking inhibition) also exhibited high extroversion and imagination. Comparatively, children who were "over-controlled" (highly inhibited) demonstrated high levels of conscientiousness (Van den Akker et al., 2013). Similarly, a Canadian study by Nantel-Vivier et al. (2014) showed that even

children who had moderate levels of aggression or high anxiety exhibited moderate levels of prosocial behaviour.

1.4.3. Remaining knowledge gaps

Childhood mental health research has less frequently investigated children's strengths alongside vulnerabilities, and even within the person-centered literature, few studies have included indicators of positive mental health and well-being either as predictors or outcome measures (Denham et al., 2012; Nantel-Vivier et al., 2014; Van den Akker et al., 2013). It remains unclear as to how early childhood indicators of positive mental health and well-being, including social competence, respect for others, positive approaches to learning, and prosocial behaviour, combine with commonly measured internalizing and externalizing symptoms to form different profile patterns. Furthermore, explorations of how social determinants may be associated with profiles of children's social-emotional functioning has also been under-researched, with many studies controlling for social factors such as family socioeconomic status rather than examining stratified analyses or interactions, potentially missing opportunities to examine social differences in early childhood social-emotional profiles and interactions of multiple social factors together (e.g., Duchesne et al., 2008; Gilliom & Shaw, 2004). Finally, few studies, if any, have investigated how different combinations of early childhood social-emotional functioning predict not only the *same* symptoms over time (i.e., homotypic continuity), but how they may be related to multiple outcomes including clinical mental health conditions and measures of subjective well-being. Identifying and understanding these associations may help inform efforts to recognize the combinations of social-emotional strengths and vulnerabilities that are most likely to predict unfavourable outcomes for children, as well as those that are associated with higher levels of mental well-being.

1.5. Dissertation Objectives and Structure

This dissertation applies person-centered latent profile analysis to two comprehensive population data sources to address the following objectives:

1. To identify latent profile patterns of early childhood social-emotional functioning among a population cohort of children entering Kindergarten, and assess the degree to which social inequalities (household socioeconomic status, child gender, and child language minority status) are associated with these profiles, both independently and in combination.
2. To investigate the association between children's social-emotional functioning profiles at Kindergarten school entry and the occurrence and frequency of children's physician-assessed mental health conditions from ages two to fourteen.
3. To examine the association between early childhood social-emotional functioning profiles and children's self-reported well-being at age nine, assessing the extent to which adult and peer connectedness mediate these associations.

Following this introduction (Chapter 1), three original empirical studies are presented (Chapters 2 to 4) that investigate profiles and population distributions of social-emotional functioning among young children entering school (Chapter 2), the association of these childhood social-emotional profiles to future mental health conditions up to age fourteen (Chapter 3), and the associations between early social-emotional profiles and children's self-reported subjective well-being at age nine as well as the potential mediating role of perceived social connectedness to adults and peers (Chapter 4). Chapter 5 integrates findings from all three studies and discusses their implications for enhanced monitoring of early childhood social-

emotional vulnerabilities and related population-level interventions for addressing mental health issues at the earliest opportunities when intervention is more likely to be effective.

Chapter 2 describes the results of a latent profile analysis of children's early social-emotional functioning, as rated by teachers on the Early Development Instrument (EDI; Janus & Offord, 2007). Using a population cohort of children attending public school Kindergarten in BC from 2004 to 2007 (EDI "Wave 2"; N = 35,818), the aim of this study is to explore whether unique combinations of social-emotional functioning can be identified among children as early as school entry, and whether these are related to sociodemographic inequalities. Examining natural groupings of EDI social-emotional subscale scores (social competence; responsibility and respect; approaches to learning; readiness to explore; prosocial behaviour; anxious-fearful behaviour; aggression; hyperactivity-inattention), the results of this study suggest that six unique profiles of social-emotional symptoms can be observed at school entry, and that population health disparities are already observable at this time (assessed using multinomial logistic regression). While the results provide insight into the prevalence and patterns of co-occurring vulnerabilities among young children, a remaining question was how these early symptom profiles would be related to future mental health issues.

In Chapter 3, latent profile analysis is used to analyze data gathered from a cohort of Kindergarten children entering school between 2001 to 2003 ("EDI Wave 1"; N = 34,323). Children's EDI scores were then linked to health records from birth to age fourteen to count the number of medical consultations received related to a mental health issue (anxiety, depression, conduct disorder, ADHD, or multiple conditions). Health data were obtained from BC Medical Services Plan (MSP) records and analyzed using zero-inflated Poisson analysis. This study provides evidence that latent profiles of early childhood social-emotional functioning in

Kindergarten can predict clinical mental health issues up to ten years later, however it remained unknown how these profiles would be related to children's future self-reported well-being.

Chapter 4 analyzes a subset of data from the most recent of the EDI cohorts (children entering school between 2007 to 2012; "Waves 3-5"; N = 17,310) to examine associations between Kindergarten social-emotional functioning profiles and self-reported subjective well-being in Grade 4 (age nine). Five dimensions of well-being including life satisfaction, optimism, self-concept, sadness, and worries are assessed using the Middle Years Development Instrument (MDI; Schonert-Reichl et al., 2013). Using multiple linear regression and mediation (path) analysis, results suggest that early childhood social-emotional functioning is predictive of later subjective well-being, and that perceived social connectedness to adults and peers partially mediates these associations.

Chapter 5 presents a summary of the research findings, overall strengths and limitations of the research design and analyses, as well as a discussion of the implications for population and public health strategies addressing mental health in early childhood.

Chapter 2: Profiles of Children's Social-Emotional Functioning at School Entry: Income, Gender, and Language Disparities

2.1. Introduction

Social-emotional vulnerabilities in early childhood, including problems with anxiety, depressive symptoms, hyperactivity and aggression, can severely impact children's social and psychological well-being. It has been estimated that 14% to 26% of children exhibit diagnosable psychiatric symptoms (emotional or behaviour problems) before school entry (Egger & Angold, 2006) and while there is variation in the continuity of symptoms as children age (some studies suggest behavioural problems decrease whereas emotional problems increase; Mathiesen, Sanson, Stoolmiller, & Karevold, 2009), early impairments are found to remain relatively stable throughout the life course and can become exacerbated as children accumulate experiences with social rejection and academic failure (Bornstein et al., 2010; Castelao & Kröner-Herwig, 2013; Dekker et al., 2007; Egger & Angold, 2006; Kuny et al., 2013). For example, in a 10-year longitudinal study, Bornstein et al. (2010) found that social competence at age four uniquely predicted adolescent internalizing (depressive symptoms and anxiety) and externalizing problems (aggression and hyperactivity) beyond children's initial emotional adjustment levels, emphasizing the interconnectedness of social and emotional functioning and importance of early social acceptance and self-regulation (Denham et al., 2003; Riggs, Jahromi, Razza, Dillworth-Bart, & Mueller, 2006). Past studies also find that earlier-onset and co-occurring social and emotional problems are more likely to follow a stable or increasing pattern over time, predicting increased odds of psychiatric diagnoses in adulthood as well as decreased occupational opportunities and income, particularly for women (Dekker et al., 2007; Fanti & Henrich, 2010; Odgers et al., 2008).

Despite the evidence demonstrating the life course implications of early social and emotional health, there has been relatively limited research dedicated to early detection of subclinical presentations with the goal of early intervention. As McGorry et al. (2014) argue, within the field of psychiatry, there has been an overemphasis on treatment once problems reach a clinical stage, whereas identifying early - potentially modifiable - biomarkers of vulnerability (e.g., neurological indicators of stress) before they take root is likely to be more successful. The current study extends this argument to suggest that identifying patterns of early childhood psychosocial functioning from a social-emotional health perspective may inform population efforts to reduce risk for later mental health challenges, particularly during Kindergarten school entry when children are transitioning to a new social environment and undergoing rapid changes in social and cognitive development (Alexander et al., 2007; Blair, 2002). In this study and throughout this dissertation, the term "social–emotional functioning" is used to describe patterns of early childhood psychosocial health including social competence, internalizing symptoms (inhibition, depressive symptoms, over-controlled behaviours), and externalizing symptoms (hyperactivity, aggression, under-controlled behaviours) that may be associated with future mental health and well-being.

2.1.1. Advantages of person-centered analyses

To date, much of the evidence regarding children's social-emotional functioning has come from non-population based studies that compare group differences across levels of a particular symptom, such as depressed mood (Dekker et al., 2007; Hankin, Mermelstein, & Roesch, 2007; Twenge & Nolen-Hoeksema, 2002). These variable-centered methods can be effective for identifying children with elevated depressive symptoms. However, such approaches also imply a homogeneous distribution of such factors within risk groups. Conversely, studies

have shown that children are more likely to experience clusters of symptoms at various moments in the life course that may influence subsequent developmental outcomes in less uniform ways, in accordance with a child's unique combination of comorbidities and environmental supports and challenges (Duchesne et al., 2008; Fanti & Henrich, 2010; Nandi et al., 2009; Nantel-Vivier et al., 2014; Odgers et al., 2008; Wichstrøm & Berg-Nielsen, 2014). To address this limitation, person-centered methods and statistical approaches (including latent profile analysis) have been utilized to examine heterogeneity within population subgroups (e.g., based on shared symptoms, symptom severity, or age of onset; Lanza & Rhoades, 2013; Lubke & Muthén, 2005; Wichstrøm & Berg-Nielsen, 2014). Not only can these methods better account for diverse constellations of symptoms experienced by a range of children, they can further identify commonly co-occurring strengths that may be leveraged to inform intervention efforts. For example, meta-analyses have found the most effective prevention programs for addressing internalizing problems target the promotion of positive thoughts, actions, and social skills, as well as the reduction of negative cognitions (e.g., Blues Program, Coping with Stress; Cuijpers, Munoz, Clarke, & Lewinsohn, 2009; Stice, Rohde, Seeley, & Gau, 2009; Stice, Shaw, Bohon, & Marti, 2010). Similarly, universal school-based programs that focus on malleable skills, such as self-awareness, self-management, social awareness, relationship skills, and responsible decision making, have been shown to be effective for reducing emotional distress as well as reducing externalizing problems such as conduct problems and aggression (Collaboarative for Academic Social and Emotional Learning [CASEL], 2013; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

Person-centered approaches may also help to identify sociodemographic characteristics that are associated with particular population subgroups for the purpose of identifying early social disparities that may contribute to the onset of more severe outcomes among subgroups of

equally vulnerable children (Basten et al., 2013; Henninger & Luze, 2013; Nandi et al., 2009; Sterba et al., 2007). Several studies have reported that boys exhibit higher externalizing behaviour than girls, although other studies show externalizing patterns to be fairly similar between genders, and that gender differences more often appear in teacher ratings of externalizing behaviour rather than parent ratings (Broidy et al., 2003; Hill et al., 2006; Keiley et al., 2000). Socioeconomic disadvantage generally predicts lower social-emotional functioning in children, for example through strained primary caregiver relationships, but again this finding is inconsistent, as not all studies observe socioeconomic differences in children's social-emotional behaviour (Basten et al., 2013; Cannon & Weems, 2006; Fanti & Henrich, 2010; Henninger & Luze, 2013; Wiggins et al., 2015). Finally, children who are newcomers to Canada may face language barriers (i.e., limited English/French proficiency) associated with lower perceived social skills (Kang et al., 2014), and higher distress from having to navigate different cultures at home and at school, potentially increasing children's anxiety and depression (Costigan, 2006; Huang, Cheng, Calzada, & Brotman, 2012). Few studies have examined the combination of multiple sociodemographic factors in relation to early childhood social-emotional functioning, however mental health research with adolescents shows that young people who have multiple intersecting social disadvantages (e.g., based on socioeconomic status, gender, minority status) are at higher risk of poor mental health (Cooke, Bowie, & Carrère, 2014; Schwartz & Meyer, 2010; Umberson, Williams, Thomas, Liu, & Thomeer, 2014). Furthermore, existing evidence among young children suggests the presence of theoretically and practically important interaction effects - for example, some stressors within children's home environments seem to increase the risk of internalizing for girls, but not for boys (Weeks et al., 2014).

2.1.2. Study objectives and hypotheses

Although there is burgeoning evidence that distinct social-emotional patterns emerge in early childhood, there are still significant knowledge gaps including how positive indicators combine with problem behaviours to form different constellations or 'profiles,' how the prevalence of such profiles may be distributed in the population, and how profiles may be jointly associated with multiple sociodemographic characteristics. The current study sought to investigate (1) whether distinct profiles of early social-emotional functioning could be identified among children at Kindergarten school entry, and (2) whether household income level (measured as receiving a government subsidy), child gender, and child English-as-a-Second-Language (ESL) status would be associated with profile membership singularly and in combination. Based on the existing literature, the following hypotheses were made: (i) distinct profiles of social-emotional functioning would be observable at this age, and (ii) children from lower income families, boys, and children with ESL status would be over-represented in the lowest social-emotional functioning profile groups.

2.2. Methods

2.2.1. Data source

This study capitalized on a comprehensive population-level dataset linking teacher's ratings of children's Kindergarten social-emotional functioning (obtained from the Early Development Instrument [EDI]; Janus & Offord, 2007) and children's health insurance subsidy status (a proxy for household poverty level) from BC Ministry of Health administrative records (British Columbia Ministry of Health, 2015; Human Early Learning Partnership, 2015).

The Early Development Instrument (EDI). The EDI is a validated population measure of children's development at Kindergarten school entry that has been implemented

internationally to monitor child development trends and to examine longitudinal associations between early childhood development and children's sociodemographic circumstances, health, and education (Brownell et al., 2016; Davies, Janus, Duku, & Gaskin, 2016; Guhn, Gadermann, Almas, Schonert-Reichl, & Hertzman, 2016; Guhn, Gadermann, Hertzman, & Zumbo, 2009; Guhn, Zumbo, Janus, & Hertzman, 2011; Lloyd & Hertzman, 2009). The EDI is completed by teachers for all classroom children attending public schools (and some private schools) six months into their Kindergarten year (Guhn, Gadermann, & Zumbo, 2007; Guhn et al., 2011; Janus & Offord, 2007). Data are collected in waves (often over a two or three-year period) to cover school district participation across the entire province (minimum 80% participation is required in each school district). To date, over 235,000 EDI records have been collected for BC Kindergarten children in rolling cohorts between 1999 to 2015. Analyses conducted throughout this dissertation examined data from multiple EDI cohorts, utilizing eight EDI subscales assessing children's early social-emotional functioning. A measures key providing the full list of items in each of these subscales is provided in Appendix A.

Data linkage. Permission to link EDI records to children's gender, ESL status, and health insurance subsidy status was obtained from the BC Ministries of Health and Education. The actual data linkage was conducted by highly trained data managers at the Human Early Learning Partnership within the secured "Red Zone" of Population Data BC's data repository facilities, using a hybrid probabilistic-deterministic approach based upon identifiers available across data sources (e.g., Personal Health Number, date of birth, gender). Within the master data file, which is referred to as the *Developmental Trajectories* dataset, each individual child (i.e., each EDI record) is linked with a student enrollment record from the Ministry of Education containing student sociodemographic information (gender, ESL status).

Medical Services Plan (MSP) records from the Ministry of Health are linked slightly differently. Each child has one Personal Health Number, but their accompanying MSP record can contain multiple household subsidy codes depending on the subsidy category applied at the time of billing for a child's medical appointments (including physician visits). BC residents and their dependents (spouses and children under age 18) are required to enroll in MSP under the Medicare Protection Act (Government of British Columbia, 2017a). MSP data therefore includes all BC citizens and permanent residents who live in BC for at least three months of the year. Not included in the MSP data are children who are undocumented, live in BC for less than three months of the year, and children who have Federal health coverage (i.e., children within Aboriginal, military, and refugee families). During the study period, non-permanent residents were estimated to account for approximately 2% of BC's population, and approximately 4% of residents were covered by Federal health care (Puyat et al., 2017; Statistics Canada, 2007).

Analytic sample. The current study examined a subset of the Developmental Trajectories dataset that included records for children participating in Wave 2 of the EDI (data collected from 2004 to 2007; N = 38,411). A subset was selected rather than all waves, to (a) control for possible cohort effects over time, and (b) be able to examine the robustness of patterns identified in Wave 2 for subsequent cohorts of children. Wave 2 was selected for this first analysis as it contained the highest number of linked records compared to all other data collection waves. The analytic data file contained one EDI record and one Ministry of Education record for each child. During the study period, 87.5% of children attending Kindergarten were enrolled in public schools compared to 12.5% enrolled in independent schools or home schooling (BC Schools, 2017). Within BC, parents are advised to register their child for school or home schooling in the year their child turns five, although legally parents may choose to defer their child's schooling

for one more year (Government of British Columbia, 2017b). Parents who enrol their children in independent schools are often more affluent (Frenette & Chan, 2015), therefore this public school sample may have under-represented families at higher income levels. Regarding language status, enrollment statistics for that period indicated that 94.5% of Kindergarten students identified as English language learners (16.7% of the population) attended public school (BC Schools, 2017; English is the primary language of instruction in BC). Ethics approval for this study was obtained from the University of British Columbia Research Ethics Board.

2.2.2. Measures

Social-emotional functioning indicators. Eight indicators of children's social-emotional functioning were measured using the following subscales from the EDI: ***Overall Social Competence*** (5 items); ***Responsibility and Respect*** (8 items); ***Approaches to Learning*** (9 items); ***Readiness to Explore*** (4 items); ***Prosocial and Helping Behaviour*** (8 items); ***Anxious and Fearful Behaviour*** (8 items); ***Aggressive Behaviour*** (7 items); ***Hyperactive and Inattentive Behaviour*** (7 items). Example items, means, and standard deviations, and ordinal alphas (a measure of internal consistency for ordinal and/or skewed data; Gadermann, Guhn, & Zumbo, 2012) are provided in Table 2.1. On the EDI, teachers are asked to select one of four response options that best describe each of their students' behaviour currently or within the last six months: "Never or not true" is assigned a score of 0; "Sometimes or somewhat true" is assigned a score of 5; "Often or very true" is assigned a score of 10. "Don't know" is coded as missing. Scores for each item are summed and divided by the number of items in the subscale to derive a subscale mean. Negatively worded items such as, "is upset when left by parent/guardian" are reverse-coded so that higher scores indicate better social-emotional functioning. EDI scores were negatively skewed indicating that most children scored high on social-emotional functioning.

However, Tabachnik and Fidell (2007) advise that in large sample sizes non-normally distributed data will not affect adversely affect sample estimates.

Table 2.1. EDI Social-Emotional Functioning Subscales: Means, Distributions, and Internal Consistency (Wave 2)

EDI subscale	Example items	Unstandardized Mean (Standard Deviation)	Ordinal Alpha
Overall social competence	Gets along with peers	7.45 (2.48)	.94
Responsibility and respect	Follows rules, respects others	8.43 (2.13)	.97
Approaches to learning	Completes work on time	7.91 (2.28)	.96
Readiness to explore	Eager to play a new game	8.86 (1.99)	.95
Prosocial and helping behaviour	Offers to help others	5.53 (3.02)	.97
Anxious and fearful	Nervous, cries a lot	8.78 (1.63)	.91
Aggressive behaviour	Temper tantrums, fights	9.22 (1.52)	.94
Hyperactive and inattentive	Distractible, impulsive	8.09 (2.52)	.97

Legend: Subscales range from 0-10 with higher scores indicating better social-emotional functioning

Sociodemographic indicators. Household subsidy status was derived from MSP records and used as an indicator of relative poverty. In instances where the same child had multiple subsidy codes associated with their health record, the earliest subsidy code was used based on life course theory that suggests earlier experiences have greater impact over child development outcomes (Elder, 1998). Subsidy status was split into two categories: '100% subsidy' and 'no subsidy.' During the data collection period, 100% subsidy was available to a family of any size that earned an annual net income less than $22,000. In contrast, no subsidy was available for families who earned an annual net income above $30,000. Ninety percent of households within the sample were included in one of these two categories. The remaining 10% of households had

incremental coverage (20% to 80% subsidy) or were eligible for temporary subsidy or disability assistance. These categories were excluded due to their low frequency (e.g., disability assistance), or because they were not easily interpretable (e.g., partial subsidies were applied in $2000 increments and not reliably indicative of relative socioeconomic status). Teachers reported each child's biological sex as 'male' or 'female.' At the time of data collection, no other sex or gender options were available. These categorizations were then cross-validated with children's biological sex from BC Ministry of Education records. ESL status was also reported by teachers and cross-validated with Ministry records. (ESL status is a designation schools use to apply for additional resources to support children's learning needs). These three sociodemographic factors were selected based on their theoretical and applied relevance in developmental and epidemiological research and representativeness of the diversity of children in the population under study.

2.2.3. Analyses

Identifying latent profiles. Latent Profile Analysis (LPA) was used to identify unique patterns (i.e., profiles) of social-emotional functioning in the population sample. LPA is a type of finite mixture modeling that assesses the ability of grouped underlying latent classes to explain the variance among a set of observed dependent variables (i.e., children's scores on each of the eight social-emotional subscales from the EDI; Berlin et al., 2014a; Muthen & Muthen, 2017a). Berlin et al. (2014a) provide a comprehensive introduction to the use of LPA and other similar latent variable mixture models to address research questions in which similarities and differences between *cases* are of interest, rather than relationships between *variables*. The models receive the label "mixture" because they allow distributions of scores from one or more latent subpopulations to mix across profile groups (Berlin et al., 2014a). For example, one or several

latent profile groups may have similarly high scores on 'readiness to explore' but may differ on other social-emotional indicators. The goal of LPA therefore is to identify distinct groups based on patterns of distributions on a set of given indicators, and to assign each case to one of these groups based on their probability of membership given their set of scores (Berlin et al., 2014a). The analysis starts by fitting a model with one class (i.e., one latent profile group) and assessing model fit statistics such as whether a model with two or more classes statistically significantly improves the fit to the data compared to a model with fewer classes (Bootstrap Likelihood Ratio Test; BLRT), whether the model is accurate at fitting individuals to their respective latent classes (entropy), and whether children have a high probability of being assigned to a particular group (i.e., if children had equal probability of being assigned to multiple profile groups this model would not fit well).

In the current study, LPA was conducted using MPlus version 7 (Muthen & Muthen, 2017b). For ease of interpretation, all eight EDI social-emotional subscale scores were first standardized within the population sample so that every indicator had a mean of 0 and standard deviation of 1. Standardized scores were then entered into MPlus to conduct the LPA, using all available data points (i.e., all cases were included unless they had missing data on all eight social-emotional subscales). Because several models were tested with a large number of class solutions (more than three classes), random starting values were set to 500 (50 iterations) in order to avoid increasing statistical inaccuracy or biasing parameter estimates (Geiser, 2012). Starting with a one class model, multiple class solutions were compared to determine the best fitting solution. Relative model fit was assessed according to four standard criteria provided by Geiser (2012) and Nylund, Asparouhov, and Muthén (2007): (1) Entropy score closest to 1, indicating good classification accuracy, (2) High discrimination between classification

probabilities (probability of being assigned to any particular class ≥ 0.8), (3) Lowest adjusted Bayesian Information Criterion (aBIC) indicating relatively better fit among nested models, and (4) Statistically significant BLRT, testing whether a model with k latent classes fits better than a model with k-1 classes. As recommended, parsimony, interpretability, and theoretical meaningfulness were also considered in the selection of the overall best model (Geiser, 2012; Nylund et al., 2007).

Predicting profile membership. Once the best fitting model was determined from the LPA, a latent profile membership value was assigned to each child based on their most likely predicted profile membership. This output file was then linked (using a unique identifier associated with each child) back to the dataset containing children's MSP and Education records (i.e., household subsidy status, gender, and ESL status). Next, multinomial logistic regression analysis was conducted using SPSS version 23 (IBM Corporation, 2013) to determine how these sociodemographic characteristics were associated with each profile. All covariates were entered simultaneously to assess the magnitude of association of each sociodemographic factor in the context of all others. Two and three-way interactions were also examined.

2.3. Results

2.3.1. Study population

From the total 38,411 children who had EDI data, linked MSP records were available for 36,321 (95%) of children. Within this subset, a further 503 (1.4%) of children were excluded due to missing data on all eight social-emotional subscales comprising the outcome measure. The final analytical sample included 35,818 children (mean age = 5.67, SD = 0.31). Sociodemographic analyses showed that 18.5% of children were from households that had received a full subsidy at their earliest health care visit, 51.5% were identified as boys, and

17.3% were identified as having ESL status. In comparison, among the 1.4% of children missing from the analysis, 26.8% were from households receiving full subsidies, 56.1% were boys, and 27.2% had ESL status. These children also had a higher mean number of days absent from school compared to children included in the analysis (17.4 days vs 4.7 days). Child age did not differ between children included or excluded in the analysis.

2.3.2. Social-emotional latent profiles

Model fit estimations from the LPA suggested six unique profiles of social-emotional functioning (Table 2.2). Although aBIC scores kept decreasing and BLRT tests were statistically significant with each additional class, the six-class solution was among three solutions with the best entropy and class probability scores, indicating good distinction of individuals between classes (95%) and high accuracy of being assigned to each class (93%) based on the eight social-emotional scores provided. To further distinguish the best fitting model, relative change in log likelihood values were calculated between nested models, with larger improvements observed between the first six solutions, but diminishing returns thereafter. Similar diminishing improvements were observed comparing relative changes in aBIC scores. Acknowledging that determining LPA model fit requires a certain level of subjectivity, Nylund et al. (2007) recommend that this “flattening out” effect in model improvement scores can be used as an indicator for model selection.

Table 2.2. Latent Profile Analysis Model Fit Comparison (EDI Wave 2)

Number of Latent Profiles	Log Likelihood Value	aBIC	Entropy	BLRT	Lowest Class Probability	Smallest Class Size	Smallest Class Proportion
1	-400021.73	800160.40	NA	NA	1	35818	1.00
2	-341163.26	682509.22	0.95	0.00	0.97	8998	0.25
3	-323736.06	647720.60	0.94	0.00	0.95	2981	0.08
4	-315968.54	632251.32	0.90	0.00	0.88	1940	0.05
5	-308638.88	617657.79	0.95	0.00	0.93	1854	0.05
6	-302360.31	605166.41	0.95	0.00	0.93	910	0.03
7	-298087.32	596686.22	0.93	0.00	0.88	826	0.02
8	-295023.77	590624.90	0.94	0.00	0.88	412	0.01
9	-291992.24	584627.60	0.92	0.00	0.83	659	0.02
10	-289428.48	579565.86	0.92	0.00	0.83	413	0.01

Legend: Better model fit is indicated by higher entropy and class probability scores, lower Log Likelihood and aBIC values, and statistically significant Bootstrap Likelihood Ratio Test (BLRT).

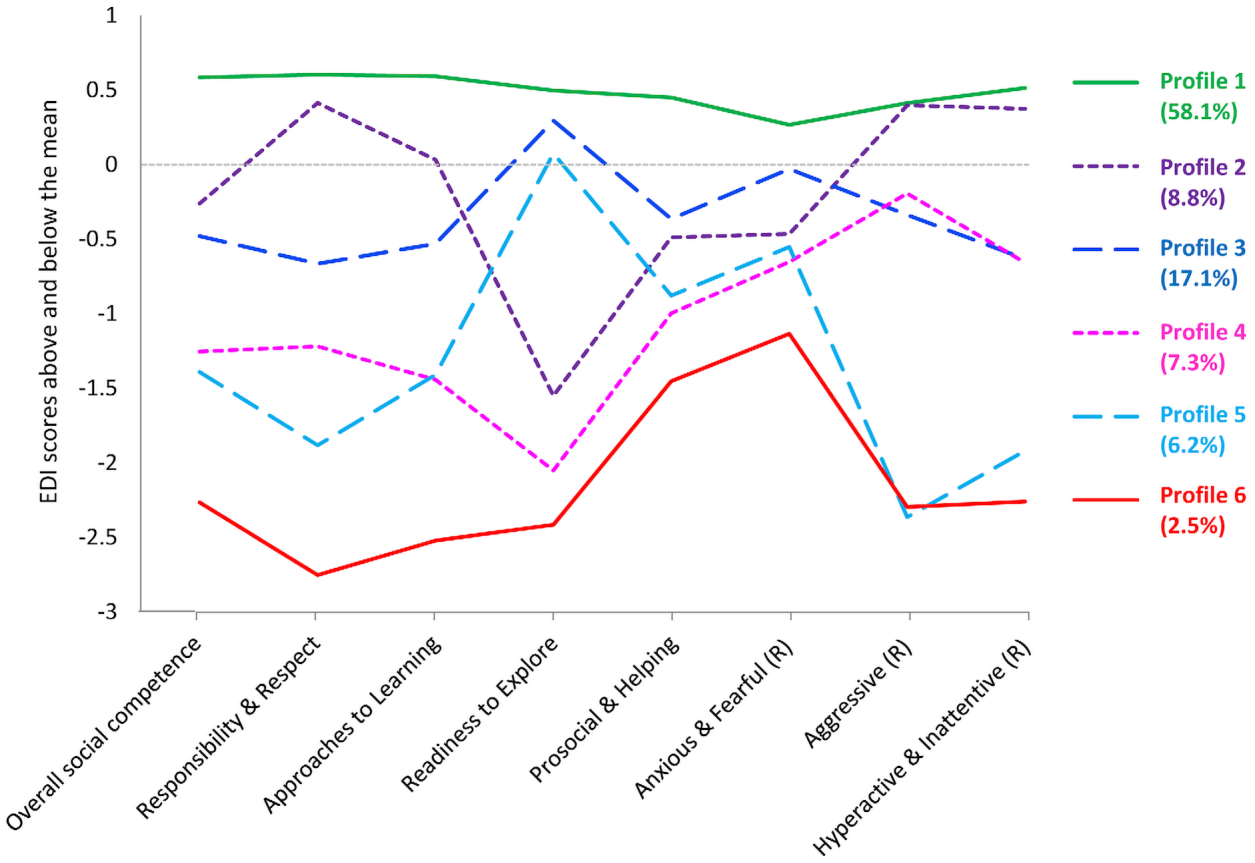


Figure 2.1. Composition of latent profile groups by EDI social-emotional subscale and prevalence within population sample (Wave 2).

Legend: Higher scores indicate better social-emotional functioning. Solid lines represent highest and lowest social-emotional profiles. Long dashes represent higher externalizing profiles. Short dashes represent higher internalizing profiles. (R) indicates the subscale was reverse-coded.

Within the selected six-class model, the majority of children (58.1%; Profile 1, "overall high social-emotional functioning") were classified together as having higher scores (on average, half a standard deviation above the mean) across all eight social-emotional subscales; 41.9% of children demonstrated areas of vulnerability on one or more social-emotional subscales. As shown in Figure 2.1, profiles could be observed in parallel patterns. Children in Profile 2

("inhibited-adaptive"; 8.8%) also demonstrated high social and emotional functioning, but had markedly lower readiness to explore (e.g., did not often show interest in a new toy or game, did not often appear curious about the world). Children in Profile 3 ("uninhibited-adaptive"; 17.1%) demonstrated the opposite pattern. These children showed high readiness to explore but slightly lower social skills, such as playing and working cooperatively with peers, following rules and instructions, or solving problems independently.

Profiles 4 to 6, while exhibiting similar patterns of relative strengths and weaknesses as the previous groups, were rated well below the population average on all eight subscales of children's social-emotional functioning. Children in Profile 4 ("inhibited-disengaged"; 7.3%) showed a parallel pattern to Profile 2 ("inhibited-adaptive"), with relative strengths in low aggression/hyperactivity and a relative weakness in readiness to explore, however children in Profile 4 demonstrated lower social skills. Children in Profile 5 ("uninhibited-aggressive/hyperactive"; 6.2%) showed a parallel pattern of strengths and weaknesses to Profile 3 ("uninhibited-adaptive"), however children in Profile 5 showed notably higher vulnerability in aggression and hyperactivity (with scores over two standard deviations below the mean) and lower social skills. Finally, a small group of children (2.5%; Profile 6, "overall low social-emotional functioning") were observed as having low social competence and emotional maturity across all subscales and scored the lowest of all children on every measure.

2.3.3. Associations with subsidy status, gender, and ESL status

Table 2.3 provides sociodemographic distributions within each profile group and associated adjusted odds ratios. Profiles are presented in descending hierarchical order from highest social-emotional functioning (Profile 1) to lowest (Profile 6). The proportion of children in the subsidy group increased incrementally at each lower level of social-emotional functioning.

Among children in the lowest ranking profile group, 37.1% received subsidies compared to 16.4% in Profile 1. Boys were over-represented in Profiles 5 and 6 that demonstrated high aggression and hyperactivity (>76% boys), and were under-represented in the highest social-emotional functioning group (43.3%). Children with ESL status were over-represented in Profiles 2 (22.5%) and 4 (24.1%) demonstrating relative strength in social competence, but lower readiness to explore.

In the multinomial logistic regression analysis, Profile 1 served as the reference to which all other profile groups were compared. In a preliminary model without interactions (results not shown), subsidy status and ESL status were associated with increased odds of membership to each lower social-emotional functioning group compared to the reference group. Being identified as a boy was also associated with increased odds of membership in the lower social-emotional functioning profiles, except for Profile 2 (lower readiness to explore). Once interaction terms were included, a statistically significant sub-additive interaction was observed between subsidy and language minority status across all five profile comparisons (Table 2.3). Odds ratios (ORs) smaller than 1.0 indicated that the association between receiving subsidies and lower social-emotional functioning was somewhat attenuated for children with ESL status. Three-way interactions were not observed and therefore were excluded from the final model for parsimony.

Table 2.3. Latent Profile Membership Distributions and Adjusted Odds Ratios

Profile membership N = 35,818	Distribution within profile	Adjusted OR (95% CI)
Profile 1 (58.1%): *Overall high social-emotional functioning*		
n = 20,819		
Receiving subsidy	16.4%	Ref
Boy	43.3%	Ref
ESL	15.3%	Ref
Subsidy×Boy		Ref
Subsidy×ESL		Ref
Boy×ESL		Ref
Profile 2 (8.8%): *Inhibited-adaptive*		
n = 3,142		
Receiving subsidy	20.8%	1.33 (1.15, 1.53)***
Boy	43.5%	1.00 (0.91, 1.11)
ESL	22.5%	1.80 (1.57, 2.07)***
Subsidy×Boy		1.06 (0.86, 1.29)
Subsidy×ESL		0.76 (0.61, 0.96)*
Boy×ESL		0.94 (0.77, 1.14)
Profile 3 (17.1%): *Uninhibited-adaptive*		
n = 6,120		
Receiving subsidy	21.4%	1.63 (1.44, 1.85)***
Boy	64.9%	2.52 (2.34, 2.72)***
ESL	18.6%	1.39 (1.21, 1.60)***
Subsidy×Boy		0.89 (0.76, 1.04)
Subsidy×ESL		0.64 (0.53, 0.78)***
Boy×ESL		1.03 (0.87, 1.22)
Profile 4 (7.3%): *Inhibited-disengaged*		
n = 2,620		
Receiving subsidy	27.3%	2.13 (1.80, 2.53)***
Boy	62.4%	2.44 (2.17, 2.75)***
ESL	24.1%	2.18 (1.82, 2.61)***
Subsidy×Boy		0.93 (0.76, 1.15)
Subsidy×ESL		0.67 (0.53, 0.85)**
Boy×ESL		0.83 (0.67, 1.03)

Continued next page

Table 2.3. Latent Profile Membership Distributions and Adjusted Odds Ratios (Cont'd)

Profile membership N = 35,818	Distribution within profile	Adjusted OR (95% CI)
Profile 5 (6.2%): *Uninhibited-aggressive/hyperactive*		
n = 2,207		
Receiving subsidy	28.5%	2.68 (2.14, 3.36)***
Boy	78.9%	5.19 (4.47, 6.03)***
ESL	17.4%	1.36 (1.02, 1.82)*
Subsidy×Boy		0.89 (0.69, 1.15)
Subsidy×ESL		0.42 (0.31, 0.55)***
Boy×ESL		1.15 (0.84, 1.57)
Profile 6 (2.5%): *Overall low social-emotional functioning*		
n = 910		
Receiving subsidy	37.1%	4.54 (3.32, 6.20)***
Boy	76.9%	4.50 (3.53, 5.74)***
ESL	19.4%	1.44 (0.92, 2.24)
Subsidy×Boy		0.79 (0.55, 1.13)
Subsidy×ESL		0.32 (0.22, 0.48)***
Boy×ESL		1.43 (0.89, 2.30)

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

Legend: Odds ratios can be interpreted as the odds of membership to each more vulnerable social-emotional profile group compared to a group with overall high social-emotional functioning.

2.4. Discussion

2.4.1. Similarities and differences between profile groups

Using a large population sample of Kindergarten children, the latent profile analysis identified six distinct profiles of social-emotional functioning, each encompassing a distinct pattern of relative strengths and weaknesses. Consistent with past studies (Basten et al., 2013; Fanti & Henrich, 2010; Kuny et al., 2013; Wiggins et al., 2015), the majority of children fit into a profile demonstrating overall high-social emotional functioning, but over 40% of children

demonstrated some areas of vulnerability. Children in Profiles 5 and 6 (approximately 9% of children) exhibited considerably higher aggression and hyperactivity than others. This rate is consistent with clinical diagnosis rates for behaviour disorders among preschool-aged children (e.g., oppositional defiant disorder, ADHD) and underscores how commonly aggression and hyperactivity co-occur (Egger & Angold, 2006). However, these results also identified that approximately 6% of children with these co-vulnerabilities (Profile 5) also demonstrated considerable *strength* in their readiness to explore. In contrast, the 3% of children who did not show this relative strength may represent a group that is more susceptible to chronic mental health problems and that may benefit more from personalized and sustained interventions throughout childhood (Reef, Diamantopoulou, Van Meurs, Verhulst, & Van Der Ende, 2011).

Comparing across Profiles 2 through 5, children who scored higher on the social competence, rule-following, and respectfulness scales also generally scored lower on the readiness to explore scale. Conversely, children who scored higher on readiness to explore generally scored lower on these social competence scales. These patterns are consistent with previous person-centered research that has found associations between high extroversion, outgoingness, and aggressive/acting out behaviours (i.e., "under-controllers") and conversely, associations between prosocial behaviour, conscientiousness, and high shyness and uneasiness (i.e., "over-controllers"; Denham et al., 2012; Janson & Mathiesen, 2008; Van den Akker et al., 2013). Although both patterns have adaptive elements, neither are considered healthy at high levels. In fact, high levels of these traits (such as those observed in the current study in Profiles 4 and 5) are thought to be differentially predictive of internalizing (depressive and anxiety problems) and externalizing (conduct and hyperactivity problems) later in life if left unaddressed (Denham et al., 2012; Janson & Mathiesen, 2008; Van den Akker et al., 2013).

2.4.2. Sociodemographic disparities in profile membership

Regarding the association between these profiles and sociodemographic factors, a second objective of this study was to investigate interactions between household income, gender, and ESL status. Consistent with past research, boys were over-represented in the profiles demonstrating high aggression and hyperactivity (Bayer et al., 2012; Bongers, Koot, van der Ende, & Verhulst, 2004). Particularly in school-based contexts, lower behaviour regulation in boys has been associated with disadvantages in academics and student-teacher relationships (Archambault, Vandenbossche-Makombo, & Fraser, 2017; Duckworth & Seligman, 2006). And while symptoms of aggression, impulsiveness, and hyperactivity are more often observed among young boys than girls, other research suggests that the same behaviours can be perceived differently by adults, such that teachers and mental health professionals are more likely to refer boys for externalizing problems when both boys and girls present symptoms of hyperactivity (Bruchmüller et al., 2012; Sciutto et al., 2004). Furthermore, although boys are commonly over-represented in lower social-emotional functioning groups in childhood, many longitudinal studies find girls exceed boys in social-emotional vulnerability beginning in early adolescence (Dekker et al., 2007; Whalen et al., 2016).

Children who spoke English as a second language were over-represented in the profiles demonstrating lower readiness to explore, which may be indicative of general uncertainty in a new school or even a new country. Halle et al. (2014) note that low verbalism of ESL children may also get mistaken by others as 'shyness' which could potentially be the case in the current study, although the measure used this study asked teachers to rate how often children exhibited observable behaviours rather than make personality assessments. The observation of a consistent subsidy status × ESL interaction is another area of interest to investigate with future research.

This interaction suggests that poverty was only associated with membership to a more vulnerable social-emotional subgroup for children who spoke English as a *first* language. There is some support for this in the literature, as strong connections with culture and ethnic identity may increase psychological resilience (Phinney, Horenczyk, & Vedder, 2001), and learning multiple languages may increase attentiveness to social cues (Halle et al., 2014). However, in the current study, some potentially relevant sociodemographic or economic confounders could not be controlled for, including parent educational attainment and cultural background. Future studies are needed to assess the replicability of the interaction observed in this study, particularly by exploring potential confounding or mediating factors such as number of years in Canada, region of residence, school context, family composition, and measures of acculturation including language and media use as well as cultural identity (Costigan, 2006; Huang et al., 2012; Huang, Cheng, & Theise, 2013; McGuire & Shanahan, 2010; Pachter & Garcia Coll, 2009).

Finally, similar to Nicholson et al. (2012) who found socioeconomic position to be associated with increased odds of social-emotional difficulties, the current analyses identified that children from households that qualified for government subsidies had higher odds of membership to each lower social-emotional functioning group compared with children who did not qualify for subsidies. Although causality cannot be determined from the study design, the observed social gradient is consistent with patterns observed across numerous other studies identifying early childhood socioeconomic status as a risk factor for future health and mental health outcomes (Apouey & Geoffard, 2013; Elovainio et al., 2012; Najman et al., 2004; Raat et al., 2011; Reiss, 2013). Unique to the current study, these findings further highlight how sociodemographic factors including poverty, gender, and language status are jointly associated with complex profile patterns of early childhood social-emotional vulnerabilities (e.g., including

those characterized by higher inhibition, social competence, or aggression). The observed associations implicate the role of social forces in the construction of social-emotional problems and (potentially) reflect a systemic failure to intervene in the case of vulnerabilities that might be 'expected' from children based on their income, gender, or English language status. At the same time, these results emphasize the universalism of social-emotional vulnerabilities. Notably, the majority of children in the lower social-emotional profiles were *not* from subsidy-receiving households. Rather, early vulnerabilities appeared to affect children across socioeconomic, gender, and ESL status categorizations.

2.4.3. Limitations and future directions

As a cross-sectional study, the current findings provide a descriptive first look at the population profiles of early childhood social-emotional functioning. Measuring sociodemographic factors dichotomously results in a loss of information that potentially obscures a more nuanced understanding of the relationships under investigation (e.g., non-linear relationships), however these results provide a useful starting point for the development of future studies. Similarly, a general limitation in this research area is the inconsistency in the measurement of social-emotional functioning. The EDI showed good discrimination and variability between latent profiles; however, there may be other social or emotional indicators not included in this measure that could be explored in future research. For example, future studies may include indicators that have been targeted in successful school-based interventions, such as self-regulation (self-awareness and self-management; Durlak et al., 2011). Although the social competence subscales of the EDI include a wide range of behaviours (overall social competence, responsibility and respect, approaches to learning), identifying specific social and emotional skills may facilitate implementation and evaluation of prevention and intervention

programs. Furthermore, this analysis distinguished profiles of relative social-emotional functioning, but did not speak to absolute levels of clinical risk. Although the EDI has been found have predictive validity in relation to later social and emotional outcomes (e.g., EDI emotional maturity items predict student well-being at age nine; Guhn et al., 2016), the EDI is not a diagnostic tool. Rather, it is a measure of population health that was applied in a novel way in this study to assess the variation and prevalence of social-emotional symptom patterns within the BC population of Kindergarten children. Teachers' ratings on the EDI also do not capture how children behave outside of school, and may therefore be more accurately interpreted as a measure of children's social-emotional functioning in a school-based context (Guhn & Goelman, 2011). Finally, an analysis of missing data indicated that the analytic sample under-represented children from lower income, English-second-language households; however, this would likely have only reduced the magnitude of observed associations between profile membership and income or ESL status.

Finally, even with access to child health records from government MSP data, there were several variables unavailable in the dataset that could be included in future research to further elucidate how social factors may be related to children's early social-emotional functioning. For example, parents' educational attainment, occupational status, and mental health history would be relevant factors to include in future analyses, given their known association with child mental health outcomes (Basten et al., 2013; Fanti & Henrich, 2010; Najman et al., 2004). Relatedly, an important question for future research to address is how regional context may influence the number and composition of child social-emotional profiles observed, as well as the strength of association with sociodemographic factors. BC is a relatively high income province in Canada and is also the most culturally diverse, with almost 30% of residents identifying as a visible

minority (Statistics Canada, 2016). However, within parts of BC there is also significant child poverty and lack of cultural diversity that may be associated with distinct regional social-emotional outcomes for children (First Call BC, 2016; Schwartz, Unger, Zamboanga, & Szapocznik, 2010). Similarly, the social-emotional functioning profiles identified in this study represent children's development at school entry and should not be used to extrapolate to children of different ages. Developmentally, one would expect relevant indicators of social-emotional functioning to change as children mature and face different stressors socially, psychologically, and academically (Eccles, 2004; Kessler et al., 2005). Gender stratified analyses would furthermore be able to investigate whether similar profile patterns emerge when restricted to only boys or girls.

2.4.4. Conclusions

Results from this first study showed that commonly occurring patterns of early social-emotional problems can be distinguished in children as young as school entry, and that sociodemographic factors such as household income, child gender, and ESL status are differentially associated with these patterns. Given the prevalence of social-emotional vulnerabilities within the entire population sample, and their ubiquity across sociodemographic factors, the results also suggest that population-level interventions are needed to address underlying issues capable of impairing children's social-emotional development, in addition to universal, strengths-based programs to promote young children's social-emotional health as they enter school (Durlak et al., 2011; Spoth, Guyll, Redmond, Greenberg, & Feinberg, 2011).

The identification of social-emotional profile patterns in Kindergarten exemplifies the power of population measurement tools such as the EDI to detect early differences in children's social and emotional well-being for the purpose of informing early intervention. Yet from this

cross-sectional analysis it remained unclear to what extent these profile patterns would be generalizable to other cohorts of children, and whether children's early social-emotional vulnerabilities would be associated with increased risk of mental health outcomes. For example, what would be the experience for a child with slight over-controlling behaviours (Profile 2) compared to a child with similar over-controlling but limited social competence (Profile 4)? Would children with high aggression and hyperactivity (Profiles 5 and 6) experience greater externalizing behaviours in adolescence, or would these symptoms also indicate risk of internalizing problems? To answer these questions, a second study was conducted following a new cohort of children from infancy to adolescence to compare the same early social-emotional functioning indicators recorded in Kindergarten and the experience of mental health conditions by age fourteen.

Chapter 3: Social-Emotional Functioning at School Entry and Early Onset Mental Health Conditions: A Population-Level Cohort Study

3.1. Introduction

Social-emotional health in early childhood is increasingly recognized as a critical developmental asset capable of supporting or undermining children's future health, well-being, and functioning in life (Carter, Briggs-Gowan, & Davis, 2004; Denham et al., 2003; Masten & Tellegen, 2012). Research in this area has found that early social-emotional vulnerabilities including internalizing and externalizing symptoms can be identified in preschool, and that more than half of all lifetime mental health problems are first experienced by age fourteen (Egger & Angold, 2006; Kessler et al., 2005). Yet, despite the serious consequences of overlooking early symptoms, the early detection and prevention of mental health problems remain poorly addressed. Primary barriers to developing adequate systems for detection and treatment include low recognition of early subclinical indicators, lack of predictive tools that can be applied at a population-level, and limited knowledge regarding effective early interventions for children and adolescents (Egger & Angold, 2006; McGorry et al., 2014; Pescosolido et al., 2008). This general lack of knowledge, tools, and capacity undermines the potential to identify and address suspected mental health problems at a more malleable time in development before problems reach a clinical stage (McGorry et al., 2014). The purpose of the current study was to describe constellations (i.e., profiles) of early social-emotional functioning observed at school entry and examine their associations with subsequent mental health conditions by age fourteen.

3.1.1. Social-emotional functioning from a person-centered perspective

This study examined young children's social–emotional functioning as patterns of social competence, internalizing symptoms (inhibition, depressive symptoms, over-controlled behaviours), and externalizing symptoms (hyperactivity, aggression, under-controlled behaviours) at Kindergarten school entry. Early behavioural indicators that have been associated with increased risk of internalizing and externalizing problems in childhood include heightened fearfulness among very young children (Gilliom & Shaw, 2004), as well as social avoidance, chronic irritability, fatigue, restlessness, and difficulty concentrating (Bernstein & Victor, 2011; McCauley et al., 2011). Consequently, one of the major challenges of predicting future mental health problems is the blurring of 'boundaries' between diagnostic symptoms (Rettew, 2010). For example, the Diagnostic Statistics Manual (DSM) fifth edition classifies irritability, fatigue, restlessness, and difficulty concentrating as symptoms common to both depression and ADHD (American Psychological Association, 2013). That said, examining the *patterns* of these multiple shared symptoms may improve capabilities to predict future disorders as well as inform early identification and treatment. Investigating these patterns requires new analytical methods and potentially new conceptualizations of early social-emotional functioning. For example, a limitation associated with many variable-centered analyses is that each predictor variable (e.g., "cries a lot" for heightened risk for anxiety) is estimated irrespective of how that indicator relates to other social-emotional characteristics. In contrast, the goal of person centered-analyses is to explore natural population subgroups according to individual differences in terms of *profiles* across multiple predictors of interest (e.g., sadness, exploration, and restlessness; Lanza & Rhoades, 2013; Lubke & Muthén, 2005; Nagin & Odgers, 2010). For example, although several groups of children within a population may exhibit low inhibition, person-centered analyses

might identify subgroups of children who have low inhibition as well as low levels of social competence, who may be at greater risk of future mental health conditions. In contrast, children with low inhibition and high social competence may show greater potential for resilience and leadership (Malti & Noam, 2009). In fact, these very profiles were identified in Chapter 2, with low inhibition combining differently with social skills to comprise relatively more and less "vulnerable" social-emotional functioning groups (Thomson, Guhn, Richardson, Ark, & Shoveller, 2017). In this way, investigating patterns of early social-emotional symptoms from a person-centered perspective has the potential to identify what differences among symptom similarities are most important for predicting life course mental health and well-being.

3.1.2. Predictive patterns of childhood social-emotional functioning: Homotypic and heterotypic continuity

Previous research examining associations between early symptomatology and later mental health outcomes is often discussed in terms of homotypic versus heterotypic continuity (Copeland, Shanahan, Costello, & Angold, 2009; Copeland, Shanahan, Erkanli, Costello, & Angold, 2013; Shevlin, McElroy, & Murphy, 2017; Wichstrøm, Belsky, & Steinsbekk, 2017). As described by Copeland et al. (2009), homotypic continuity is when an earlier symptom or disorder predicts itself later in life. For example, a child who struggles with ADHD in early childhood can develop sustained or worsened ADHD in adolescence, depending on the severity of symptoms and factors within the child's environment (Law, Sideridis, Prock, & Sheridan, 2014). In contrast, heterotypic continuity describes when an earlier symptom predicts a different outcome later on. A documented example of this is when childhood ADHD predicts anxiety later in adolescence (Shevlin et al., 2017; Wichstrøm et al., 2017). Homotypic continuity is more often reported than heterotypic continuity, however some argue that this is due in part to

measurement (i.e., heterotypic patterns may be more observable at specific subtype levels versus more general categorizations of disorders; Broeren, Muris, Diamantopoulou, & Baker, 2013; Sterba et al., 2007).

Homotypic patterns in childhood mental health. Numerous longitudinal studies demonstrate that early symptoms of internalizing and externalizing conditions predict earlier onset and increased severity of those same conditions later in life (Broeren et al., 2013; Fichter, Kohlboeck, Quadflieg, Wyschkon, & Esser, 2009; Korhonen et al., 2014; Luby, Gaffrey, Tillman, April, & Belden, 2014; Reef et al., 2011). Among the internalizing conditions, depression is commonly found to have high homotypic continuity (Fichter et al., 2009; Korczak & Goldstein, 2009; Luby et al., 2014; Whalen, Sylvester, & Luby, 2017), with one study finding that subclinical depressive symptoms in preschool predicted future DSM-criteria depression in later childhood even after accounting for maternal depression and traumatic life events (Luby et al., 2014). Existing evidence suggests that anxiety also follows a homotypic pattern, although perhaps not to the same extent as depression (studies estimate that preschool anxiety is associated with two times the odds of later childhood anxiety, compared to three times the odds between preschool and childhood depression; Luby et al., 2014). Continuity of childhood anxiety may also depend on the type of anxiety disorder, with high behavioural inhibition being the best predictor of high-stable *social anxiety* trajectories from ages four to eleven, and high internalizing difficulties (emotional symptoms and peer problems) best predicting high-stable *generalized anxiety* (Broeren et al., 2013).

Externalizing problems, including conduct disorder, oppositional and aggressive behaviour, and ADHD, also demonstrate high homotypic continuity (Kjeldsen et al., 2014; Korhonen et al., 2014; Reef et al., 2011). Although externalizing behaviours typically decrease

as children age, an estimated 5% to 18% of children demonstrate high-stable or high-increasing trajectories from childhood to adolescence and adulthood (Fanti & Henrich, 2010; Kjeldsen et al., 2014; Korhonen et al., 2014; Nagin & Tremblay, 1999; Reef et al., 2011). In terms of magnitude of association, preschool-aged ADHD has been associated with three times the odds of school-aged ADHD (ages six to thirteen), and preschool conduct problems have been associated with over four times the odds of school-age conduct disorder (Luby et al., 2014).

Heterotypic patterns in childhood mental health. Apart from homotypic patterns of mental health continuity in childhood, there is also considerable evidence that different mental health issues coincide and predict each other, both within and between internalizing and externalizing domains (Angold, Costello, & Erkanli, 1999; Copeland et al., 2009; Cummings et al., 2014; Fichter et al., 2009; Jarrett & Ollendick, 2008; Lee & Bukowski, 2012; Meinzer et al., 2014; Shevlin et al., 2017; Sibley et al., 2014; Wichstrøm et al., 2017). A frequently explored heterotypic pattern is the comorbidity of anxiety and depression (Côté et al., 2009; Cummings et al., 2014). In a recent review (Cummings et al., 2014), evidence was found to support at least three pathway models whereby (i) early onset anxiety puts children at risk for depression through behaviour inhibition and social isolation, (ii) generalized anxiety and depression co-occur as a result of shared symptoms and underlying causes, and (iii) early onset depression leads to social anxiety through underdeveloped social skills and victimization (Angold et al., 1999; Côté et al., 2009; Ferdinand, De Nijs, Van Lier, & Verhulst, 2005; Merikangas et al., 2009; Ranta, Kaltiala-Heino, Pelkonen, & Marttunen, 2009; Watson, 2005). And while there is substantial comorbidity between these two conditions, there is evidence that anxiety co-occurs more often among children with depression (15% to 75% prevalence), than depression occurs among children with

anxiety (10% to 15% prevalence; Angold et al., 1999; Cummings et al., 2014; Ferdinand et al., 2005).

Childhood externalizing conditions predict each other as well, with ADHD and conduct disorder often demonstrating a high degree of comorbidity and heterotypic continuity (Biederman, Petty, Clarke, Lomedico, & Faraone, 2011; Danforth, Connor, & Doerfler, 2016; Patterson et al., 2000; Sibley et al., 2014). Hyperactive symptoms and antisocial behaviour have also been found to be highly correlated (up to 50% comorbidity; Danforth et al., 2016; Jarrett & Ollendick, 2008). Longitudinal studies have generally shown that hyperactive and impulsive symptoms associated with ADHD precede the antisocial and violent behaviours typical of conduct disorder (Patterson et al., 2000; Thapar, Harrington, & McGuffin, 2001). Other research suggests that oppositional and defiant behaviours, observable during preschool and school entry, precede both ADHD and conduct problems (Burke, Hipwell, & Loeber, 2010; Wichstrøm et al., 2017). Moreover, it is increasingly recognized that ADHD and oppositional behaviours predict the onset of internalizing problems (Jarrett & Ollendick, 2008; Meinzer et al., 2014; Shevlin et al., 2017; Wichstrøm et al., 2017). ADHD has frequently been associated with anxiety (Copeland et al., 2009; Jarrett & Ollendick, 2008; Shevlin et al., 2017; Wichstrøm et al., 2017), and furthermore, a recent meta-analysis (Meinzer et al., 2014) found a consistent moderate association between ADHD and depression across studies, identifying several common symptoms including attention difficulties, low reward responsivity, and poor emotion regulation. Conduct disorder, in contrast, has not shown to be associated with depression; however, oppositional defiant symptoms including spitefulness and anger have been found to predict depression, especially when symptoms are comorbid with anxiety (Burke et al., 2010; Copeland et al., 2009). Again, shared symptoms including inattention and restlessness may account for

potentially misclassified diagnoses in childhood (Jarrett & Ollendick, 2008), although other studies have demonstrated a clear sequential progression between early childhood ADHD symptoms and adolescent-onset anxiety (Shevlin et al., 2017; Wichstrøm et al., 2017). For example, Shevlin et al. (2017) found that ADHD at age seven predicted age fourteen generalized anxiety disorder better than age seven anxiety or stress disorders.

3.1.3. Mechanisms of symptom comorbidity and continuity

The extensive literature on this topic, summarized here only briefly, has also begun to unpack the mechanisms that explain the continuity of mental health symptoms over time. Both the persistence of the same symptoms over time (homotypic continuity) and divergence of symptomatic conditions (heterotypic continuity) have been explained by genetic and environmental factors (Danforth et al., 2016; Kan et al., 2013; Nivard et al., 2015; Roberson-Nay et al., 2015; Savage et al., 2015; Waszczuk, Zavos, Gregory, & Eley, 2016). Genetic heritability, for example, best exemplifies a latency pattern (Ben-Shlomo & Kuh, 2002; Hertzman & Power, 2003) whereby a child has a genetic predisposition for irritability or inattention that becomes heightened and thus more observable later in life (Kan et al., 2013; Roberson-Nay et al., 2015; Savage et al., 2015). Similarly, early symptoms may become exacerbated by environmental factors including loss of social support (e.g., peer rejection, harsh parent discipline) or other stressful life circumstances such as an unstable home environment (e.g., financial instability, parent illness; Fanti & Henrich, 2010; Hannigan et al., 2016; Mathiesen et al., 2009; Patterson et al., 2000).

Further on the topic of social rejection, there is evidence that early under-controlled behaviours (aggression, hyperactivity) evoke negative responses from peers and adults, which may then lead to the development of internalizing conditions (anxiety, depression; Burke et al.,

2010; Humphreys et al., 2013; Jarrett & Ollendick, 2008; Patterson & Capaldi, 1990; Wichstrøm et al., 2017). This pattern, known as the "failure model," has generally been supported in empirical studies (Patterson & Capaldi, 1990), although other research suggests that shared etiological factors (e.g., environmental stress, maternal depression) may better explain the frequent comorbidity of externalizing and internalizing disorders (Lee & Bukowski, 2012; Mathiesen et al., 2009). Other scholars have challenged current psychiatric diagnostic nosology entirely. For example, Caspi et al. (2014) have argued that mental health conditions may be more similar than they are distinct, possibly sharing a common psychopathology factor, but expressed differently in different individuals.

While the etiology of childhood mental health conditions continues to be investigated, there is relatively clear and consistent evidence regarding the outcomes of such conditions; Namely, early social-emotional symptoms persist if left unaddressed (Kessler et al., 2012; Merikangas et al., 2009), and comorbid conditions put children at higher risk of concurrent and future disorders (Angold et al., 1999; Biederman et al., 2011; Fichter et al., 2009). That said, there remains a high degree of variability among individuals' experiences of mental health conditions (Kjeldsen et al., 2014; Nandi et al., 2009; Sterba et al., 2007), with gender being a particular factor of interest.

3.1.4. Gender differences in symptom progression

Across internalizing and externalizing conditions, gender differences have often been observed in symptom prevalence, age of onset, persistence, and severity (Dekker et al., 2007; Henninger & Luze, 2013; Silver et al., 2005; Sterba et al., 2007; Whalen et al., 2016). Although evidence is mixed regarding the presence of gender differences in internalizing conditions in early childhood, most studies suggest that girls begin to experience more depressive symptoms

than boys around the onset of puberty (Nolen-Hoeksema, 2006; Nolen-Hoeksema & Girgus, 1994; Piccinelli & Wilkinson, 2000). Interestingly, evidence suggests that only a small proportion of the observed gender differences can be attributed to hormonal changes. Rather, it is suggested that gendered (potentially socialized) risk factors, including unassertiveness and rumination, may increase girls' likelihood of depression during times of increased stress (Hankin, Mermelstein, & Roesch, 2007; Keenan & Shaw, 1997; Nolen-Hoeksema & Girgus, 1994). Longitudinal studies have also found that girls, on average, tend to have higher initial levels of depressive and internalizing symptoms compared to boys, as well as faster rising and high-stable symptoms from childhood to adolescence (Castelao & Kröner-Herwig, 2013; Dekker et al., 2007; Sterba et al., 2007; Whalen et al., 2016). Conversely, boys typically exhibit more externalizing behaviours than girls, and longitudinally are more likely to be represented in high-stable externalizing trajectories (although under-controlled behaviours typically decrease for both boys and girls from preschool to adolescence; Keiley et al., 2000; Leve et al., 2005; Mathiesen et al., 2009; Miner & Clarke-Stewart, 2008; Odgers et al., 2008; Silver et al., 2005). Some scholars have also questioned the extent to which the higher prevalence of externalizing conditions in boys reflects gender bias in referrals and diagnoses for problem behaviour (Bruchmüller et al., 2012; Sciutto et al., 2004). Moreover, how internalizing and externalizing symptoms may co-occur in the context of social skills has been less thoroughly researched. One person-centered analysis (Denham et al., 2012) found that boys were over-represented in a profile pattern characterized by high externalizing behaviours co-occurring with lower prosocial and social problem-solving skills. This study also found that girls were over-represented in a socially competent but emotionally restrained group, whereas no gender differences were observed in a socially competent and emotionally expressive group (Denham et al., 2012). Still,

there remain significant gaps in the literature regarding the population prevalence of social-emotional functioning profiles, both within and across genders, as well as the predictive ability of young children's social-emotional profiles in relation to mental health outcomes in childhood and adolescence.

3.1.5. Study objectives and hypotheses

This study had two objectives: (1) to identify latent profiles of early social-emotional functioning among a population cohort of children at Kindergarten school entry, and (2) to examine the association between early childhood social-emotional functioning profiles and the frequency of physician-assessed mental health conditions throughout childhood and early adolescence including depression, anxiety, conduct disorder, ADHD, and multiple conditions. It was hypothesized that children with more vulnerable social-emotional profiles in Kindergarten would have a higher likelihood of mental health conditions and more frequent consultations for their conditions. Longitudinal associations between internalizing and externalizing conditions were also examined to explore homotypic versus heterotypic developmental patterns: (i) a homotypic pattern, for example, would mean that early childhood profiles characterized by more internalizing symptoms (such as anxious, inhibited, over-controlled behaviours) would be more strongly associated with subsequent diagnoses of internalizing mental health conditions (e.g., anxiety, depression) and (ii) a heterotypic pattern would mean that early childhood profiles characterized by higher internalizing symptoms would be associated with later externalizing mental health conditions (or vice versa). Finally, it was also hypothesized (iii) that among children with a mental health condition, higher vulnerability social-emotional profiles would be associated with higher frequency of physician consultations for those mental health conditions. Gender stratified associations were also investigated.

3.2. Methods

3.2.1. Data source

Data were analyzed from the Developmental Trajectories dataset (British Columbia Ministry of Health, 2015; Human Early Learning Partnership, 2015) that links BC child development data from the Early Development Instrument (EDI; Janus & Offord, 2007) to BC Ministry of Health and Education records (for a detailed description of this data source please refer to Chapter 2, p. 24). Analyses were conducted on the Wave 1 EDI cohort (data collected from 2001 to 2003; N = 34,552). Children included in this cohort were born between 1996 to 1998, and had Medical Services Plan (MSP) health insurance records between 1996 to 2011 (i.e., for at least 14 years following their birth).[1] Permission to link EDI, Education, and Health records was obtained from the BC Ministries of Health and Education. Ethics approval was obtained from the University of British Columbia Research Ethics Board.

Within this data collection period, 86% of children attending Kindergarten in BC were enrolled in public schools and captured within the EDI population sample (BC Schools, 2017). As discussed in Chapter 2 (p. 26), MSP data included children who lived in BC for at least three months of the year. Children not included in these records were undocumented children, children not living in BC for at least three months per year, and up to 4% of residents with Federal health care, including children within Aboriginal, military, and refugee families (Puyat et al., 2017; Statistics Canada, 2007). In the current study, a further condition for inclusion in the longitudinal analytic sample was to have had continuous MSP coverage in all years (and have been registered with MSP for at least nine months of every year) from birth to age fourteen.

---

[1] Hospital outpatient records were also available during the study period, but contributed fewer than 1% of new linked cases to the cohort, as has been found in past research (Puyat, Kazanjian, Goldner, & Wong, 2016). For this reason, data linkages were based solely on MSP records.

3.2.2. Measures

Explanatory variable: Social-emotional functioning at school entry. Eight subscales of the EDI (Janus & Offord, 2007) were used as indicators of children's social-emotional functioning at school entry: ***Overall Social Competence*** (5 items); ***Responsibility and Respect*** (8 items); ***Approaches to Learning*** (9 items); ***Readiness to Explore*** (4 items); ***Prosocial and Helping Behaviour*** (8 items); ***Anxious and Fearful Behaviour*** (8 items); ***Aggressive Behaviour*** (7 items); ***Hyperactive and Inattentive Behaviour*** (7 items). Example items, means, and standard deviations, and ordinal alphas (a measure of internal consistency for skewed data; Gadermann et al., 2012) are provided in Table 3.1. The full list of items is provided in Appendix A. Teachers rated the frequency of each child's behaviour as "Never or not true" (0); "Sometimes or somewhat true" (5); or "Often or very true" (10). "Don't know" was coded as missing. Scores for each item were summed and divided by the number of items in the subscale to derive a subscale mean, and negatively worded items were reverse-coded so that higher scores indicated better social-emotional functioning. The observed negative skewness (with most children scoring high on social-emotional functioning) was not considered to adversely affect the study estimates due to the large sample size (Tabachnick & Fidell, 2007).

Table 3.1. EDI Social-Emotional Health Subscales: Means, Distributions, and Internal Consistency (Wave 1)

EDI subscale	Example items	Unstandardized Mean (Standard Deviation)	Ordinal Alpha
Overall social competence	Gets along with peers	7.59 (2.51)	.92
Responsibility and respect	Follows rules, respects others	8.55 (2.02)	.97
Approaches to learning	Completes work on time	8.01 (2.18)	.95
Readiness to explore	Eager to play a new game	8.94 (1.90)	.95
Prosocial and helping behaviour	Offers to help others	5.72 (2.98)	.96
Anxious and fearful	Nervous, cries a lot	8.90 (1.57)	.91
Aggressive behaviour	Temper tantrums, fights	9.23 (1.48)	.94
Hyperactive and inattentive	Distractible, impulsive	8.16 (2.46)	.97

Legend: Subscales range from 0-10 with higher scores indicating better social-emotional functioning

Covariates: Household subsidy status, child gender, child English-as-a-Second Language (ESL) Status. Household subsidy status from MSP records was used as an indicator of relative poverty, with '100% subsidy' indicating lower affluence (full subsidies were available to a family of any size that earned an annual net income <$22,000 Canadian dollars) compared to families earning over $30,000 who qualified for 'no subsidy.' Ten percent of households did not fall into these two categories and were recorded as having missing data on this variable (a more detailed description of this variable is provided in Chapter 2, p. 28). Child gender was derived from teachers' ratings of children's biological sex as 'male' or 'female' and were cross-validated with BC Ministry of Education records (other sex or gender options were not available in these records). ESL status was also reported by teachers and cross-validated with Ministry records. These covariates were selected to control for potential confounding related to disproportionate

behaviour ratings and uneven access of health care services based on family income, child gender, and language barriers (Bruchmüller et al., 2012; Gulliver, Griffiths, & Christensen, 2010; Lasser, Himmelstein, & Woolhandler, 2006; Sciutto et al., 2004; Zachrisson, Rödje, & Mykletun, 2006).

Outcome variable: Mental health conditions. Mental health conditions were obtained from fee-for-service physician claims files, recorded in the MSP data, for *Anxiety*, *Depression*, *Conduct Disorder*, and *ADHD*. A fifth outcome, *Multiple Conditions*, was derived for children who had a medical record for two or more of the above conditions during the study period.[2] Within the available MSP records, medical services provided were identified using the International Classification of Diseases 9th Revision (ICD-9), an internationally recognized system of alpha-numeric codes published by the World Health Organization to classify health conditions including mental health diagnoses (Buck, 2003). Every patient visit was therefore associated with at least one ICD-9 code, although up to five codes could be recorded for one medical visit if there were multiple health issues discussed during the consultation (PopulationData BC, 2017).

In the current study, mental health conditions were counted based on one or more of the following five ICD-9 codes related to the study outcomes of interest: Anxiety Disorder (under parent code 300), Depression (296.2-296.36, parent code 311), Conduct Disorder (parent code 312), and ADHD (parent code 314). Every physician visit that included consultation (and a consequent corresponding billing claim) for a mental health condition was coded as an 'occurrence' of a mental health condition, therefore children's health records could accumulate

[2] This outcome is referred to as "multiple conditions" rather than "comorbid conditions" to account for the possibility that conditions presented at different times during the study period.

multiple occurrences for the same mental health condition over the study period. Records of mental health conditions were included in the outcome whether they were recorded as the primary or a secondary reason for the physician consultation. Within the Developmental Trajectories dataset, two variables: (1) the age of onset and (2) the total number of occurrences for each mental health condition, were linked with EDI records at the individual level. As a conservative measure, only conditions incurred at age two or older were included in the analyses, based on past research identifying preschool psychiatric disorders at this age (Egger et al., 2006; Whalen et al., 2017; Wichstrøm & Berg-Nielsen, 2014). Furthermore, only conditions first incurred up to and including age fourteen were included in the outcome measure to maximize comparability of follow-up time for all children. However, because the available count variable was a sum of all mental health occurrences for each child, the frequency outcome could include subsequent occurrences of the condition after age fourteen for 11% of children (n = 1937) who had reached age fifteen by the end of the study period.

3.2.3. Analyses

Part One: Identifying latent social-emotional profiles. Latent Profile Analysis (LPA) was performed using MPlus version 7 (Muthen & Muthen, 2017b) to identify unique profiles of social-emotional functioning (for a comparison, please see Chapter 2, p. 32). All eight EDI social-emotional subscale scores were standardized within the sample so that every indicator had a mean of 0 and standard deviation of 1. Missing data were deleted pair-wise, excluding only those cases who had missing data for each of the eight social-emotional indicators. Random starting values were set to 500 (50 iterations) to avoid biasing parameter estimates by fitting a model to the best "local solution"; rather, the best overall solution was identified based on a range of starting values (Berlin et al., 2014a; Geiser, 2012). Model fit was assessed according to

(1) Entropy score closest to 1, indicating good classification accuracy, (2) High discrimination between classification probabilities (probability of being assigned to any particular class ≥ 0.8), (3) Lowest adjusted aBIC indicating relatively better fit among nested models, and (4) Statistically significant Bootstrap Likelihood Ratio Test (BLRT), testing whether a model with k latent classes fits better than a model with k-1 classes (Geiser, 2012; Nylund et al., 2007). Parsimony, interpretability, and theoretical meaningfulness were also considered in the interpretation of the best model (Geiser, 2012; Nylund et al., 2007). In the final step, each child was assigned a latent profile membership value based on their most likely profile membership.

Part Two. Association between latent social-emotional profiles and mental health conditions. Zero-inflated Poisson regression was conducted to assess the association between children's Kindergarten social-emotional profiles and the occurrence of mental health visits for anxiety, depression, conduct disorder, ADHD, and multiple conditions. Zero-inflated Poisson (also referred to as "ZIP" analysis) is a version of Poisson regression optimized for count data with a high preponderance of zeros (Karazsia & van Dulmen, 2008). ZIP models are often utilized in studies where the occurrence of the outcome is rare, including many pediatric studies examining clinical internalizing and externalizing diagnoses in adolescence (Bongers et al., 2004; Fanti & Henrich, 2010; Nagin & Odgers, 2010). Based on a single frequency variable, the model assesses the data in two parts: First, a dichotomous latent outcome variable (log-odds) is derived whereby cases are classified based on their probability of belonging to an "always zero class" that can only score zero over the study period, versus a "not always zero class" comprised of cases that can have zero or more events (Fanti & Henrich, 2010; Karazsia & van Dulmen, 2008; Muthen & Muthen, 2017a). In this first output, the *probability* of belonging to these classes is estimated (rather than directly observed) to account for the uncertainty regarding

whether or not a child scores zero because the mental health event did not occur, or because the child was not connected to medical services to have their event recorded (Karazsia & van Dulmen, 2008). Consideration of uncertainty in the zero count sets ZIP models apart from other similar models (including negative binomial regression) that can also be used to process non-normally distributed data. For this reason, Karazisia and van Dulman (2008) recommend ZIP models when overdispersion (variance greater than the mean) is caused by a high preponderance of zeros. The second part of the model estimates the frequency of events among children in the "not always zero" class who had the possibility of one or more events (Fanti & Henrich, 2010; Muthen & Muthen, 2017a). This second estimate follows a Poisson distribution with the data exhibiting a right skew but approximating a normal distribution as the mean number of events increases (Karazsia & van Dulmen, 2008).

3.3. Results

3.3.1. Part one: Latent Profile Analysis (LPA)

Among 34,552 children included in the initial Developmental Trajectories dataset, 229 children (0.7%) were excluded for having missing data on all eight EDI social-emotional subscales. The remaining 34,323 children (mean age at Kindergarten = 5.67, SD = 0.30, range 4.41 to 7.18 years) were included in the LPA analytic sample. Within this cohort, 18.4% of children were from households that had received a full subsidy at their earliest health care visit, 51.1% were identified as boys, and 15.1% were identified as having ESL status.

The results of this LPA suggested six unique profiles of social-emotional functioning (Table 3.2). Compared to the other solutions, the six-class model showed improved in model fit over models with fewer classes (i.e., statistically significant BLRT and lower log-likelihood and aBIC scores), while still demonstrating high entropy (94%) and high probability of children of

being assigned to a specific class (90%). Log-likelihood and aBIC scores continued to decrease in models seven through ten, however these decreases were relatively small compared to the differences between models one through six. Based on these diminished improvements in later models and subsequent losses in entropy and class probability accuracy, the six-class solution was determined to fit the data best (Nylund et al., 2007).[3]

Table 3.2. Latent Profile Analysis Model Fit Comparison (EDI Wave 1)

Number of Latent Profiles	Log Likelihood Value	aBIC	Entropy	BLRT	Lowest Class Probability	Smallest Class Size	Smallest Class Proportion
1	-382412.71	764941.66	NA	NA	1	34323	1
2	-327988.96	656159.56	0.95	0.00	0.97	8307	0.24
3	-311943.74	624134.52	0.93	0.00	0.93	3081	0.09
4	-304171.75	608655.92	0.90	0.00	0.86	1824	0.05
5	-297795.87	595969.55	0.91	0.00	0.87	1506	0.04
6	-291595.94	583635.07	0.94	0.00	0.90	963	0.03
7	-288058.93	576626.46	0.94	0.00	0.89	581	0.02
8	-284930.45	570434.88	0.91	0.00	0.78	496	0.01
9	-281664.14	563967.65	0.93	0.00	0.82	467	0.01
10	-279379.12	559463.00	0.93	0.02	0.79	442	0.01

Legend: Better model fit is indicated by higher entropy and class probability scores, lower Log Likelihood and aBIC values, and statistically significant Bootstrap Likelihood Ratio Test (BLRT)

[3]A sensitivity analysis conducted on the smaller cohort of children included in the subsequent ZIP analysis (N=17,412) replicated these results.

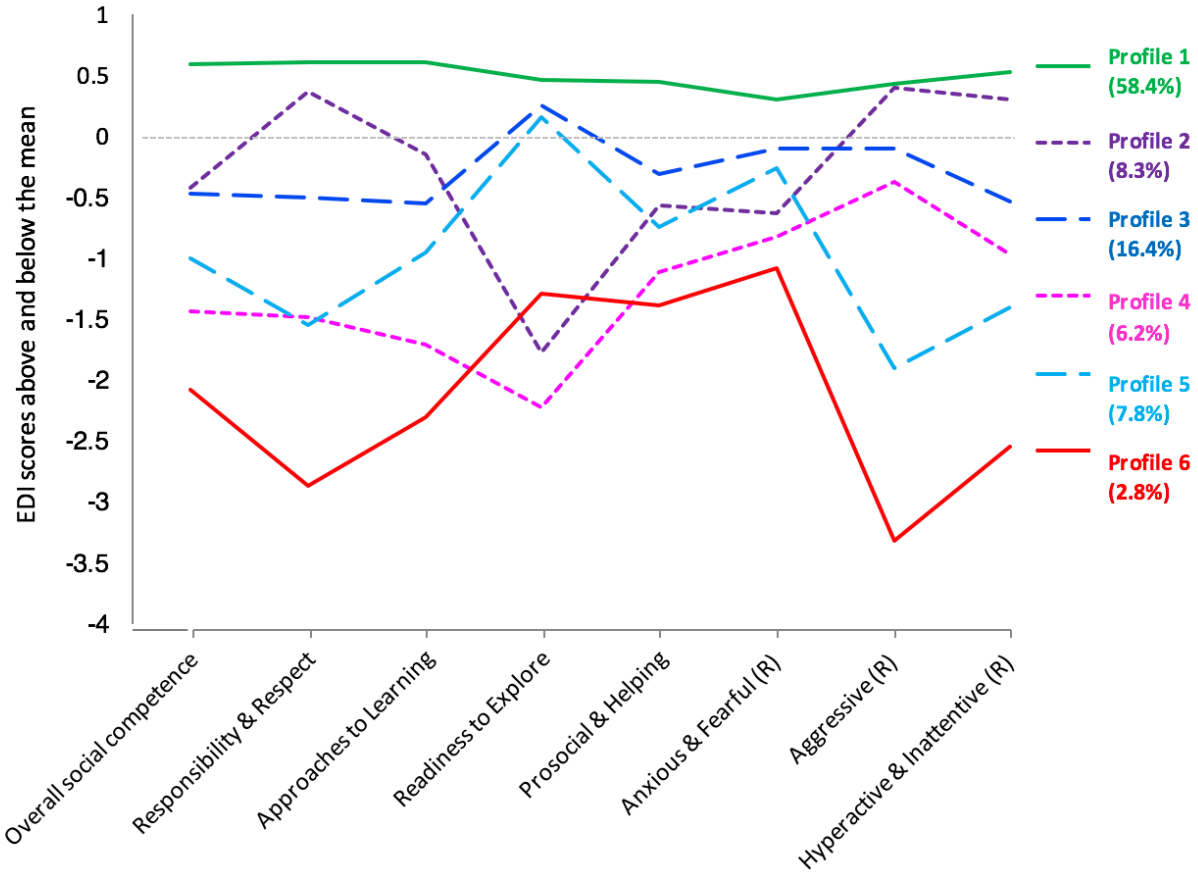


Figure 3.1. Composition of latent profile groups by EDI social-emotional subscale and population prevalence (Wave 1).

Legend: Higher scores indicate better social–emotional functioning. Solid lines represent highest and lowest social–emotional profiles. Long dashes represent higher externalizing profiles. Short dashes represent higher internalizing profiles. (R) indicates the subscale was reverse-coded.

The composition of the resulting six social-emotional profiles are presented in Figure 3.1. The majority of children were classified as having high scores across all eight EDI subscales (58.4%; Profile 1, “overall high social-emotional functioning”). The remaining 41.6% of

children were classified into the following profile patterns depicting higher vulnerability in one or more social-emotional domains: Profile 2 ("inhibited-adaptive"; 8.3%) and Profile 4 ("inhibited-disengaged"; 6.2%) shared similarly low readiness to explore, yet children in Profile 2 exhibited high social competence, responsibility and respect, and approaches to learning. Children in Profile 2 also demonstrated fewer aggressive and hyperactive behaviours than children in Profile 4. In comparison, children in Profile 3 ("uninhibited-adaptive"; 16.4%) and Profile 5 ("uninhibited-aggressive/hyperactive"; 7.8%) shared similarly high readiness to explore but children in Profile 3 exhibited better social skills than children in Profile 5 (most notably regarding respectfulness of others). Children in Profile 3 also exhibited less aggression and hyperactivity compared to children in Profile 5. Children in Profile 6 ("overall low social-emotional functioning"; 2.8%) demonstrated low social-emotional functioning across all eight EDI subscales. And while children in Profile 6 demonstrated a relative strength in readiness to explore (better than Profiles 2 or 4), they also exhibited more aggression (over 3 standard deviations below the mean) as well as hyperactivity and inattention compared to all other profile groups. Sociodemographic comparisons showed that boys, and children from households receiving subsidies were increasingly over-represented in each worsening social-emotional functioning profile. Children who spoke English as a second language were over-represented in more inhibited Profile groups (Profiles 2 and 4). Sociodemographic distributions are presented in Table 3.3.

Table 3.3. Sociodemographic Characteristics by Latent Profile Group

	Proportion of Total Sample	Proportion Receiving Subsidies	Proportion Boys	Proportion ESL Status
LP1 "Overall high social-emotional functioning"	20,061 (58.4%)	2,755 (15.2%)	8,685 (43.3%)	2,616 (13.2%)
LP2 "Inhibited-adaptive"	2,856 (8.3%)	511 (20.5%)	1,272 (44.5%)	578 (20.6%)
LP3 "Uninhibited-adaptive"	5,622 (16.4%)	1,034 (21.2%)	3,481 (61.9%)	879 (15.9%)
LP4 "Inhibited-disengaged"	2,144 (6.2%)	491 (27.3%)	1,349 (62.9%)	532 (25.2%)
LP5 "Uninhibited-hyperactive/aggressive"	2,677 (7.8%)	545 (24.2%)	1,957 (73.1%)	357 (13.5%)
LP6 "Overall low social-emotional functioning"	963 (2.8%)	235 (31.6%)	794 (82.5%)	136 (14.4%)

LP = Latent Profile

ESL = English as a Second Language

3.3.2. Part two: Zero-Inflated Poisson (ZIP) model

ZIP analysis was conducted on a subsample of children who met the additional criteria for inclusion in the prospective cohort (i.e., resided full time in BC, with MSP coverage, across all 14 years). In total, 13,914 out of 34,323 children (40.5%) were excluded who had not resided in BC continuously from birth through age fourteen. A further 2,997 children were then excluded for not having complete data available on all variables, resulting in a final ZIP cohort of 17,412 children. Among the 16,911 children (50.7%) excluded from the ZIP analysis, 21.6% were from households receiving subsidies (compared to 16.1% of children remaining in the cohort, $\chi^2(1) = 150.54$, $p < .001$) and 20.0% spoke English as a second language (compared to 10.5% of children

remaining in the sample, $\chi^2(1) = 594.26$, $p < .001$). A slightly higher proportion of girls were among children excluded from the ZIP cohort (49.5%) compared to 48.3% of children remaining ($\chi^2(1) = 4.95$, $p = .026$).

Among children included in the ZIP cohort, the estimated prevalence of each mental health condition was as follows: 4.7% depression, 9.0% anxiety, 10.2% conduct disorder, 9.5% ADHD, and 8.4% multiple conditions. The most frequently co-occurring conditions over the study period were ADHD and conduct disorder (4.5%), followed by anxiety and conduct disorder (2.4%), anxiety and ADHD (2.3%), depression and anxiety (1.7%), depression and conduct disorder (1.5%) and depression and ADHD (1.4%). The total number of medical consultations by any individual child for one mental health condition across the study period ranged from 0 to 27 (depression), 0 to 34 (anxiety), 0 to 45 (conduct disorder), and 0 to 145 visits (ADHD). Among children with at least one mental health consultation, the percentage of children with a recurring consultation for that condition ranged from 37.2% (depression), 39.7% (anxiety), 48.2% (conduct disorder), and 72.7% (ADHD). Most children (>75%) had consulted a medical professional two or fewer times for depression or anxiety, three or fewer times for conduct disorder, and ten or fewer times for ADHD.

Results are presented below for five ZIP models assessing the occurrence (dichotomous outcome) and frequency (continuous outcome) of the five mental health conditions, adjusting for sociodemographic variables (subsidy status, gender, ESL status). A gender-stratified analysis was also conducted and is presented at the end of this section. Overall, the ZIP models identified a consistent gradient pattern in occurrences of nearly every mental health condition. Children classified in successively more vulnerable social-emotional functioning profiles in Kindergarten (Profiles 2 to 6 compared to Profile 1) had incrementally higher odds of a consultation for

depression, anxiety, conduct disorder, ADHD, and two or more (multiple) conditions from age two to fourteen, after controlling for subsidy status, child gender, and ESL status. The pattern of results for the count outcomes (i.e., the frequency of mental health consultations) was not as consistent as the dichotomous outcomes. For conduct disorder, ADHD, and multiple conditions, a pattern was observed such that children in Profiles 3 to 6 had a higher number of consultations than children with overall high social-emotional functioning (Profile 1), however this pattern was not observed for depression or anxiety. Table 3.4 presents all results of the ZIP analyses, providing coefficients (b), standard errors (SE), exponentials of the coefficients (e^b) which represented odds ratios (for dichotomous outcomes) and rate ratios (for continuous outcomes). Importantly, odds ratios in Table 3.4 represent the odds of belonging to an "always zero class" (i.e., the odds of the event *not* occurring). Highlights are presented in this section, along with inversed odds ratios (1/OR) to indicate the odds of the mental health condition occurring, for ease of interpretation.

Table 3.4. Summary of Zero-Inflated Poisson Results by Mental Health Condition (Total ZIP Cohort; N = 17,412)

	Depression (4.7%)			Anxiety (9.0%)			Conduct Disorder (10.2%)			ADHD (9.5%)			Multiple Conditions (8.4%)		
	B	SE	e^b	B	SE	e^b	B	SE	e^b	B	SE	e^b	B	SE	e^b
Likelihood of Condition															
Subsidy	-0.28	0.11	0.76**	-0.11	0.09	0.90	-0.19	0.07	0.83**	-0.25	0.07	0.78***	-0.31	0.07	0.73***
Boy	0.11	0.09	1.11	-0.06	0.07	0.94	-0.37	0.07	0.69***	-0.74	0.06	0.48***	-0.41	0.06	0.66***
ESL	0.65	0.20	1.92**	0.48	0.14	1.62***	0.41	0.13	1.51**	1.00	0.12	2.71***	1.03	0.13	2.81***
LP2	-0.20	0.17	0.82	0.03	0.12	1.03	-0.53	0.15	0.59***	-0.26	0.12	0.77*	-0.22	0.12	0.80
LP3	-0.17	0.13	0.84	-0.16	0.10	0.85	-0.70	0.08	0.50***	-1.16	0.07	0.31***	-0.81	0.08	0.45***
LP4	-0.92	0.16	0.40***	-0.38	0.12	0.68**	-1.19	0.10	0.31***	-1.56	0.10	0.21***	-1.37	0.10	0.25***
LP5	-0.86	0.13	0.42***	-0.39	0.10	0.68***	-1.30	0.09	0.27***	-1.83	0.08	0.16***	-1.55	0.08	0.21***
LP6	-0.80	0.21	0.45***	-0.66	0.16	0.52***	-1.99	0.12	0.14***	-2.49	0.12	0.08***	-2.24	0.12	0.11***
Frequency of Consultations															
Subsidy	0.14	0.17	1.15	-0.19	0.12	0.83	0.19	0.09	1.20*	0.17	0.08	1.18*	0.15	0.07	1.17*
Boy	-0.17	0.13	0.84	0.03	0.10	1.03	0.24	0.09	1.27**	0.09	0.08	1.10	0.11	0.06	1.12
ESL	-0.25	0.31	0.78	-0.30	0.19	0.74	-0.52	0.18	0.60***	-0.39	0.13	0.68**	-0.44	0.11	0.65***
LP2	-0.14	0.25	0.87	0.20	0.20	1.22	-0.32	0.18	0.72	-0.17	0.16	0.85	-0.01	0.12	0.99
LP3	-0.12	0.21	0.89	-0.13	0.14	0.88	0.34	0.12	1.41**	0.18	0.10	1.19	0.19	0.09	1.21*
LP4	-0.12	0.22	0.89	0.28	0.18	1.32	0.48	0.12	1.62***	0.26	0.12	1.30*	0.30	0.10	1.35**
LP5	0.09	0.19	1.10	0.35	0.16	1.42*	0.72	0.11	2.05***	0.51	0.10	1.67***	0.56	0.09	1.76***
LP6	0.11	0.28	1.11	0.16	0.22	1.17	0.76	0.13	2.14***	0.56	0.12	1.75***	0.60	0.10	1.82***

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

Legend: The dichotomous exponentiated coefficient (e^b) can be interpreted as the odds of belonging to the group that always scores zero on the outcome compared to the reference (LP1). The continuous e^b can be interpreted as the rate change in scores associated with each level of the explanatory variable compared to the reference.

Reference categories: No subsidy; Girls; English First Language; Membership to LP1 “Overall high social-emotional functioning”

Internalizing conditions: Depression and anxiety. Among the sociodemographic variables, only ESL and subsidy status were associated with internalizing conditions. ESL status increased the odds of membership to the "always zero class" by a factor of 1.92 for depression (e^b [OR] = 1.92, $p = .001$) and by a factor of 1.62 for anxiety (e^b [OR] = 1.62, $p < .001$). Additionally, for depression only, having been born to a household receiving subsidies decreased the odds of membership to the "always zero class" by a factor of 0.76 (e^b [OR] = 0.76, $p < .01$). Calculating the inversed odds ratios, ESL status was associated with 0.52 times the odds of depression and 0.62 times the odds of anxiety. Receiving subsidies was associated with 1.32 times odds of depression. Child gender was not statistically significantly associated with these outcomes.

Compared to children with "overall high social-emotional functioning" in Profile 1, children with "inhibited-disengaged" behaviours (Profile 4), "uninhibited-aggressive/hyperactive" behaviours (Profile 5), and "overall low social-emotional functioning" (Profile 6) had lower odds of membership to an "always zero class" for both depression and anxiety. Magnitudes ranged from a factor of 0.40 times the odds of depression (Profile 4 vs Profile 1) to 0.68 times the odds of anxiety (Profiles 4 and 5 vs Profile 1). In the inversed calculation, children in Profile 4 had 2.51 times the odds of depression compared to children in Profile 1, children in Profile 5 had 2.36 times the odds of depression, and children in Profile 6 had 2.23 times the odds of depression. On the anxiety outcome, children in Profiles 4 and 5 had 1.47 and 1.48 times the odds of anxiety, respectively, whereas children in Profile 6 had 1.93 times the odds of anxiety. Children in the "inhibited-adaptive" and "uninhibited-adaptive" profiles (Profiles 2 and 3) did not differ from children with "overall high social-emotional functioning" (Profile 1) on either outcome. No explanatory variables were associated with the

continuous outcome (rate ratios) for depression, however on the anxiety outcome, children with "uninhibited-aggressive/hyperactive" behaviours (Profile 5) on average had 1.42 times the number of anxiety consultations from ages two to fourteen compared to children with overall high social-emotional functioning ($e^b = 1.42$, $p = .02$).

Externalizing conditions: Conduct disorder and ADHD. All covariates (subsidy status, gender, ESL status) were statistically significantly associated with the odds of experiencing conduct disorder and ADHD. Receiving subsidies was associated with 0.83 times the odds of membership to an "always zero class" for conduct disorder and 0.78 times the odds "always zero class" membership for ADHD. Male gender was associated with 0.69 times the odds of membership to the "always zero class" for conduct disorder and 0.48 times the odds of "always zero class" membership for ADHD. Children with ESL status had 1.51 times the odds of membership to the "always zero class" for conduct disorder and 2.71 times the odds of "always zero class" membership for ADHD. Calculating the inversed odds ratios, children receiving subsidies had 1.20 times the odds of conduct disorder and 1.28 times the odds of ADHD, whereas boys had 1.45 times the odds of conduct disorder and 2.08 times the odds of ADHD. Children with ESL status had 0.66 times the odds of conduct disorder and 0.37 times the odds of ADHD.

Children's odds of membership to an "always zero class" for conduct disorder decreased with each more vulnerable social-emotional profile group compared to Profile 1 ("overall high social-emotional functioning") by a factor of 0.59 times the odds for children in Profile 2, 0.50 times the odds for Profile 3, 0.31 times the odds for Profile 4, 0.27 times the odds for Profile 5, and 0.14 times the odds for Profile 6. Inversed, this corresponded to 1.70 times the odds of conduct disorder for children in Profile 2, 2.02 times the odds in Profile 3, 3.28 times the odds

for Profile 4, 3.68 times the odds for Profile 5, and 7.30 times the odds of conduct disorder for children in Profile 6 who exhibited overall low social-emotional functioning. Similarly, for ADHD, children in Profiles 2 to 6 had lower odds of membership to an "always zero class" by a factor of 0.77 for children in Profile 2, 0.31 times the odds for Profile 3, 0.21 times the odds for Profile 4, 0.16 times the odds for Profile 5, and 0.08 times the odds for Profile 6. Inversed, associations ranged from 1.30 times the odds of ADHD for children in Profile 2, 3.19 times the odds for Profile 3, 4.74 times the odds for Profile 4, and 6.20 times the odds of ADHD for Profile 5. Children with overall low social-emotional functioning in Profile 6 again had the greatest vulnerability, with 12.01 times the odds of ADHD compared to children with overall high social-emotional functioning in Profile 1.

Regarding the frequency of medical consultations, receiving subsidies was associated with 1.20 times the number of conduct disorder consultations ($e^b = 1.20$, $p = .045$) and 1.18 times the consultations for ADHD ($e^b = 1.18$, $p = .034$). Male gender was associated with 1.27 times the number of consultations for conduct disorder ($e^b = 1.27$, $p = .007$) but was not associated with consultation frequency for ADHD ($e^b = 1.10$, *ns*). ESL status was associated with 0.60 times the number of conduct disorder consultations ($e^b = 0.60$, $p = .004$) and 0.68 times the number of ADHD consultations ($e^b = 0.68$, $p = .003$). Children with "uninhibited-adaptive" behaviours (Profile 3) had a higher number of consultations for conduct disorder than children with overall high social-emotional functioning ($e^b = 1.41$, $p = .004$), however this difference was not statistically significant for ADHD ($e^b = 1.19$, *ns*). Children with "inhibited-disengaged" behaviours (Profile 4), those with "uninhibited aggressive/hyperactive" behaviours (Profile 5), and children with "overall low social-emotional functioning" (Profile 6) had on average a higher number of consultations for conduct disorder ranging from 1.62 to 2.14 times the consultation

frequency of children in Profile 1. Similarly, children in Profiles 4 to 6 had an increasingly higher number of consultations for ADHD, ranging from 1.30 to 1.75 times the consultation frequency of children in Profile 1.

Multiple Conditions. Nearly all covariates were associated with the odds of having two or more mental health conditions over the study period. Receiving subsidies and male gender were associated with 0.73 and 0.66 times the odds of belonging to the "always zero group" (1.36 and 1.51 times the odds of multiple conditions, respectively). ESL status was associated with 2.81 times the odds of belonging to the "always zero group" (0.36 times the odds of multiple conditions). Children with "uninhibited-adaptive" behaviours (Profile 3) had 0.45 times the odds of membership to the always zero class (2.24 times the odds of multiple conditions). Children with "inhibited-disengaged" behaviours (Profile 4) and "uninhibited aggressive/hyperactive" behaviours (Profile 5) had 0.25 and 0.21 times the odds of membership to the always zero class (3.94 and 4.73 times the odds of multiple conditions, respectively). Children with overall low social-emotional functioning (Profile 6) had 0.11 times the odds of membership to the always zero class (9.37 times the odds of multiple conditions). For the frequency outcome, receiving subsidies was associated with 1.17 times the number of consultations across multiple conditions ($e^b = 1.17$, $p = .02$) and ESL status was associated with 0.65 times the number of consultations ($e^b = 0.65$, $p < .001$). Compared to children with overall high social-emotional functioning (Profile 1), children in Profiles 3 to 6 had on average 1.21 to 1.82 times the number of consultations across multiple conditions.

Gender Analysis. The initial ZIP analyses (Table 3.4) showed that child gender was not associated with depression or anxiety conditions by age fourteen, but that boys had higher odds of conduct disorder, ADHD, and multiple conditions. A gender stratified analysis replicated

these results, showing that overall, boys by age fourteen had comparable prevalence of depression and anxiety as girls (approximately 5% and 9% prevalence, respectively), but approximately twice the prevalence of conduct disorder, ADHD, and multiple conditions (e.g., 5% girls vs. 14% boys for ADHD). The stratified analysis further investigated how early social-emotional functioning profiles may be differentially related to mental health outcomes depending on child gender (results are presented in Tables 3.5a and 3.5b). Generally, associations were consistent with the initial ZIP analyses, however some key differences were observed. Internalizing symptoms combined with high social competence (Profile 2: "inhibited-adaptive") was associated with 0.56 times the odds of membership to the "always zero" depression class (1.79 times the odds of depression) for boys but not for girls. High internalizing symptoms combined with low social competence and low rule-following (Profile 4: "inhibited-disengaged") was associated with higher odds of depression for both boys and girls compared to children in Profile 1. However, Profile 4 was only associated with higher odds of anxiety for boys but not girls (0.63 times the odds of membership to the "always zero" anxiety class; 1.47 times the odds of anxiety). Boys and girls exhibiting social-emotional vulnerabilities in Profiles 3 to 6 both had lower odds of membership to an "always zero class" for conduct disorder and ADHD.

Regarding condition frequency, high aggressive and hyperactive behaviour (Profile 5) was associated with a greater number of mental health consultations for anxiety for boys but not girls (e^{b}_{boys}= 1.48, p = .04). As well, adaptive internalizing behaviour (Profile 2) was associated with *fewer* ADHD consultations for boys (e^{b}_{boys} = 0.56, p = .005) whereas combined internalizing-externalizing behaviours (Profile 6) were associated with statistically significantly more ADHD consultations for boys but not girls (e^{b}_{boys} = 1.74, p < .001), although a trend was observed for girls in Profile 6 in the same direction. In contrast, minor externalizing but socially

adaptive behaviour (Profile 3) was associated with a higher number of conduct disorder visits for girls but not boys ($e^{b}_{girls} = 1.85$, $p < .004$). Profile membership was not related to depression consultation rates for girls or boys.

Table 3.5a. Summary of Zero-Inflated Poisson Results by Mental Health Condition (Boys; N = 9,000)

	Depression (4.7%)			Anxiety (9.6%)			Conduct Disorder (13.2%)			ADHD (13.7%)			Multiple Conditions (10.9%)		
	B	SE	e^b	B	SE	e^b	B	SE	e^b	B	SE	e^b	B	SE	e^b
Likelihood of Condition															
Subsidy	0.43	0.15	1.53**	0.16	0.12	1.17	0.20	0.09	1.22*	0.30	0.08	1.34***	0.38	0.09	1.46***
ESL	-0.68	0.25	0.51**	-0.29	0.19	0.75	-0.36	0.15	0.70*	-1.00	0.14	0.37***	-0.92	0.15	0.40***
LP2	-0.57	0.25	0.56*	0.14	0.17	1.14	-0.45	0.17	0.64**	-0.25	0.16	0.78	-0.19	0.17	0.83
LP3	-0.45	0.24	0.64	-0.12	0.12	0.88	-0.73	0.10	0.48***	-1.04	0.09	0.36***	-0.77	0.10	0.46***
LP4	-1.02	0.21	0.36***	-0.47	0.14	0.63**	-1.19	0.12	0.30***	-1.47	0.11	0.23***	-1.37	0.12	0.26***
LP5	-0.85	0.17	0.43***	-0.36	0.12	0.70**	-1.41	0.10	0.24***	-1.83	0.09	0.16***	-1.61	0.10	0.20***
LP6	-0.83	0.24	0.43***	-0.61	0.18	0.54**	-2.00	0.13	0.14***	-2.51	0.13	0.08***	-2.28	0.13	0.10***
Frequency of Consultations															
Subsidy	-0.10	0.23	0.91	0.25	0.16	1.28	-0.13	0.11	0.88	-0.19	0.09	0.83*	-0.17	0.08	0.84*
ESL	0.00	0.38	1.00	0.44	0.26	1.55	0.61	0.16	1.83***	0.52	0.16	1.68**	0.53	0.13	1.70***
LP2	-0.32	0.33	0.72	0.18	0.26	1.19	-0.22	0.21	0.80	-0.58	0.21	0.56**	-0.18	0.14	0.83
LP3	-0.60	0.34	0.55	-0.11	0.18	0.90	0.23	0.14	1.26	0.15	0.13	1.16	0.11	0.12	1.11
LP4	-0.27	0.26	0.76	0.20	0.18	1.22	0.41	0.14	1.51**	0.23	0.14	1.25	0.20	0.12	1.23
LP5	0.11	0.25	1.12	0.39	0.19	1.48*	0.71	0.13	2.04***	0.50	0.13	1.66***	0.57	0.11	1.76***
LP6	0.09	0.31	1.10	0.15	0.25	1.16	0.76	0.14	2.14***	0.55	0.14	1.74***	0.60	0.12	1.81***

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

Legend: The dichotomous exponentiated coefficient (e^b) can be interpreted as the odds of belonging to the group that always scores zero on the outcome compared to the reference (LP1). The continuous e^b can be interpreted as the rate change in scores associated with each level of the explanatory variable compared to the reference.

Reference categories: No subsidy; English First Language; Membership to LP1 “Overall high social-emotional functioning”

Table 3.5b. Summary of Zero-Inflated Poisson Results by Mental Health Condition (Girls; N = 8,412)

	Depression (4.8%)			Anxiety (8.4%)			Conduct Disorder (6.9%)			ADHD (5.1%)			Multiple Conditions (5.6%)		
	B	SE	e^b	B	SE	e^b	B	SE	e^b	B	SE	e^b	B	SE	e^b
Likelihood of Condition															
Subsidy	0.08	0.15	1.09	0.03	0.13	1.03	0.13	0.13	1.14	0.15	0.13	1.16	0.18	0.13	1.19
ESL	-0.52	0.38	0.59	-0.74	0.20	0.48***	-0.55	0.28	0.58	-0.97	0.23	0.38***	-1.34	0.26	0.26***
LP2	0.11	0.23	1.12	-0.06	0.16	0.94	-0.72	0.29	0.49*	-0.32	0.20	0.72	-0.26	0.18	0.77
LP3	-0.01	0.18	0.99	-0.22	0.16	0.81	-0.64	0.14	0.53***	-1.45	0.13	0.24***	-0.90	0.13	0.41***
LP4	-0.82	0.23	0.44***	-0.19	0.20	0.83	-1.18	0.18	0.31***	-1.74	0.18	0.17***	-1.38	0.17	0.25***
LP5	-1.00	0.22	0.37***	-0.47	0.19	0.62*	-0.95	0.19	0.39***	-1.70	0.18	0.18***	-1.37	0.18	0.26***
LP6	-0.86	0.52	0.42	-0.84	0.38	0.43*	-2.12	0.30	0.12***	-2.10	0.32	0.12***	-1.98	0.31	0.14***
Frequency of Consultations															
Subsidy	-0.25	0.25	0.78	0.08	0.17	1.08	-0.41	0.18	0.66*	-0.09	0.16	0.91	-0.14	0.12	0.87
ESL	0.76	0.51	2.13	0.11	0.28	1.11	0.31	0.46	1.36	-0.02	0.22	0.98	0.08	0.21	1.09
LP2	0.00	0.36	1.00	0.22	0.28	1.24	-0.56	0.34	0.57	0.32	0.21	1.38	0.18	0.18	1.19
LP3	0.27	0.25	1.31	-0.18	0.24	0.83	0.62	0.21	1.85**	0.24	0.16	1.28	0.35	0.12	1.42**
LP4	0.03	0.33	1.03	0.46	0.36	1.59	0.67	0.20	1.94**	0.36	0.20	1.43	0.50	0.17	1.65**
LP5	-0.08	0.27	0.92	0.19	0.26	1.20	0.54	0.24	1.71*	0.46	0.19	1.58*	0.40	0.17	1.50*
LP6	-0.15	0.72	0.86	0.20	0.47	1.23	0.52	0.27	1.69	0.48	0.34	1.61	0.34	0.25	1.40

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

Legend: The dichotomous exponentiated coefficient (e^b) can be interpreted as the odds of belonging to the group that always scores zero on the outcome compared to the reference (LP1). The continuous e^b can be interpreted as the rate change in scores associated with each level of the explanatory variable compared to the reference.

Reference categories: No subsidy; English First Language; Membership to LP1 “Overall high social-emotional functioning”

3.4. Discussion

This study identified six profiles of children's early social-emotional functioning, with approximately 10% of children exhibiting considerably higher hyperactivity and aggression than the population average and approximately 3% exhibiting comorbid internalizing and externalizing symptoms at levels up to three standard deviations below the population mean. These results were similar to the profile patterns identified in Chapter 2, and are consistent with other population-based, person-centered research that has found most children starting school exhibit high social-emotional functioning, followed by 7% to 23% exhibiting predominantly externalizing symptoms, 5% to 11% exhibiting predominantly internalizing symptoms, and up to 13% exhibiting both internalizing and externalizing symptoms (Basten et al., 2013; Cannon & Weems, 2006; Denham et al., 2012; Janson & Mathiesen, 2008; Mindirila, 2016). Regarding mental health conditions, the proportion of children in this cohort accessing services for a mental health condition by age fourteen was also similar to previous prevalence estimates involving children ages five to seventeen estimating 2% to 5% prevalence for depression, 2% to 10% anxiety, 2% to 6% conduct disorder, and 2% to 9% ADHD (Costello, Egger, & Angold, 2005; Merikangas et al., 2009). Both the composition of the latent profile groups and their association with mental health problems were related to sociodemographic factors, with boys, children from lower income households, and children speaking English as a first language over-represented in more vulnerable social-emotional functioning profiles in early childhood and having higher odds of a mental health condition by early adolescence.

As hypothesized, children exhibiting worse social-emotional functioning at school entry had higher odds of a mental health condition by age fourteen after adjusting for child gender, household subsidy status, and ESL status. Consistent with past studies, a homotypic pattern was

observed to the extent that children in Profile 4 ("inhibited-disengaged") had statistically significantly higher odds of depression and anxiety by early adolescence, and children in Profiles 5 and 6, characterized by higher externalizing symptoms (aggression, hyperactivity), had significantly higher odds of conduct disorder and ADHD (Broeren et al., 2013; Fichter et al., 2009; Kjeldsen et al., 2014; Korczak & Goldstein, 2009; Korhonen et al., 2014; Luby et al., 2014; Reef et al., 2011). However, homotypic continuity (in terms of higher odds of an internalizing condition) was not observed for children in Profile 2 ("inhibited-adaptive") who exhibited similarly high internalizing at school entry to children in Profile 4 (i.e., low readiness to explore and elevated anxious symptoms) but also showed high social competence and rule-following and low aggression/hyperactivity. On the one hand, this result could have practical implications for intervention design, as it suggests that having social skills (and thus boosting social skills) might be an important asset for buffering against later mental health problems, for example through peer acceptance and social support (Guhn, Schonert-Reichl, Gadermann, Hymel, & Hertzman, 2013; Masten & Tellegen, 2012; Stice et al., 2010). On the other hand, this result could also indicate that children who suffer from internalizing symptoms but still function well socially (and academically) get overlooked for identification and treatment. In general, it has been estimated that only a third of adolescents experiencing the highest 1% anxiety and depressive symptoms seek professional treatment (Zachrisson et al., 2006) and that children who internalize but perform well in the classroom are less likely to receive school-based mental health services than children who externalize and perform poorly (Bradshaw, Buckley, & Ialongo, 2008).

Overall, the current analyses more strongly supported a heterotypic pattern, whereby children who exhibited any relative vulnerability in internalizing or externalizing symptoms

compared to the children in Profile 1 ("overall high social-emotional functioning") had statistically significantly higher odds of conduct disorder and ADHD by early adolescence, as well as depression and anxiety to a lesser extent. Children with co-occurring early childhood vulnerabilities at school entry such as low social competence, low readiness to explore, and high anxious/hyperactive behaviour (Profile 4), low social competence/respectfulness and high aggression/hyperactivity (Profile 5), and high vulnerabilities across all internalizing and externalizing symptoms (Profile 6) had the highest odds of a mental health condition, with magnitudes ranging from 1.5 to 12.0 times the odds of children without early social-emotional vulnerabilities. Interestingly, among these three profiles, the profile group with the highest internalizing symptoms (Profile 4: "inhibited-disengaged") did not predict the highest odds of an anxiety diagnosis. Rather, it was the profile group characterized by anxious behaviour combined with low social competence, high aggression and hyperactivity (Profile 6) that best predicted the dichotomous anxiety outcome. Children with the three most vulnerable social-emotional profiles (Profiles 4 to 6) also had the highest odds of multiple conditions, with up to 9.4 times the odds of children without early vulnerabilities.

The observation that early social-emotional patterns predicted different (heterotypic) mental health conditions is consistent with past studies showing progressions from one condition to the next, for example, from preschool conduct problems to school-age depression (Luby et al., 2014; Whalen et al., 2016) or childhood ADHD symptoms to adult anxiety (Shevlin et al., 2017; Wichstrøm et al., 2017). Again, possible explanations may be shared genetic or environmental etiology of mental health conditions (Danforth et al., 2016; Fanti & Henrich, 2010; Lee & Bukowski, 2012; Mathiesen et al., 2009; Waszczuk et al., 2016) or more direct symptom progressions or causal pathways (Burke et al., 2010; Meinzer et al., 2014; Patterson & Capaldi,

1990; Sibley et al., 2014). A direction for future research is to continue to tease apart the mechanisms that contribute to shared mental health symptoms in childhood, with the goal of identifying where progressions from early subclinical symptoms to qualified mental health disorders can be interrupted or shifted to less severe conditions.

Early childhood social-emotional profiles were not as strongly associated with the frequency of mental health consultations, but still showed a consistent pattern whereby children with incrementally higher initial vulnerabilities (Profiles 3 to 6) showed an increasingly higher number of consultations for conduct disorder, ADHD, and multiple conditions. In contrast, membership to Profile 2 ("inhibited-adaptive") was *not* associated with increased frequency of consultations for any mental health condition. Children with relatively low inhibition but high aggressive/hyperactive behaviours (Profile 5) had the highest rates of consultations for anxiety. In contrast, none of the six profile patterns were associated with rates of depression consultations. This may be attributable to the comparatively late age of onset for depressive disorders, which has a lifetime median onset age of 30 years (Kessler et al., 2005). Another explanation, relevant to all mental health disorders in this study, is that public health data may not capture all professional consultations for a given disorder, particularly if parents/caregivers do not connect their children to services or seek private specialists for their children after an initial consultation with a general practitioner. More is discussed on this topic under the study limitations.

Observed gender differences were consistent with past research in that boys were over-represented in the profiles characterized by higher externalizing behaviours (Sciutto et al., 2004). When gender was included in the ZIP model, boys had comparable odds of depression and anxiety diagnoses as girls, but at least twice the odds of conduct disorder, ADHD and multiple

conditions. Furthermore, stratified comparisons showed that both boys and girls exhibiting high externalizing behaviours (Profiles 5 and 6) had similar odds of conduct disorder and ADHD, in contrast to other studies that suggest boys may be over-diagnosed based on similar symptoms (Bruchmüller et al., 2012). That said, internalizing behaviours were more likely to result in a depression (Profile 2) or anxiety (Profile 4) consultation for boys than for girls. Moreover, the benefit of using person-centered analysis was that it distinguished two internalizing profile groups; Profiles 2 and 4 shared similar levels of behaviour inhibition and anxious symptoms, yet Profile 4 (over-represented by boys) showed additional low social competence and high hyperactivity. These results therefore suggest that boys may exhibit different internalizing symptoms than girls which may require different observational methods and interventions.

3.4.1. Strengths and limitations

A primary strength of this study was the use of a comprehensive population dataset to investigate prospective longitudinal patterns of children's social-emotional development from age two to fourteen. As discussed by Jutte, Roos, & Brownell (2011), linked administrative datasets are valuable resources for researchers, particularly for the purpose of investigating low prevalence or multiple outcomes across a significant length of follow-up time. EDI data were also collected for the entire population of public school Kindergarten children in BC, thus allowing a unique opportunity to investigate patterns among population subgroups without the problems of under-representing families at either end of the socioeconomic spectrum (a limitation which can sometimes result from the use of stratified or cluster sampling techniques; Jutte et al., 2011). That said, the EDI cohort may have under-represented children from very high income families, as these families are more likely to enroll their children in private schools (Frenette & Chan, 2015).

In the ZIP analysis, the analytic sample was restricted to children who were continuously enrolled in BC their entire 14 years and were covered by provincial health insurance full-time; thus, all children had approximately equal length of follow-up and equal chance of a recorded mental health condition within the study period. An exception was that the frequency of conditions could have included consultations after age fourteen for a small proportion of children who turned fifteen by the end of the study period and whose first onset of the condition occurred before age fifteen. Post-hoc analyses showed this affected fewer than 3% of consultations for any condition (with depression affected the most). Consultations with health professionals including general practitioners, nurses, and health care providers at walk-in clinics are free of cost in BC and Canada, theoretically enabling the equal access of health services for all children, regardless of household income. That said, research suggests that these services are underutilized by families who have lower income and are new to Canada, often due to access issues, time availability, and language barriers (Lasser et al., 2006). Thus, the MSP data may have under-represented children from low income families and families who spoke English as a Second Language. However, because household income and ESL status were significantly associated with mental health conditions, under-representation would have only attenuated the associations observed in this study.

Similarly, the use of public health insurance data for measuring mental health outcomes likely underestimated the number of mental health conditions present across the whole population. Studies suggest that only 30% of children with mental health concerns are connected to appropriate services (Zachrisson et al., 2006). Again, this may reflect a failure of adult duty-bearers to recognize mental health problems in young people and connect them to care (Pescosolido et al., 2008), as well as hesitance among young people themselves to seek help due

to a similar lack of symptom recognition or fear of stigma and social exclusion (Chandra & Minkovitz, 2006; Mukolo et al., 2010). Furthermore, not all children who connect with services access these through the public system. Within BC, public services including family physicians and walk-in clinics are the first point of contact for most children and families, and many mental health professionals including pediatricians, psychiatrists and psychologists are also covered by public health insurance (BC Ministry of Health, 2016). However, although generally a referral is required from a general practitioner to access specialized (potentially privatized) services (Dunlop, Coyte, & Mcisaac, 2000), the data used in this study would exclude mental health consultations with private BC health care professionals not covered by MSP (an estimated 12% to 20% of services; Canadian Institute for Health Information [CIHI], 2007; PopulationData BC, 2017). Seeking specialized care after an initial referral may have therefore again underestimated the frequency of consultations observed in the current dataset, however other research finds that most children and families access public services, particularly families with lower incomes (Dunlop et al., 2000; Zachrisson et al., 2006).

Finally, although the calculation of mental health outcomes based on billing codes has been found to be congruent with self-reported and diagnostic rates (Byrne, Regan, & Howard, 2005; Donnell et al., 2016), it is possible that some conditions were misclassified, particularly because of the difficulty of distinguishing mental health disorders at this age. Conditions that were recorded before age two were excluded to account for this potential misclassification, as other research has used this age as a cut-off for preschool diagnostic measures (Egger et al., 2006; Wichstrøm & Berg-Nielsen, 2014). The current study also counted a single recorded consultation as evidence of a mental health condition. Although there is precedent for this in past research (Brownell & Yogendran, 2001; Kingston, Heaman, Brownell, & Ekuma, 2015;

Zachrisson et al., 2006), more strict criteria would require at least two consultations, evidence of medication, or a diagnosis by a mental health specialist. Use of less strict criteria may have resulted in increased false positives for mental health conditions, potentially biasing associations with EDI profile membership towards the null hypothesis. Similarly, because MSP records were only available in the linked dataset until early adolescence, these results underestimate the prevalence of lifetime mental health disorders (particularly depression), again reducing the ability to detect a true association. Future research should continue to investigate these patterns with extended follow-up time into adulthood.

3.4.2. Implications and future directions

Traditionally, early mental health indicators have been difficult to identify and distinguish, undermining efforts for early detection and intervention (McGorry & Goldstone, 2011; Rettew, 2010; Wright, Jorm, Harris, & McGorry, 2007). Examining childhood social-emotional functioning form a person-centered perspective identified substantial overlap in early behaviour indicators, as found in past research (Jarrett & Ollendick, 2008; Rettew, 2010; Sterba et al., 2007). Furthermore, using these profiles to predict early onset mental health problems further detected subtle differences in the *combinations* of early subclinical symptoms that were more strongly associated with depression, anxiety, conduct disorder, and ADHD by early adolescence. Notably, the inclusion of social competence measures in this investigation identified that children with higher social competence were generally less likely to be identified for a mental health condition by early adolescence, even when they exhibited high internalizing symptoms. Children with externalizing symptoms and low social competence were more likely to be identified for an internalizing or externalizing condition.

Furthermore, this study demonstrates how routinely-collected early childhood data can be utilized to monitor population patterns in child mental health development to inform effective interventions. As discussed by McGorry et al. (2014), identifying and targeting modifiable factors before mental health conditions become fully developed is a key goal for future research in this area. Within the current study, results support the notion that targeting high impact social-emotional symptoms such as high aggression or low social competence may have overlapping benefits for reducing future externalizing disorders as well as internalizing disorders (Wichstrøm et al., 2017). For example, several evidence-based programs supporting children's social-emotional skills are well documented in the literature (Durlak et al., 2011; Greenberg & Abenavoli, 2017; Greenberg, Domitrovich, Weissberg, & Durlak, 2017). As such, exploring the mechanisms of symptom progression from early social-emotional indicators to adolescent mental health is an important future research direction, both in the context of addressing future mental health problems as well as promoting positive mental health. In the current dissertation, a third and final study was conducted to investigate how early childhood social-emotional profiles would be related to later subjective well-being outcomes, and how children's perceived connectedness with peers and adults might alter these developmental patterns. Furthermore, given the limitations of assessing mental health outcomes based on MSP data, it was also of interest to explore how early social-emotional functioning may be associated with children's mental health, from children's own perspectives.

Chapter 4: Associations between Children's Social-Emotional Functioning Profiles at School Entry and Future Social Connectedness and Subjective Well-Being in Middle Childhood

4.1. Introduction

Subjective well-being is an important component of mental health that has increasingly become a focus of research and policy (Barry, 2009; Hone, Jarden, Schofield, & Duncan, 2014; Keyes, 2009; Seligman & Csikszentmihalyi, 2000). Distinct from psychopathology, subjective well-being has been defined as individuals' cognitive and emotional evaluations of their lives (Gillham et al., 2011). Cognitive evaluations refer to judgments about one's life including life satisfaction; emotional evaluations, meanwhile, refer to the balance of pleasant emotions (happiness, enjoyment) over unpleasant emotions (sadness, worry; Diener, Suh, & Oishi, 1997; Gillham et al., 2011). Although subjective well-being is correlated with mental health problems, previous studies have identified that 7% to 13% of school-age children self-report low well-being even in the absence of mental health problems, and that 9% to 13% of children report concurrent mental health problems and high well-being (Antaramian, Huebner, Hills, & Valois, 2010; Greenspoon & Saklofske, 2001; Lyons, Huebner, Hills, & Shinkareva, 2012; Suldo & Shaffer, 2008). This evidence has generated support for a "dual-factor model" of mental health, proposing that mental health and mental illness are not opposite ends of the same spectrum, but better understood as two related, but separate, factors (Greenspoon & Saklofske, 2001). To this end, research in this area has sought to understand not only how mental health problems can be avoided, but how subjective well-being can be promoted.

4.1.1. Measurement of childhood subjective well-being

Subjective well-being is a multidimensional construct that has been investigated through a number of different lenses (positive psychology, mental health promotion) across multiple contexts and cultures (Diener et al., 2017; Keyes, 2009; Rose et al., 2017; Seligman & Csikszentmihalyi, 2000). Different indicators have been used to assess well-being, including individual traits and interpersonal skills as well as measures of civic engagement (Seligman & Csikszentmihalyi, 2000). However, consistent across these measures are the inclusion of both "feeling and functioning" components (Rose et al., 2017) and a focus on subjective experiences (Seligman & Csikszentmihalyi, 2000). In the present study, subjective well-being was measured using the Middle Years Development Instrument (MDI), a comprehensive population health monitoring survey designed specifically for children (Schonert-Reichl et al., 2013; Thomson et al., 2017). Integrating perspectives from the fields of social and emotional learning, resilience, and positive youth development (Luthar, 2006; Masten & Coatsworth, 1998; Masten & Motti-Stefanidi, 2009; Scales, Benson, & Mannes, 2006; Weissberg, Payton, O'Brien, & Munro, 2007), the purpose of the MDI is to better understand how contextual factors (including relationships with adults and peers) are related to measures of children's self-reported well-being (life satisfaction, self-concept, optimism, and emotional affect) as well as physical health and academic achievement (Gadermann et al., 2015; Guhn et al., 2012, 2016, 2013; Oberle, Schonert-Reichl, Guhn, Zumbo, & Hertzman, 2014). As recommended by Diener et al. (2017), cognitive and emotional components of childhood well-being (e.g., life satisfaction vs affect) are measured separately to account for the observation that while related, these components are predicted by different factors and, in turn, predict different outcomes.

Life satisfaction. Life satisfaction has been associated with several advantageous outcomes over the life course including better health, professional success, and relationship satisfaction, making it a widely studied construct in adulthood (Diener et al., 2017). To optimize generalizability, life satisfaction measures often ask individuals to make global judgments about their lives rather than reflect on specific experiences (e.g., "the conditions of my life are excellent"; Suldo, Huebner, Freidrich, & Gilman, 2009). The global nature of the questions furthermore adjusts for the different values individuals attribute to various aspects of their lives, such as professional success, wealth, health, and family (Suldo et al., 2009). Relatively fewer studies have examined life satisfaction during childhood and adolescence, in part because of the perceived measurement challenges of asking children to reflect on their lives in a manner consistent with current theories of life satisfaction (Rose et al., 2017). However, in recent years, several life satisfaction and subjective well-being measures have been developed and validated specifically for younger participants to address this limitation (Copeland et al., 2017; Gadermann, Schonert-Reichl, & Zumbo, 2010; Kern, Benson, Steinberg, & Steinberg, 2016; Keyes, 2009; Ravens-Sieberer et al., 2014; Schonert-Reichl et al., 2013). These measures address the same constructs, but pose questions in child-friendly language (e.g., "the things in my life are excellent"; Gadermann, Guhn, & Zumbo, 2011; Gadermann et al., 2010). In addition to demonstrating children's comprehension of life satisfaction questions and ability to respond validly, this research is also fulfilling a growing interest in empowering children to share their thoughts and feelings, and be listened to by the adults around them (Gadermann et al., 2015; Ravens-Sieberer et al., 2014; Schonert-Reichl et al., 2013; Thomson et al., 2017). Life satisfaction research with children and adolescents identifies several health and life course benefits similar to those observed with adults, including better relationships with adults and

peers, increased school engagement, higher academic achievement, and better perceived mental and physical health (Antaramian et al., 2010; Gadermann et al., 2015; Suldo & Shaffer, 2008).

Emotional well-being. The components and outcomes of the emotional dimension of subjective well-being have also been widely investigated. In childhood and adolescence, emotional well-being has been measured by hedonic components, such as the frequency of positive feelings (happiness, pride) as well as negative feelings (sadness, worry, anger; Diener et al., 2017; Keyes, 2009; Rose et al., 2017). Eudaimonic components, in comparison, refer to elements of psychological and social functioning (such as self-acceptance, sense of purpose, social integration) that contribute to emotional states (Keyes, 2009; Rose et al., 2017). These psychologically-oriented characteristics in childhood have included self-efficacy (belief in oneself, confidence in one's social skills and academic abilities), perceived control over events in one's life (internal locus of control), and positive expectations about the future (Keyes, 2009; Rose et al., 2017; Suldo et al., 2009).

In the current study, two eudaimonic measures of well-being that were of interest were children's optimism and self-concept. Generally, optimism is defined as a dispositional tendency to expect that good things will happen, as opposed to hope which is situation-specific (Gillham & Reivich, 2004). Like life satisfaction, optimism has been associated with several life course benefits, including better social relationships, health, and emotional well-being (Gillham et al., 2011; Oberle, Schonert-Reichl, & Thomson, 2010; Rasmussen, Scheier, & Greenhouse, 2009). Similarly, self-concept refers to children's beliefs about themselves (Marsh & Hocevar, 1985). Self-concept can vary across contexts (e.g., children may have positive beliefs about their academic ability, but negative beliefs about their physical ability); however, this study explored children's general self-concept as a higher order factor that underlies all other beliefs about

oneself (Marsh, 1995; Marsh & Hocevar, 1985). A positive and unified self-concept, in turn, has been associated with better psychological adjustment, life satisfaction, and positive affect (Campbell, Assanand, & Di Paula, 2003; McCullough, Huebner, & Laughlin, 2000).

Finally, two hedonic measures of negative affect – sadness and worries – were also investigated to measure children's subjective well-being holistically. Negative affect can be influenced by negative life experiences, conflict, and perceptions of problems, and is indicative of overall lower well-being (Diener et al., 2017; McCullough et al., 2000). Importantly, although negative affect is often a component of mental health conditions, the two are not perfectly correlated. Nuances have been observed in subjective well-being studies, finding that 13% of children *without* mental health conditions reported high life satisfaction and frequent positive affect, but also reported frequent negative affect (Suldo & Shaffer, 2008). In other studies, negative affect and internalizing behaviours have been highly correlated, but only moderate associations have been found between negative affect and externalizing behaviours (Antaramian et al., 2010). Still, interventions that address childhood negative affect may have potential to improve both well-being and mental health outcomes, making this an important area to explore.

4.1.2. Social-emotional functioning, well-being, and the role of social connectedness

In light of the complex associations between mental health problems and well-being, an important area of investigation is identifying the mechanisms that contribute to some children developing higher subjective well-being than others. Evidence from longitudinal studies finds that early childhood social-emotional patterns remain relatively stable over time, particularly for children who experience overall high social-emotional functioning, as well as for children who experience several concurrent social-emotional problems, including internalizing and externalizing tendencies (Fanti & Henrich, 2010; Hill et al., 2006; Korhonen et al., 2014; Sterba

et al., 2007; Van den Akker et al., 2013; Weeks et al., 2014; Wiggins et al., 2015). Indeed, results of the study described in Chapter 3 found that children's early social-emotional profiles at school entry predicted their likelihood of mental health conditions up to 10 years later. Hypothesized mechanisms to explain this continuity included genetic heritability and factors within children's social and structural environments (including infant-caregiver attachment patterns), which interact to shape children's development (Danforth et al., 2016; Kan et al., 2013; Nivard et al., 2015; Roberson-Nay et al., 2015; Savage et al., 2015; Sroufe, 2005; Waszczuk et al., 2016). However, given the evidence suggesting mental health problems and subjective well-being are distinct constructs (Antaramian et al., 2010; Greenspoon & Saklofske, 2001; Lyons et al., 2012; Suldo & Shaffer, 2008), the degree to which early childhood social-emotional functioning might predict children's future subjective well-being remained unclear.

Consistently across existing studies, the presence of positive social relationships has been found to be one of the strongest predictors of subjective well-being, both concurrently and over time (Diener et al., 2017; Diener & Seligman, 2002; Gadermann et al., 2015; Gillham et al., 2011; Guhn et al., 2013; Lyons et al., 2012; Olsson, McGee, Nada-Raja, & Williams, 2013; Rueger, Malecki, Pyun, Aycock, & Coyle, 2016). For example, in several studies comparing children's well-being and psychopathology, children who reported more positive relationships and social support from peers and adults also reported high well-being, even when they had high psychopathology (Greenspoon & Saklofske, 2001; Lyons et al., 2012; Suldo & Shaffer, 2008). Lyons et al. (2012) additionally demonstrated that children with psychopathologies who experienced low subjective well-being reported significantly lower perceived parental support than children with psychopathologies and high well-being. A recent meta-analysis examining the associations between perceived social support and depression also found that supportive

relationships were instrumental in protecting against sadness, both by buffering against stress from adverse life events and by generally improving overall well-being (Rueger et al., 2016). Similarly, high connectedness to peers and adults has been found to predict higher well-being and life satisfaction (Gilman & Huebner, 2006; Guhn et al., 2013), with perceived connectedness even mediating associations between family socioeconomic status and children's self-reported satisfaction with life (Gadermann et al., 2015). Other research that has examined children's well-being over a period of 32 years also implicates childhood and adolescent social connectedness as the strongest pathway to well-being in adulthood (Olsson et al., 2013).

Importantly, research has also identified that while social relationships influence subjective well-being, subjective well-being influences one's motivation to seek and maintain social connectedness (Whelan & Zelenski, 2012). The cyclical nature of feeling good, being social and approachable, developing positive relationships, and feeling good because of those relationships, also implies that children with initial low well-being and social difficulties may continuously miss opportunities for enhanced well-being. As Gillham et al. (2011) describe, children's social skills predicted higher well-being in adolescence, primarily through building connections to other people. In summary, subjective well-being appears to be highly influenced by social connectedness, and children's early social and emotional capacities may also influence children's opportunities to build and maintain these relationships. The current study sought to explore whether social connectedness mediates the association between children's early social-emotional functioning profiles and their well-being in middle childhood.

4.1.3. Objectives and hypotheses

The objectives of the current study were (1) to identify latent profiles of early social-emotional functioning among children at Kindergarten school entry; (2) to examine how early

profile patterns of children's social-emotional functioning predict their subjective well-being in middle childhood; and (3) to determine the extent to which perceived connectedness to adults and peers mediate these associations. Based on the literature, it was hypothesized that distinct profiles of social-emotional functioning would be identifiable at school entry, that children with more social-emotional vulnerabilities at school entry would report lower subjective well-being in Grade 4, and that lower perceived connectedness to adults and peers would contribute to explaining these associations.

4.2. Methods

4.2.1. Data source

Analyses were conducted using a comprehensive population dataset linking children's teacher-rated social-emotional indicators at Kindergarten school entry (Time 1) to their self-reported well-being in Grade 4 (Time 2). Time 1 (Kindergarten) data were collected using the Early Development Instrument (EDI; Janus & Offord, 2007), administered across three waves of data collection between 2007 and 2012 (Waves 3 to 5; N = 127,647). Time 2 (Grade 4) data were collected using the Middle Years Development Instrument (MDI; Schonert-Reichl et al., 2013) exactly four years later (MDI data collection 2011 to 2016). A total of 17,310 children (13.6% of those with EDI data) had linkable records from Kindergarten to Grade 4, based on the timing of MDI survey administration within each school district (i.e., whether or not MDI data collection occurred exactly four years after EDI data collection) as well as migration of children and families to and from BC. Previous research indicates that compared to children included in the linked dataset, children not included in the linked EDI-MDI sample (i.e., who have had data at one time point but not both) do not differ on gender or age, but are more likely to speak English as a second language (for those with only MDI data) and have generally higher vulnerability

scores at school entry (for those with only EDI data; Guhn et al., 2016). Data linkage was completed at Population Data BC using a combination of identifiers (Personal Education Number, child date of birth, gender). From this linked data source, a further 129 children (1%) were excluded from data analyses for missing data on all eight explanatory variables, resulting in a final analytic sample of 17,181 children.

4.2.2. Measures

Explanatory variables. Time 1 (Kindergarten) social-emotional functioning was assessed using the eight social and emotional subscales of the EDI (Janus & Offord, 2007): ***Overall Social Competence*** (5 items); ***Responsibility and Respect*** (8 items); ***Approaches to Learning*** (9 items); ***Readiness to Explore*** (4 items); ***Prosocial and Helping Behaviour*** (8 items); ***Anxious and Fearful Behaviour*** (8 items); ***Aggressive Behaviour*** (7 items); ***Hyperactive and Inattentive Behaviour*** (7 items). Example items, means, and standard deviations, and ordinal alphas (for skewed data, Gadermann et al., 2012) are provided in Table 4.1. All subscale items are provided in Appendix A. Teachers rated children's behaviour currently or within the last six months using one of four response options: "Never or not true" (0); "Sometimes or somewhat true" (5); "Often or very true" (10); or "Don't know" (coded as missing). Scores for each item were summed and divided by the number of items in the subscale to derive a subscale mean. Negatively worded items such as, "is upset when left by parent/guardian" were reverse-coded so that higher scores indicated better social-emotional functioning.

Outcome variables. Time 2 (Grade 4) subjective well-being was measured using five scales of the MDI (Schonert-Reichl et al., 2013): ***Satisfaction with Life*** (5 items); ***Optimism*** (3 items); ***Self-concept*** (3 items); ***Sadness*** (3 items); and ***Worries*** (3 items). The MDI is a validated self-report survey that measures children's well-being as well as contextual factors pertaining to

their home, school, and neighbourhood environments (Schonert-Reichl et al., 2013). The MDI well-being scales bring together several previously validated measures for school-aged children. Children's life satisfaction was measured using the *Satisfaction with Life Scale adapted for Children* (SWLS-C; Gadermann et al., 2011, 2010) adapted from the original *Satisfaction with Life Scale* developed for adults (Diener, Emmons, Larsen, & Griffin, 1985). Children's optimism was assessed using the *Optimism Resiliency Inventory Subscale* (Noam & Goldstein, 1998). Self-concept was assessed using *Marsh's Self-Description Questionnaire* (Marsh, 1988). Sadness and worries were assessed using items from the *Seattle Personality Questionnaire for Young School-Age Children* (Kusche, Greenberg, & Beilke, 1998). Example items, means, standard deviations, and ordinal alphas (Gadermann et al., 2012) are provided in Table 4.1, and a list of all items are provided in Appendix A. Across the well-being scales, children self-reported how much they agreed or disagreed with statements such as, "I have more good times than bad times" (Optimism) or "I feel that I do things wrong a lot" (Sadness). Items were rated from 1 (Disagree a lot) to 5 (Agree a lot), and were summed and averaged to derive scale means. Because of the small number of items for most MDI scales (three items), a mean score was only calculated if children had responded to every item within the scale.

Mediating variables. Potential mediators included two social connectedness scales previously investigated in another study of childhood well-being (Guhn et al., 2012). ***Adult Connectedness*** (9 items) assessed children's perceived connectedness to adults in their home, school, and community, and ***Peer Connectedness*** (6 items) assessed their perceived peer belonging and friendship intimacy (scale psychometric properties can be found in Table 4.1, and the full list of items in Appendix A). Originating from the *California Healthy Kids Survey* (Constantine & Benard, 2001), the Adult Connectedness items ask children to rate how true

statements were to them, such as “In my home, there is a parent or another adult who I can talk to about my problems.” The rating scale ranged from 1 (Not at all true) to 4 (Very true). On Peer Connectedness items, children rated how much they agreed with such statements as, “I feel part of a group of friends that do things together.” These scores were rated from 1 (Disagree a lot) to 5 (Agree a lot). Scores were summed and averaged to create a mean score for each scale.

Sociodemographic variables. Child gender and English as a Second Language (ESL) status were included as covariates due to their developmental relevance. Child gender (‘boy’ or ‘girl’) and ESL status (ESL or not ESL) were reported by teachers on the EDI and cross-validated with BC Ministry of Education records. Only these two gender options were available at the time of data collection. The subsidy status (income) variable used in Chapters 2 and 3 was not available in this dataset.

Table 4.1. Means, Distributions, and Internal Consistency for All Variables

Subscale	Example items	Unstandardized Mean (Standard Deviation)	Ordinal Alpha
Explanatory Variables (EDI; Kindergarten)			
Overall social competence	Gets along with peers	7.48 (2.46)	0.93
Responsibility and respect	Follows rules, respects others	8.43 (2.12)	0.97
Approaches to learning	Completes work on time	7.98 (2.22)	0.96
Readiness to explore	Eager to play a new game	8.88 (1.89)	0.94
Prosocial and helping	Offers to help others	5.16 (3.04)	0.97
Anxious and fearful	Nervous, cries a lot	8.75 (1.68)	0.91
Aggressive behaviour	Temper tantrums, fights	9.19 (1.52)	0.94
Hyperactive and inattentive	Distractible, impulsive	8.21 (2.46)	0.97
Outcome Variables (MDI; Grade 4)			
Satisfaction with Life	I am happy with my life	4.12 (0.83)	0.86
Optimism	I start most days thinking I will have a good day	4.09 (0.84)	0.73
Self-concept	In general, I like being the way I am	4.46 (0.69)	0.79
Sadness	I feel upset about things	2.53 (1.04)	0.75
Worries	I worry a lot that other people might not like me	3.00 (1.28)	0.87
Mediator Variables (MDI; Grade 4)			
Adult connectedness	At my home there is an adult who really cares about me.	3.25 (0.58)	0.87
Peer connectedness	When I am with other kids my age, I feel I belong.	4.22 (0.80)	0.86

Legend: Explanatory (EDI/Kindergarten) variables range from 0-10 with higher scores indicating better social-emotional health. Outcome (MDI/Grade 4) variables range from 1 to 5 with higher scores indicating higher agreement with subscale statements. Higher connectedness scores indicate greater connectedness to adults (rated from 1 to 4) and peers (rated from 1 to 5).

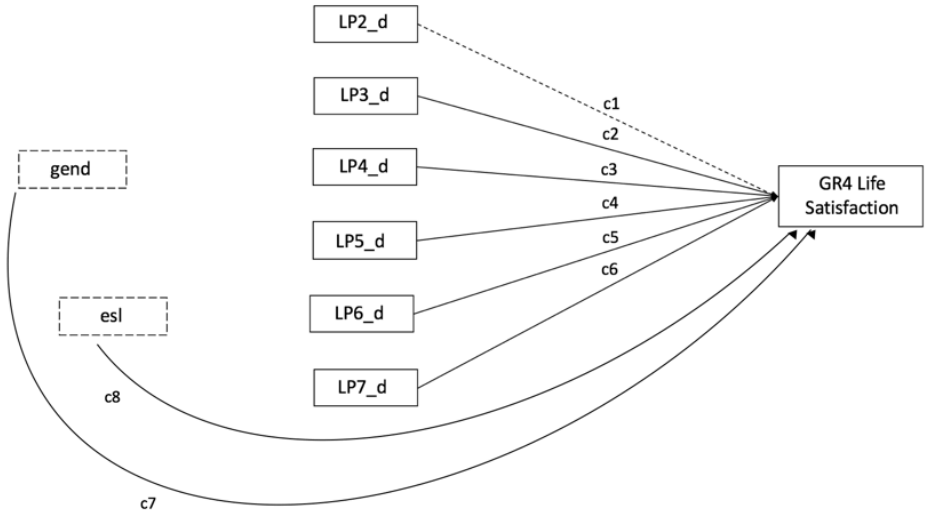
4.2.3. Analyses

Analyses were conducted in three steps. First, Latent Profile Analysis (LPA) was performed with the EDI social-emotional subscales to fit a series of social-emotional functioning profiles as conducted in Chapters 2 and 3. For a review of this method and fit indices, please see Chapter 2, p. 29. Second, five separate multiple linear regression models were produced to assess the associations between children's membership to Kindergarten social-emotional profiles derived in step 1, and the five outcomes of children's self-reported well-being reported in Grade 4, with each analysis controlling for child gender and Kindergarten ESL status. Regression was conducted in MPlus version 7 (Muthen & Muthen, 2017b). Because the explanatory variable contained ordered profiles that appeared to represent increasing vulnerability, dummy coding was used to compare each more vulnerable social-emotional profile group to the group with the highest social-emotional functioning at school entry (i.e., the reference group). Thus, regression coefficients indicate the differences in Grade 4 well-being scores associated with different patterns (i.e., profiles) of social-emotional vulnerabilities experienced by children at school entry, compared to children with overall high social-emotional functioning (Profile 1).

In the third and final step, adult and peer connectedness were tested as mediators of any observed associations between Kindergarten social-emotional functioning and Grade 4 subjective well-being outcomes. Using the latent profiles as grouping variables, regression models were conducted to compare coefficients of children's social-emotional profiles on Grade 4 well-being outcomes with and without the mediator variables. Figure 4.1 presents a conceptual path model demonstrating the hypothesized pathways between children's latent profile groups (dummy codes of latent profiles 2 through 7), adult connectedness in Grade 4 (mediator), and Grade 4 life satisfaction (outcome), controlling for child gender and ESL status. Mediation was

assessed in MPlus using 95% Confidence Intervals (CI; 5000 bootstrap resamples) to calculate the statistical significance of specific indirect effects of the mediation pathway (ab) for each level of the explanatory variable (X) on the outcome (Y) through the mediator (M) (Hayes & Preacher, 2014; Hayes & Rockwood, 2017). With a categorical explanatory variable, Hayes and Preacher (2014) refer to these paths as the *relative* direct effects (c') of X → Y, controlling for the mediator (M). Syntax for calculating the relative total, direct, and indirect effects using MPlus are provided by Hayes and Preacher (2014).

(1) Unmediated model showing relative total effects (c)



(2) Mediated model showing relative direct (c') and indirect effects (a, b)

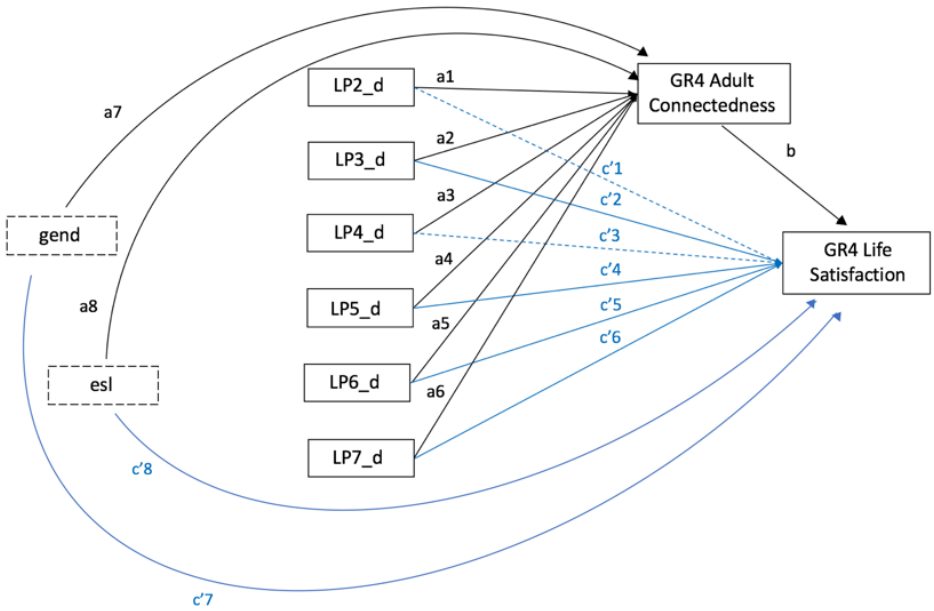


Figure 4.1. Conceptual path model showing mediation from EDI Latent Profiles (LP2_d to LP7_d; X) to Grade 4 Life Satisfaction (Y), through Grade 4 Adult Connectedness (M), controlling for child gender (gend) and ESL status (esl). Blue lines (c') represent the association between X and Y after controlling for M. Dashed lines represent statistically non-significant associations. In this conceptual example, the association between LP4 and life satisfaction becomes statistically non-significant controlling for adult connectedness.

4.3. Results

4.3.1. Study population

The study population included 17,181 children with data collected at both Time 1 (Kindergarten) and Time 2 (Grade 4). At Time 1, children had an average age of 5.65 years (range = 4.86 to 7.43 years, SD = .30). At Time 2, children had an average age of 9.24 years (range = 7.93 to 11.85 years, SD = .50). Child gender and ESL status were calculated based on school entry records at Time 1. Within the analytic sample, 51.1% of children were identified as boys, and 19.7% were identified as having ESL status. By Time 2, only 12.0% of children still met the criteria for ESL status, however Time 1 ESL status was used for all analyses on the basis that children's social-emotional skills at school entry could affect their later well-being through their social relationships. For example, language abilities at school entry could lead to potential social exclusion (based on difficulty communicating with peers and adults outside the home; Kang et al., 2014) thus resulting in lower subjective well-being at Time 2.

4.3.2. Latent profiles

The LPA identified seven unique latent profiles of social-emotional functioning at school entry (Table 4.2). Compared to the other solutions, (e.g., with one to six latent profiles), the seven-class model demonstrated the best overall fit across the range of fit indices, providing one of the highest entropy scores (94%) and high probability of children of being assigned to a specific class (90%) while also being among the solutions with the lowest log-likelihood and aBIC values. Log-likelihood and aBIC scores continued to decrease in the models with eight through ten profiles, and these decreases continued to be statistically significant according to the Bootstrap Likelihood Ratio Test (BLRT). However, these decreases were relatively small compared to the differences between models 1 through 7, and improvements were not observed

in other fit indices (entropy, class probability accuracy). As recommended when interpreting LPA results (Geiser, 2012; Nylund et al., 2007), interpretability and theoretical meaningfulness were also considered in the model selection. Although not as parsimonious as other models, the seven-class solution identified a new profile of social-emotional functioning that was distinct from (i.e., not parallel to) the patterns identified in Profiles 1 through 6. Furthermore, given that social and emotional developmental vulnerabilities have increased between earlier birth cohorts and the cohorts used in this study, the additional low social-emotional functioning profile was considered to be meaningfully reflective of this trend over time (discussed further in section 4.4). For these reasons, the seven-class solution was selected and a latent profile membership value from 1 (reference group) to 7 was assigned to each child based on their most likely predicted latent profile membership.

Table 4.2. Latent Profile Analysis Model Fit Comparison (EDI Waves 3-5)

Number of Latent Profiles	Log Likelihood Value	aBIC	Entropy	BLRT	Lowest Class Probability	Smallest Class Size	Smallest Class Proportion
1	-193279.510	386664.198	NA	NA	1	17181	1
2	-165472.597	331109.534	0.95	0.00	0.97	4155	0.24
3	-157478.437	315180.378	0.93	0.00	0.94	1526	0.09
4	-153575.622	307433.910	0.91	0.00	0.89	794	0.05
5	-150152.801	300647.429	0.95	0.00	0.92	884	0.05
6	-147328.551	295058.093	0.93	0.00	0.89	574	0.03
7	-145662.391	291784.935	0.94	0.00	0.90	394	0.02
8	-144176.654	288872.624	0.94	0.00	0.89	391	0.02
9	-142602.708	285783.894	0.93	0.00	0.87	258	0.02
10	-141622.708	283883.058	0.93	0.00	0.87	243	0.01

Legend: Better model fit is indicated by higher entropy and class probability scores, lower Log Likelihood and aBIC values, and statistically significant Bootstrap Likelihood Ratio Test (BLRT)

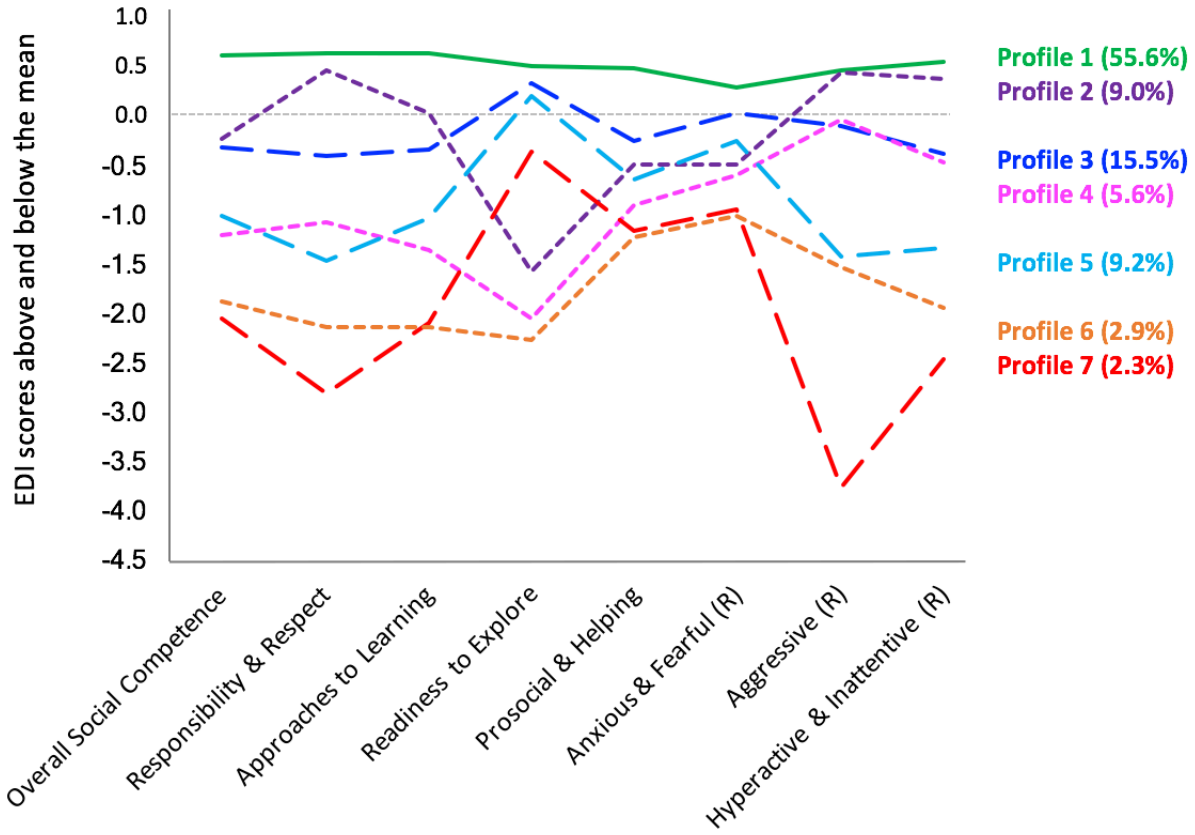


Figure 4.2. Composition of latent profile groups by EDI social-emotional subscale and population prevalence (Waves 3-5).

Legend: Higher scores indicate better social–emotional functioning. Long dashes represent externalizing profiles. Short dashes represent internalizing profiles. (R) indicates the subscale was reverse-coded.

Within the selected seven-class model, the majority of children (55.6%) fit into a profile of "overall high social-emotional functioning" (Profile 1). Relative to other children in the population, children in Profile 1 scored half a standard deviation above the mean across all eight social-emotional subscales. In contrast, 44.4% of children fit into profiles characterized by relative vulnerability on one or more social-emotional subscales. Based on the readiness to

explore and aggressive/hyperactive subscales, profile patterns were distinguished into predominantly internalizing patterns (high inhibition) versus externalizing patterns (low inhibition, under-controlled behaviours). Figure 4.2 presents the composition of each of the seven latent profiles in relation to each other. Children in Profile 2 (9.0%) had "inhibited-adaptive" behaviours, demonstrating high social-emotional functioning but also more inhibition than other children (i.e., lower readiness to explore). Children in Profile 3 ("uninhibited-adaptive"; 15.5%) demonstrated high readiness to explore but slightly lower social skills.

Profile 4 ("inhibited-disengaged"; 5.6%) was comparable to Profile 2 ("inhibited-adaptive") in terms of lower readiness to explore. However, children in Profile 4 also scored lower on social skills (social competence, rule following, responsibility and respect). Profile 5 ("uninhibited-aggressive/hyperactive"; 9.2%) showed similar strengths and vulnerabilities as Profile 3 ("uninhibited-adaptive"), except that these children were rated as having high aggression and hyperactivity (1.5 standard deviations below the mean). Finally, two distinct profiles were identified at the lowest end of the social-emotional spectrum. Profile 6 (2.9%, "inhibited-low social-emotional functioning") included children that exhibited very low social competence across the social subscales (over 2 standard deviations below the mean), the lowest readiness to explore of any group, as well as high hyperactivity and aggression. In contrast, Profile 7 (2.3%; "uninhibited-low social-emotional functioning") included children with the lowest social competence scores of any group, relatively high readiness to explore (a potential strength), but also the highest aggression scores (nearly 4 standard deviations below the mean) and high hyperactivity. Gender and ESL distributions within each profile group are presented in Table 4.3.

Table 4.3. Mean Comparisons (and Standard Deviations) of Latent Profile Groups, Subjective Well-Being Measures, and Connectedness Scores

	Life Satisfaction	Optimism	Self-concept	Sadness	Worries	Adult Connectedness	Peer Connectedness
LP1 "overall high social-emotional functioning"	4.19	4.14	4.53	2.44	2.94	3.29	4.31
n = 9,549 (42.4% boys; 17.3% ESL)	(0.78)	(0.78)	(0.61)	(0.99)	(1.27)	(0.55)	(0.72)
LP2 "inhibited-adaptive"	4.13	4.13	4.47	2.50	2.96	3.23	4.21
n = 1,544 (46.5% boys; 22.9% ESL)	(0.84)	(.084)	(0.69)	(1.03)	(1.28)	(0.59)	(0.80)
LP3 "uninhibited-adaptive"	4.04	4.02	4.39	2.64	3.08	3.22	4.15
n = 2,656 (60.8% boys; 22.4% ESL)	(0.88)	(0.90)	(0.76)	(1.06)	(1.29)	(0.59)	(0.84)
LP4 "inhibited-disengaged"	4.03	4.00	4.34	2.67	3.12	3.11	4.05
n = 969 (61.0% boys; 27.1% ESL)	(0.90)	(0.92)	(0.77)	(1.09)	(1.32)	(0.64)	(0.87)
LP5 "uninhibited-aggressive/hyperactive"	3.97	3.99	4.33	2.67	3.13	3.18	4.08
n = 1,574 (71.0% boys; 19.6% ESL)	(0.93)	(0.94)	(0.80)	(1.10)	(1.30)	(0.64)	(0.91)
LP6 "inhibited-low social-emotional functioning"	3.97	4.04	4.29	2.73	3.09	3.12	3.85
n = 495 (75.6% boys; 26.6% ESL)	(0.93)	(0.93)	(0.83)	(1.12)	(1.30)	(0.65)	(1.04)
LP7 "uninhibited-low social-emotional functioning"	3.89	3.95	4.19	2.92	3.26	3.13	3.99
n = 394 (80.5% boys; 22.4% ESL)	(0.90)	(0.91)	(0.90)	(1.15)	(1.30)	(0.65)	(0.94)

Legend: Well-Being and Peer Connectedness items rated from 1-5. Adult Connectedness items rated from 1-4.

4.3.3. Bivariate associations

Mean comparisons between the seven latent profile groups and five outcome measures were conducted using ANOVA and Tukey's Honestly Significant Difference post-hoc tests. Profile group sizes, sociodemographic distributions, mean comparisons, and standard deviations are shown in Table 4.3 (previous page). Figure 4.3 presents group comparisons using standardized scores. Children in Profile 1 ("overall high social-emotional functioning") reported the highest well-being on every outcome measure in Grade 4 (high scores on life satisfaction, optimism, self-concept; low scores on sadness and worries). Children with early vulnerabilities in readiness to explore (Profile 2) on average reported lower well-being than children in Profile 1, but these comparisons were not statistically significant. Children with early vulnerabilities in rule-following/responsibility/social competence (Profile 3) had significantly lower well-being than Profiles 1 and 2 on all well-being measures except life satisfaction, where scores differed significantly from Profile 1 but not Profile 2. Children with multiple early vulnerabilities (Profiles 4 to 7) reported the lowest well-being in Grade 4, generally with increasing severity from Profile 4 through 7. Exceptions to this pattern were optimism and worries, where children in Profile 6 "inhibited-low social-emotional functioning" had slightly better functioning than Profiles 5 or 7 (although differences between profile groups on this measure were not statistically significant). Across well-being measures, mean comparisons between Profiles 4 through 7 generally did not differ significantly from each other. However, children in these lower four profile groups had significantly lower Grade 4 well-being compared to children in Profiles 1 and 2 with the following exceptions: Profile 2 vs 4 life satisfaction; Profiles 1 or 2 vs 7 optimism and worries. Children with the most vulnerabilities (Profiles 6 and 7) generally had the lowest self-reported well-being compared to children in any other profile group.

A similar pattern was observed on the mediator variables such that children with higher social-emotional functioning generally reported higher connectedness with adults and peers in Grade 4. This time, children in Profile 1 reported significantly higher connectedness to adults and peers than children in all other profile groups (including Profile 2). Regarding connectedness with adults, children in Profile 4 ("inhibited-disengaged") reported significantly lower connectedness compared to children in Profiles 1 through 3. Differences between Profiles 4 through 7 were not significant. Regarding connectedness with peers, children in Profile 4 again scored low, but children in Profile 7 scored significantly lower. On both connectedness measures, children in Profile 5 ("uninhibited-aggressive/hyperactive") showed slightly higher adult and peer connectedness compared to children in Profile 4, but these differences were not statistically significant. Children in Profile 7 scored significantly lower on peer connectedness than children in any other profile group, except for Profile 6.

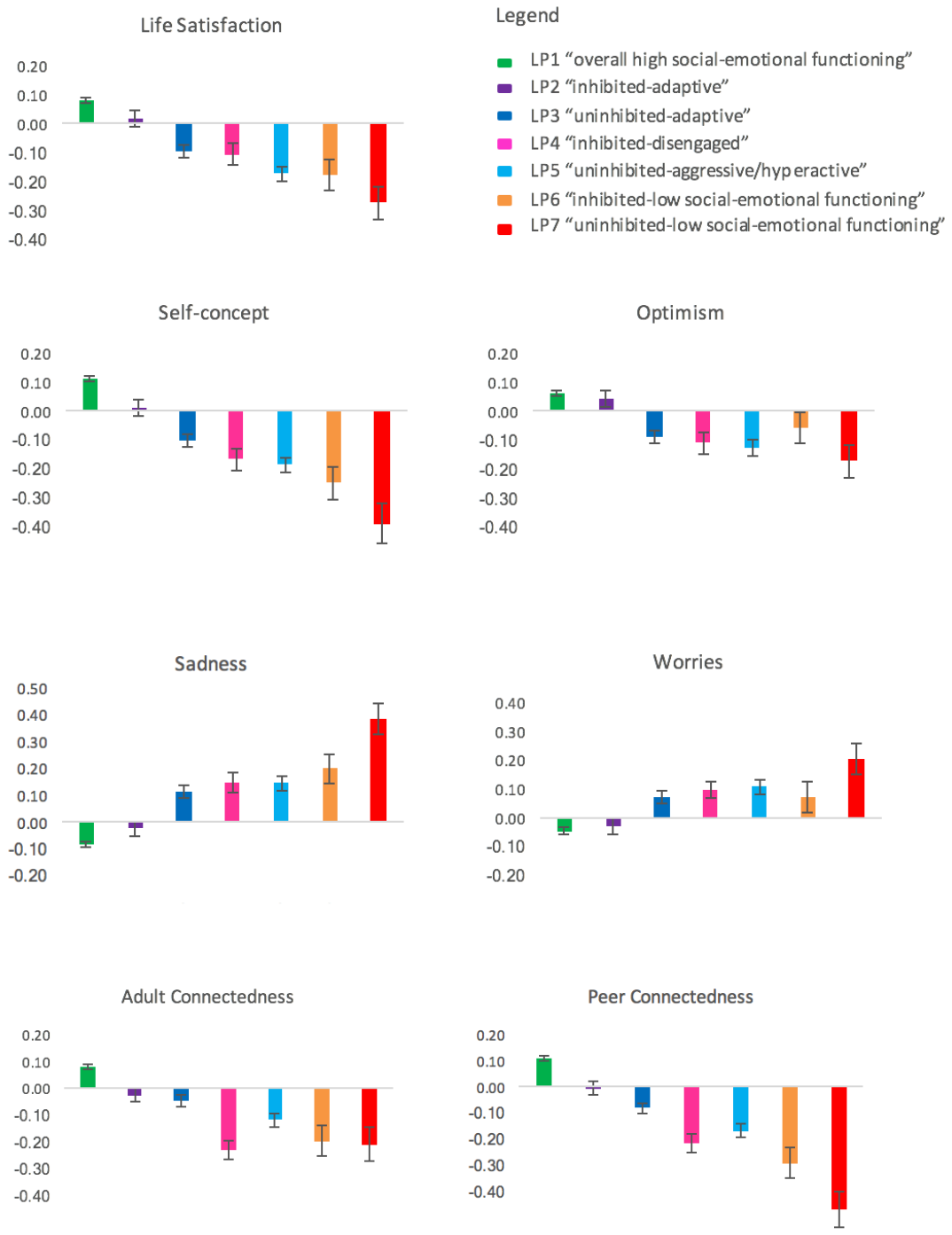


Figure 4.3. Standardized mean comparisons of Latent Profile (LP) groups, subjective well-being, and connectedness scores. Please refer to Table 4.3 for unstandardized scores and sample distributions.

Correlations between the sociodemographic variables, subjective well-being, and connectedness measures are provided in Table 4.4. All subjective well-being variables were correlated at a $p < .001$ significance level with magnitudes ranging from $r = -.12$ (self-concept and worries) to $r = .61$ (optimism and self-concept). The potential mediating variables, adult and peer connectedness, were also significantly correlated with all well-being variables with magnitudes from $r = -0.08$ (adult connectedness and worries) to $r = .43$ (peer connectedness and life satisfaction). Gender and ESL status had the smallest correlations with the well-being and connectedness variables. On average, boys reported slightly lower connectedness with adults and peers and slightly lower well-being than girls, except that boys reported fewer worries. Gender was not correlated with sadness. Children who spoke English as a second language reported slightly lower life satisfaction and self-concept, more sadness and worries, and lower connectedness with adults and peers. ESL status was not related to optimism.

Table 4.4. Bivariate Correlations between Outcome, Mediator, and Sociodemographic Variables

	1	2	3	4	5	6	7	8
1. Life satisfaction								
2. Optimism	.56***							
3. Self-concept	.60***	.61***						
4. Sadness	-.33***	-.35***	-.30***					
5. Worries	-.17***	-.13***	-.12***	.48***				
6. Adult connectedness	.39***	.37***	.42***	-.21***	-.08***			
7. Peer connectedness	.43***	.40***	.42***	-.25***	-.15***	.46***		
8. Gender	-.04***	-.09***	-.10***	.01	-.10***	-.13***	-.09***	
9. ESL status	-.04***	-.01	-.06***	.05***	.04***	-.12***	-.03**	-.03**

*p <.05, **p < .01, *** p < .001
Dichotomous variables: Girls = 0, Not ESL status = 0

4.3.4. Regression models

Table 4.5a presents the results of five linear regression models showing the unstandardized coefficients for the relative total effects (c) of the explanatory variable (X = children's social-emotional functioning profiles at school entry) on Grade 4 subjective well-being (Y), in the absence of the mediating variables (M) (Hayes & Preacher, 2014). After adjusting for gender and ESL status, children with relative vulnerabilities in social skills and internalizing/externalizing behaviours at school entry (Profiles 2 to 7) reported significantly lower subjective well-being in Grade 4 across nearly all five well-being dimensions compared to children with overall high social-emotional functioning (Profile 1). For example, children in Profile 4 (inhibited behaviours with low social skills) scored on average 0.15 points lower on the life satisfaction scale compared to children in Profile 1. Exceptions to this pattern included

children in Profile 2 ("inhibited-adaptive") and Profile 6 ("inhibited-low social-emotional functioning") who did not have statistically lower optimism scores than Profile 1. Children in Profiles 3 through 7 all scored significantly higher than Profile 1 on both sadness and worries. Children in Profile 2 also scored significantly higher on sadness compared to Profile 1, but not worries.

Table 4.5a. Multiple Linear Regression Model without Mediators (Relative Total Effects, path c)

	Life Satisfaction		Optimism		Self-Concept		Sadness		Worries	
	B	SE	*B*	SE	*B*	SE	*B*	SE	*B*	SE
Intercept	4.21***	0.01	4.20***	0.01	4.59***	0.01	2.43***	0.01	3.05***	0.02
Gender	-0.03*	0.01	-0.12***	0.01	-0.10***	0.01	-0.04*	0.02	-0.31***	0.02
ESL	-0.06***	0.02	-0.01	0.02	-0.09***	0.01	0.12***	0.02	0.11***	0.03
LP2	-0.05*	0.02	-0.02	0.02	-0.06**	0.02	0.06*	0.03	0.03	0.04
LP3	-0.14***	0.02	-0.10***	0.02	-0.13***	0.02	0.21***	0.02	0.20***	0.03
LP4	-0.15***	0.03	-0.12***	0.03	-0.16***	0.02	0.24***	0.04	0.24***	0.05
LP5	-0.20***	0.02	-0.12***	0.02	-0.17***	0.02	0.25***	0.03	0.28***	0.04
LP6	-0.21***	0.04	-0.06	0.04	-0.21***	0.03	0.30***	0.05	0.25***	0.06
LP7	-0.28***	0.05	-0.15**	0.05	-0.30***	0.04	0.49***	0.06	0.44***	0.07

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

The two potential mediating variables (adult connectedness, peer connectedness) were significantly positively associated with all outcome variables (M → Y; see correlations Table 4.4). Adult and peer connectedness were also significantly positively associated with all levels of the explanatory variable (X → M; indirect path a; see Appendix B), with higher social-emotional functioning at school entry predicting higher connectedness in Grade 4. Although current mediation approaches no longer require these conditions to be met to test for mediation (Hayes & Rockwood, 2017), the path variables in the current study did meet the conditions for this "causal steps" approach first popularized by Baron and Kenny (1986). Subsequent linear regression analyses were then conducted to test how the inclusion of adult connectedness and, in

a parallel analysis, peer connectedness, changed the coefficient for of children's school entry social-emotional functioning on Grade 4 well-being in the presence of these potential mediators. Results are presented in Tables 4.5b and 4.5c.

Table 4.5b. Model with Adult Connectedness as Mediator (Relative Direct Effects, path c')

	Life Satisfaction		Optimism		Self-Concept		Sadness		Worries	
	B	Δ[a]	*B*	Δ	*B*	Δ	*B*	Δ	*B*	Δ
Intercept	2.32***		2.42***		2.985***		3.65***		3.71***	
Gender	0.05***		-0.05***		-0.04***		-0.09***		-0.34***	
ESL	0.03		0.08***		-0.02		0.06**		0.08**	
LP2	-0.02	57%	0.01	173%	-0.04*	41%	0.04	29%	0.02	40%
LP3	-0.12***	18%	-0.08***	23%	-0.11***	17%	0.19***	8%	0.19***	5%
LP4	-0.07*	54%	-0.05	62%	-0.09***	42%	0.19***	20%	0.21***	11%
LP5	-0.16***	20%	-0.08**	32%	-0.14***	21%	0.22***	11%	0.27***	5%
LP6	-0.15**	28%	-0.01	90%	-0.15***	25%	0.26***	13%	0.23***	8%
LP7	-0.22***	22%	-0.10*	38%	-0.25***	18%	0.45***	9%	0.42***	5%

Table 4.5c. Model with Peer Connectedness as Mediator (Relative Direct Effects, path c')

	Life Satisfaction		Optimism		Self-Concept		Sadness		Worries	
	B	Δ	*B*	Δ	*B*	Δ	*B*	Δ	*B*	Δ
Intercept	2.27***		2.393***		3.053***		3.768***		4.119***	
Gender	0.02		-0.08***		-0.07***		-0.07***		-0.34***	
ESL	-0.05**		0.00		-0.08***		0.11***		0.10***	
LP2	-0.01	82%	0.02	240%	-0.03	51%	0.03	47%	0.00	85%
LP3	-0.08***	44%	-0.05*	54%	-0.08***	38%	0.17***	20%	0.17***	17%
LP4	-0.04	72%	-0.02	81%	-0.08**	52%	0.17***	30%	0.18***	24%
LP5	-0.12***	42%	-0.04	66%	-0.11***	40%	0.19***	24%	0.23***	17%
LP6	-0.09	59%	0.06	209%	-0.11**	48%	0.21***	29%	0.18**	28%
LP7	-0.10*	67%	0.03	117%	-0.15**	50%	0.36***	26%	0.34***	23%

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

[a]Percent change in the coefficient is calculated as 1- $\frac{c\prime}{c}$ and estimates the proportion of the total effect that is mediated by adult or peer connectedness, respectively (Preacher & Kelley, 2011). A change greater than 100% indicates "inconsistent mediation" and has occurred here when the indirect and total effects are close to zero and are opposite signs (Mackinnon, Fairchild, & Fritz, 2007).

Compared to the total effects model without mediators (Table 4.5a), the associations between Kindergarten social-emotional profiles and Grade 4 well-being were attenuated across all well-being measures when adult and peer connectedness variables were included in the model. Significance tests of the relative indirect effects (ab) of X → M → Y (Hayes & Preacher, 2014; Hayes & Rockwood, 2017) confirmed that that connectedness to adults and connectedness to peers each statistically significantly mediated the associations between lower social-emotional functioning at school entry and lower well-being in Grade 4 (all path coefficients shown in Appendix B). Following the recommendations of Preacher and Kelley (2011), particularly meaningful mediation pathways were identified based the magnitude of changes to the regression coefficients (c') as well as theoretical meaningfulness. Relative magnitude was assessed using the percent change in regression coefficients between the total effects and mediation models (calculated as 1- $\frac{c\prime}{c}$). This measure, mathematically equivalent to the ratio of the indirect effect to the total effect (ab/c), can be interpreted as the proportion of the total effect that is mediated by the mediator variable (Preacher & Kelley, 2011).

Life satisfaction. Holding children's profile group constant, adult connectedness was associated with a 0.56-point increase in children's life satisfaction (path b, shown in Appendix B). While the difference in life satisfaction between each lower functioning profile group and the reference (Profile 1) was attenuated once adult connectedness was included, this attenuation was larger (> 50%) for children with higher inhibition at school entry (Profiles 2 and 4). Similarly, peer connectedness was associated with a 0.45-point increase in children's life satisfaction holding children's profile group constant (Appendix B). Compared to adult connectedness, peer connectedness appeared to account for larger changes in coefficients across all profile groups, with attenuations ranging from 57% to 82% for children exhibiting higher inhibition at school

entry (Profiles 2, 4, and 6), as well as higher aggression, hyperactivity, and low social skills (Profile 7). Accounting for peer connectedness, membership to Profiles 4 or 6 was no longer statistically significantly related to children's life satisfaction.

Optimism. Holding profile membership constant, adult connectedness was associated with a 0.53-point increase in children's optimism, and peer connectedness was associated with a 0.42-point increase in optimism. Again, accounting for adult and peer connectedness resulted in larger attenuations for more inhibited children (Profiles 2, 4, and 6), with membership to Profile 4 no longer statistically significantly associated with lower Grade 4 optimism scores compared to Profile 1. Similarly, accounting for peer connectedness largely attenuated the previous associations between Profiles 4, 5, and 7 and children's optimism, with percent changes ranging from 66% to 209%.[4]

Self-concept. Holding profile membership constant, connectedness to adults was associated with a 0.48-point increase in children's self-concept, and peer connectedness was associated with a 0.36-point increase. While associations between all profile groups and the self-concept outcome still remained statistically significant after including the connectedness items (although scores were attenuated), associations were attenuated > 50% for Profiles 2, 4, and 7 when peer connectedness was included in the model.

Sadness and worries. Holding children's profile membership constant, adult connectedness was associated with a 0.36-point decrease in sadness and 0.20-point decrease in worries (indicating higher well-being). Adjusting for profile membership, peer connectedness

[4] The indirect-to-total effects ratio can be greater than 100% when the indirect and total effects are opposite signs (+/-). This is called "inconsistent mediation" and can indicate the simultaneous occurrence of two opposing mediational processes (i.e., suppression; Mackinnon, Fairchild, & Fritz, 2007).

was associated with a 0.31-point decrease in sadness and a 0.25-point decrease in worries. Accounting for the mediator variables again attenuated the initial differences observed between children's early social-emotional functioning and later sadness and worries, however these changes were generally smaller than observed with life satisfaction, optimism, and self-concept (< 40%). One exception was found for children in Profile 2 ("inhibited-adaptive"), for whom peer connectedness attenuated Grade 4 sadness and worries by 47% and 85%, although the initial difference between Profile 2 and Profile 1 on these measures were not particularly large. For all other profile groups, the previously observed associations between Kindergarten social-emotional functioning and Grade 4 sadness and worries remained statistically significant.

4.4. Discussion

This study had three objectives: to identify latent profiles of early social-emotional functioning among children at Kindergarten school entry, to examine how these profiles would predict children's Grade 4 subjective well-being, and to assess whether connectedness to adults and peers would mediate these associations. Seven latent profiles of children's early social-emotional functioning were identified, demonstrating a similar pattern of profiles previously identified in the studies presented in Chapters 2 and 3. As in those studies, the majority of children in current cohort (55.6%) exhibited overall high social-emotional functioning, whereas approximately 5% of children exhibited considerably lower social skills and higher aggression and hyperactivity than other children (from two to four standard deviations below the population mean). As hypothesized, children with membership to more vulnerable social-emotional profiles at school entry reported lower subjective well-being in Grade 4. For life satisfaction, self-concept, and sadness, these associations followed a gradient pattern, with each more vulnerable profile group associated with incremental decreases in well-being. For optimism and worries,

children in Profile 6 ("inhibited-low social-emotional functioning") reported slightly better well-being compared to children in Profile 5 ("uninhibited-aggressive/hyperactive") and Profile 7 ("uninhibited-lower social-emotional functioning") although these mean comparisons were not statistically significant.

Of primary interest in this study were the subsequent associations between early social-emotional profiles, connectedness to adults and peers, and self-reported well-being. Results provided support for the proposed mediation model, indicating that early childhood social-emotional behaviours seem to influence later well-being at least partially through adult and peer connectedness. Due to the large sample size, significance tests of indirect effects were statistically significant across all mediation models. More importantly, however, several mediation pathways were identified that produced sizable changes in the initial association between latent profiles and the outcome (indirect-to-total effects ratios > 50%) that were considered to be particularly meaningful.

In relation to the life satisfaction outcome, initial lower life satisfaction among children with high inhibition (Profiles 2 and 4) compared to children with overall high social-emotional functioning (Profile 1) was substantially attenuated by connectedness to both adults and peers (i.e., perceived connectedness to peers and adults largely explained why children in Profiles 2 and 4 reported lower life satisfaction than children in Profile 1). Peer connectedness also substantially mediated differences in life satisfaction for children with high aggression and hyperactivity, with and without high inhibition (Profiles 6 and 5, respectively), compared to children in Profile 1. A similar pattern emerged for optimism, in that children in the profile groups with highest vulnerabilities (Profiles 4 to 7) showed lower initial optimism than children in Profile 1 in a total effects model, but not as low optimism after taking into account adult and

peer connectedness. Notably, optimism was the only well-being outcome where evidence of inconsistent mediation was observed (indirect-to-total effect ratios > 100%). That is, membership to Profiles 2, 6, and 7 was initially associated with lower optimism in a total effects model, but associated with *higher* optimism after taking social connectedness into account. Although inconsistent mediation can sometimes indicate suppression effects (Mackinnon, Krull, & Lockwood, 2000), in this scenario this effect likely occurred because of the very small initial association between these profile groups and optimism being overpowered by the strong effect of the mediator (further discussed under the study limitations). Again, it is important to recognize that percent change in the coefficient is a relative measure, and should be interpreted in the context of the absolute effect size of the associations between variables.

Similar attenuation patterns emerged for self-concept, whereby adult and peer connectedness were again found to largely attenuate the initial differences observed between the lower social-emotional functioning profiles and the outcome. Mediation effects were not as evident for the sadness and worries outcomes, which could be due to the relatively smaller initial correlations between the mediator variables and these outcomes. Although higher social connectedness was associated with lower sadness and worries, this correlation may have been smaller due to potential negative features of close relationships, such as conflict or co-rumination, that can also be a source of internal distress for children despite their overall benefits (La Greca & Harrison, 2005). Overall, peer connectedness attenuated children's subjective well-being associations more than adult connectedness, which suggests peer relationships may be particularly salient for children's well-being in middle childhood (Bornstein et al., 2010; Kingery et al., 2011).

The current results are consistent with past research, finding that social connectedness is a key factor influencing children's perceived well-being (Diener et al., 2017; Diener & Seligman, 2002; Gadermann et al., 2015; Gillham et al., 2011; Guhn et al., 2013; Lyons et al., 2012; Olsson et al., 2013; Rueger et al., 2016). Additionally, given the prospective design of the current study, the results identify connectedness to adults and peers as a potential mechanism to help change potentially maladaptive trajectories from early social-emotional vulnerability to later well-being. That said, although this study tested a directional pathway from early childhood social-emotional functioning → adult and peer connectedness → subjective well-being, an area that warrants further investigation is exploring the bidirectional associations between children's early social-emotional behaviours and connectedness to others (Gillham et al., 2011; Groh, Fearon, Ijzendoorn, Bakermans-Kranenburg, & Roisman, 2017). For example, a large body of evidence suggests that early attachment to a primary caregiver influences children's behaviours including their social competence, externalizing behaviours, and to a lesser degree their internalizing behaviours, rather than behaviours influencing attachment (Groh et al., 2017). Subsequently, these early attachment styles are predictive of future connectedness to peers, with early insecurities undermining children's social competence and abilities to form peer relationships (Groh & Bakermans-Kranenburg, 2014). In this way, it is also plausible that connectedness with a primary caregiver/adult at home is a common cause in the relationship between early childhood social-emotional vulnerability and later well-being (Mackinnon et al., 2000). Early attachment style was not an available measure in the current study, but would be an important factor to include in future investigations. It was of interest to explore social connectedness as a mediator because it is considered to be malleable (rather than a fixed attribute) and can vary across time (Mackinnon et al., 2000; Sroufe, 2005). Still, caution should be taken when interpreting these

results, as the associations between children's social-emotional behaviours and social connectedness are highly complex.

Relatedly, the current results raise additional questions regarding why social connectedness explained associations between some profile groups and well-being better than others. For example, adult and peer connectedness did not explain as much of the differences between children with uninhibited behaviours (Profiles 3 and 5) and Profile 1 on the well-being outcomes. This could be interpreted as indicating that close relationships with trusted friends and adults matter more for children who are naturally inhibited (Profiles 2, 4, 6), than for children who are more outgoing. For example, bivariate analyses in the current study identified that children in Profile 4 who exhibited high inhibition and low social skills, but otherwise low aggression and hyperactivity, scored consistently low on adult and peer connectedness measures, with comparable connectedness scores to children with the highest overall social-emotional vulnerabilities (Profiles 6 and 7). Future research should investigate these differences using more advanced methodologies, such as moderated mediation, to test whether subgroups of children experience associations between connectedness and well-being differently, depending on their social-emotional patterns (Hayes & Preacher, 2014). Furthermore, mixed methods research may be particularly useful in this area, further enabling children to describe the relationships and experiences that have meaning to them, potentially elucidating the reasons why social connectedness operates differently across dimensions of well-being.

4.4.1. Strengths and limitations

In a recent summary of the subjective well-being literature, Diener et al. (2017) call for more research using large samples, and more studies using diverse measures of well-being to better understand the intricacies of this construct. The current study addresses both of these

recommendations, using a large population sample of school-age children, and analyzing associations across five distinct dimensions of well-being. Analysis of distinct well-being outcomes enabled the observation of different patterns between social-emotional profiles and well-being dimensions, including linear progressions from highest to lowest social-emotional functioning (life satisfaction, self-concept, sadness) as well as non-linear progressions with well-being (optimism and worries). This study also contributes to the literature by linking two population databases to predict children's self-reported well-being at age nine with their earliest recorded social-emotional development ratings (by teachers) at age five. Few studies have the opportunity to collect and link such records, demonstrating the value of population health monitoring tools for examining longitudinal patterns in child development and identifying the factors that may modify these trajectories. Finally, this study adds to the growing body of research upholding children's self-reported emotional and psychological experiences as a valid and valued outcome measure that provides unique information over and above parent and teacher-rated assessments (De Los Reyes & Kazdin, 2005; Deighton et al., 2014; Ravens-Sieberer et al., 2014; Varni, Limbers, & Burwinkle, 2007).

While the use of self-reported well-being was a notable strength of this study, it also meant potential reductions to the predictive power of the explanatory variable, derived from teacher-reported early childhood behaviours. Generally, in observational studies, small to moderate correlations have been observed when social-emotional behaviours are compared over time (i.e., between school entry and later school years; La Paro & Pianta, 2000). Furthermore, existing studies have found sizable discrepancies between child and teacher ratings of social-emotional behaviours measured concurrently, with correlations in the $r = .20$ range (De Los Reyes & Kazdin, 2005; Goodman, 2001). That said, higher correlations between multi-informant

ratings have been observed for younger children (ages six to eleven) compared to older children (ages twelve to nineteen), possibly because younger children's behaviours are more observable or more consistent (De Los Reyes & Kazdin, 2005). The current study identified small to moderate effect sizes between time points (and between raters), consistent with that research. Importantly, current multi-informant studies generally recommend the use of child self-report measures, even when observational measures are available, as children tend to report more contextualized information than parents or teachers who tend to rate children's behaviours more generally (De Los Reyes & Kazdin, 2005; Goodman, 2001). Keeping these limitations in mind, teacher-reported measures of child behaviour at school entry have still been found to be predictive of adolescents' self-reported mental health and well-being as much as eight years later, emphasizing the value of involving teachers in early identification and intervention efforts for childhood mental health and well-being (Honkanen et al., 2014). Comparably, in the current study, teacher's ratings of early childhood social-emotional functioning were predictive of children's self-reported well-being four years later, even with selective drop-out across time points from children with more vulnerable social-emotional functioning at school entry, which would only have attenuated observed associations (Wolke et al., 2009).

Finally, it should be noted that this study was an exploratory analysis of adult and peer connectedness as mediators of the associations between early social-emotional profiles and subjective well-being and did not examine all potential confounders or mediation pathways. Future research could include more in-depth analyses (such as moderated mediation) with additional covariates to better understand the intricacies of these associations (Hayes & Preacher, 2014). Moderated mediation, for example, could explore the possibility that connectedness has a greater impact on well-being for some latent profiles of children than for others. Similarly,

inclusion of new variables such as socioeconomic status (absent in this study due to the unavailability of this variable) could again examine differences in the association between connectedness and well-being depending on children's level of family income. Relatedly, more refined methods, such as residualized regression (Wodtke & Almirall, 2017), could also better isolate the predictive power of the explanatory variable on the outcome, adjusting for the high degree of shared variation between the mediator and the outcome that occurs when measures are rated at the same time by the same rater (i.e., children in Grade 4) compared to teacher's ratings in Kindergarten. Such methods were beyond the scope of the current investigation, but warrant further exploration.

4.4.2. Implications and future directions

Research consistently demonstrates that supportive relationships with peers and adults is one of the strongest predictors of children's well-being concurrently and across the life course (Diener et al., 2017; Diener & Seligman, 2002; Gadermann et al., 2015; Gillham et al., 2011; Guhn et al., 2013; Lyons et al., 2012; Olsson et al., 2013; Rueger et al., 2016). The present study builds on this evidence, demonstrating that progressions from early childhood social-emotional vulnerabilities to lower well-being in middle childhood may be influenced by feelings of connectedness to a trusted friend or adult. The power of close social connections is reflected in the resilience literature, which proposes that resilience is not an internal trait, but an outcome of everyday adaptive processes in which supportive relationships play a critical role (Masten & Tellegen, 2012). Processes that foster resilience also may be particularly salient during the transition period from early to middle childhood, when over half of chronic mental health problems are first reported to occur (Kessler et al., 2005). Furthermore, research is needed to examine trajectories from early childhood (and long *before* early childhood) that focus on

identifying mechanisms that create, sustain, or modify patterns in social-emotional health throughout adolescence and adulthood, as well as how the timing of such modifying factors might affect children's current and future well-being.

Chapter 5: Discussion and Conclusions

Burgeoning research in the area childhood social-emotional health has found that early social-emotional vulnerabilities including low social skills, internalizing and externalizing symptoms are associated with increased risk of mental health problems and diminished well-being across the life course (Egger & Angold, 2006; Domitrovich, Durlak, Staley, & Weissberg, 2017; Greenberg, Domitrovich, Weissberg, & Durlak, 2017; Kessler et al., 2005; Wichstrøm & Berg-Nielsen, 2014). Due to the serious consequences of leaving early mental health symptoms unaddressed, research has highlighted the importance of examining patterns in early childhood social-emotional functioning for informing early detection at a population-level and identifying levers to improve mental health and well-being (McGorry et al., 2014). This dissertation contributes to the knowledge base in this area by identifying patterns of early social-emotional indicators among young children and social resources within children's early environments associated with positive trajectories of mental health and well-being. Using large administrative datasets including provincial health insurance data and school-based population-level data on children's teacher-rated and self-reported health and well-being, the empirical studies described in Chapters 2 through 4 highlight several key findings that can inform mental health promotion efforts and areas for future research.

5.1. Summary of Findings

At the outset of this research, it was hypothesized that children's observable social-emotional behaviours during Kindergarten (measured using the Early Development Instrument [EDI]; Janus & Offord, 2007) could identify common social-emotional patterns that naturally group together in populations. Furthermore, it was hypothesized that these patterns might predict future mental health and well-being outcomes measured objectively through physician's

assessments, and measured subjectively through children's self-reports. Chapter 2 applied person-centered latent variable modeling (latent profile analysis) to identify unique patterns of social-emotional strengths and vulnerabilities among Kindergarten children in BC. This analysis identified a subgroup of children (3% of the population) with high vulnerability in both internalizing and externalizing symptoms. Results also showed social gradients, with boys, children with ESL status, and children from lower socioeconomic households over-represented in "lower social-emotional functioning" subgroups. In subsequent analyses in Chapter 3, it was observed that children's school entry social-emotional profiles were strongly associated with mental health conditions experienced by age fourteen, with up to a 12-fold increase in probability of a single condition (for anxiety, depression, conduct disorder, or ADHD) and up to a 9-fold increase in probability of multiple conditions. This study also indicated that children with better social skills did not show this same risk of future conditions, even when they had comparable vulnerabilities in other areas. Chapter 4 concluded this research by conducting an exploratory mediation analysis to better understand the mechanisms of the progression from early social-emotional functioning to later subjective well-being in middle childhood. Children's perceived connectedness to peers and adults in their homes, schools, and neighbourhoods attenuated each of the associations examined between early social-emotional vulnerabilities and later well-being, implicating the important role of social relationships in promoting mental wellness in childhood and during transitions to adolescence.

5.1.1. Methodological contributions

One of the unique contributions of this research was the application of person-centered analyses to observe heterogeneous patterns in children's social-emotional development. Previous research has often relied on variable-centered methods that measure children's functioning on a

single measure independent of children's functioning on other social-emotional indicators (Berlin et al., 2014a; Lubke & Muthén, 2005; Rettew et al., 2008). Person-centered methods may be particularly valuable in the area of child psychology and psychiatry, where one of the challenges identified with the current diagnostic system is the substantial comorbidity of symptoms and their relation to not one, but several mental health outcomes, exacerbating the difficulty of early detection and diagnosis (Rettew, 2010). Furthermore, childhood mental health conditions can progress and differentiate over the life course – particularly during adolescence (Hannigan, Walaker, Waszczuk, McAdams, & Eley, 2016). In clinical practice, several childhood symptoms including irritability, fatigue, difficulty concentrating, restlessness, physiological complaints, and difficulty sleeping could equally indicate depression, anxiety, ADHD, or a severe behaviour disorder, according to the DSM-V (American Psychological Association, 2013; Cheng & Myers, 2011). Some research suggests that these early symptoms may lead to multiple mental health outcomes by triggering each other (e.g., through learned experiences; Patterson & Capaldi, 1990). More recent research, however, indicates that mental health conditions may have shared genetic and environmental causes and that the expressions of early emotional problems may operate more like a phenotype, with variations in outcomes influenced by children's social, hormonal, and physical environments (Caspi et al., 2014; Hannigan et al., 2016).

In line with this emergent perspective on mental health etiology, the predictive specificity of early detection tools and their role in informing interventions may benefit from the use of additional information identifying common symptoms shared *across multiple conditions* that can be modified to circumvent multiple mental health issues (Patel, 2013; Rettew, 2010; Wichstrøm et al., 2017). Within this dissertation, important symptoms that emerged using person-centered

analysis were social skills, readiness to explore, aggression, and hyperactivity. These indicators, over and above the others (i.e., prosocial or anxious/fearful behaviours) best differentiated profiles of early childhood social-emotional functioning and also identified parallel/complimentary patterns, with lower readiness to explore (a measure of behavioural inhibition) often presenting opposite to higher externalizing behaviours (aggression, hyperactivity). Social skills (including overall social competence, responsibility and respect, and positive approaches to learning) further differentiated profiles that were considered "adaptive" (i.e., Profiles 2 and 3) versus problematic (Profiles 4 to 7). Although these initial profile labels were determined based on relative scores compared to the overall high social-emotional functioning group (Profile 1), prospective analyses conducted in Chapters 3 and 4 in fact showed that children in Profiles 4 to 7 experienced significantly worse outcomes in mental health and well-being longitudinally compared to children with relative strengths in social skills, indicating social skill building as a critical area for intervention to promote mental health and wellness (Masten & Tellegen, 2012; Stice et al., 2010). Likewise, universal school-based interventions that aim to reduce heightened inhibition, aggression, and hyperactivity/inattention could serve the dual benefits of circumventing immediate outcomes such as social exclusion, anxiety, and learned failure, as well as long-term outcomes that including internalizing and externalizing mental health disorders (Durlak et al., 2011; Greenberg et al., 2017). Learning that early vulnerabilities frequently occur concomitantly also suggests that trans-diagnostic treatments and other interventions (e.g., those that combine emotional disorder therapy with positive mental health promotion) may be effective strategies for addressing emerging childhood mental health issues (Ellard, Fairholme, Boisseau, Farchione, & Barlow, 2010; Trompetter et al., 2017).

5.1.2. Implications for population and public health

From a population and public health perspective, assessing the variation and prevalence of symptom patterns within a population can indicate where resources are needed not only to target high-risk individuals, but to shift a larger proportion of children experiencing mild to moderate symptoms along a spectrum of well-being to improve population health outcomes overall. In this regard, two important findings from this research were that over 40% of children demonstrated areas of relative social-emotional vulnerability across a range of social-emotional indicators and that these patterns were inequitably distributed within the BC Kindergarten population.

Overall, more than 55% of children in each EDI cohort demonstrated overall high social-emotional functioning. Although, as Profiles 2 and 3 indicate, there is a range of functioning at the population-level, whereby heterogeneity in well-being outcomes are observed. The more than 25% of children included in Profiles 2 and 3 (who scored within half a standard deviation below the mean on readiness to explore, or social skills, aggression, hyperactivity/inattention, but also exhibited corollary strengths) fared better than children in higher vulnerability groups on longitudinal measures of mental health and well-being and even showed comparable outcomes to Profile 1 in some cases. These overall patterns were observed across 12 years of EDI data collection (from 2001 to 2012), with nearly identical compositions of social skills, internalizing, and externalizing behaviours observed within profile groups for each cohort (with some variation at the lowest functioning levels).

As Rose's theorem suggests (1985), significant impacts at the population-level can be gained by creating conditions whereby children from lower social-emotional functioning subgroups can 'migrate' to more moderate subgroups. Such strategies have the potential to both

reduce the overall number of children at very high risk, and to improve outcomes for a large proportion of children experiencing better (albeit not fully) adaptive social-emotional functioning status (Rose, 1985). In the current dissertation, several profile patterns were observed that differed only in their level of relative severity. This suggests that it may be feasible to 'shift' the overall distribution of outcomes in the population towards higher levels of social-emotional functioning (i.e., from Profile 4 to 2, and from Profile 5 to 3). The observed patterns of social-emotional vulnerability also signal that proportionate universalism approaches may hold promise, whereby universal actions are taken to improve outcomes for all children, but are specialized to a degree that is proportionate with children's level of vulnerability (Allen, Balfour, Bell, & Marmot, 2014).

Social gradients among population profile distributions were also observed across studies – the proportion of boys and children from lower income families increased in a step-wise fashion as the overall degree of vulnerability increased across social-emotional functioning groups. Children with ESL status were generally over-represented in more 'inhibited' profiles (2 and 4), but also had lower odds of membership to the more vulnerable profile groups (compared to children without ESL status) in low income contexts (discussed in Chapter 2). These patterns suggest that children's development of social-emotional functioning is not random, but may be influenced by social and structural factors beyond children's control. A vast amount of research, for example, has demonstrated how disadvantageous social and economic conditions during early childhood can create inequities in child development that permeate across the life course (Hertzman & Boyce, 2010; Reiss, 2013; Shonkoff & Garner, 2012). For example, infant-caregiver attachment is often discussed as a central mechanism through which disadvantages in social-emotional functioning can develop, although several other mechanisms operating

concurrently or independently can also produce these inequities (Bowlby, 1973; Groh & Bakermans-Kranenburg, 2014; Groh et al., 2014; Sroufe, 2005).

Taking infant-caregiver attachment as one example, a secure relationship with a primary caregiver has been found to be associated with greater childhood social competence, fewer externalizing behaviours, and, to a lesser extent, fewer internalizing behaviours (Groh et al., 2017; Sroufe, 2005). In contrast, insecure attachment can occur when the conditions for caregiver responsiveness are not met. These conditions, including financial instability, caregiver health and mental health problems, divorce, limited access to childcare resources, and low social status/stigmatization, can undermine caregiver sensitivity, which in turn has been associated with greater child behaviour problems (Basten et al., 2013; Braungart-Rieker, Hill-Soderlund, & Karrass, 2010; Bronfenbrenner, 1979; Evans & English, 2002; Miner & Clarke-Stewart, 2008; Mistry, Benner, Biesanz, & Clark, 2010). The resulting stress from an inconsistent or insecure infant-caregiver relationship can debilitate children's developing stress-reaction systems (hypothalamic-pituitary-adrenal axis), as well as influence epigenetic and cerebral changes affecting executive functioning, memory, and emotional processes, making it more difficult for children to self-regulate their behaviours in the presence of future stressors (Apter-Levi et al., 2016; Heim & Binder, 2012; Hertzman & Boyce, 2010; Hostinar, Sullivan, & Gunnar, 2014; Repetti, Taylor, & Seeman, 2002). Furthermore, stressful circumstances that can induce these changes are not limited to infant-caregiver interactions; other detrimental conditions include subordination in early social hierarchies (including preschool classrooms), unsafe home or neighbourhood environments, lack of opportunities to play, deprived sensory environments, and social discrimination based on factors such as child gender, ethnicity, and minority status (Hertzman & Boyce, 2010).

The point at which population health responses may be most effective at addressing childhood social-emotional functioning, therefore, is promoting healthy foundations for children including opportunities for secure attachment, play, and social acceptance, and reducing conditions that can reinforce toxic stress throughout the life course (Bakermans-Kranenburg, Ijzendoorn, & Juffer, 2003; Cooke et al., 2014; Schwartz & Meyer, 2010; Shonkoff & Garner, 2012; Umberson et al., 2014). For example, intersectionality theory posits that children with multiple social disadvantages (e.g., social class, gender, minority status) are at highest risk of social stress and subsequent mental health problems due to increased discrimination and exclusion (Cooke et al., 2014; Schwartz & Meyer, 2010; Umberson et al., 2014). Therefore, improving children's social-emotional functioning at a population-level also requires upstream interventions that address the social processes that create and sustain inequities in child mental health. For example, policies that mandate monetary and social support for families with children, provision of affordable high-quality child care, universally accessible early childhood education programs, subsidized housing and transportation to child care, increased job training and security for parents, and improved connections to resources have all been cited as evidence-based strategies capable of reducing social inequities in health (Tobias, 2017).

5.1.3. Early identification and labeling

Regarding the application of this research, a final note is warranted regarding the potential hazards of early identification and the stigma associated with labeling children as having mental health issues. Although early identification of social-emotional symptoms can facilitate earlier access to treatment resulting in healthier developmental trajectories (Link & Phelan, 2013; Wright et al., 2007; Wright, Jorm, & Mackinnon, 2011), the associated stigma can also negatively affect children and their families (Link & Phelan, 2013; Wright et al., 2011).

Perceived external stigma and child gender have been identified as strong predictors of adolescents' decisions whether or not to disclose a mental health concern to friends or family (Chandra & Minkovitz, 2006). Similarly, fear of blame and judgement has been associated with parents' decisions to seek treatment for their children, which is also problematic as parents are often the gatekeepers for children accessing mental health services (Brannan & Heflinger, 2006; Mukolo et al., 2010). However, overall, the benefits of early identification are generally regarded to outweigh the unintended harms (Link & Phelan, 2013; Wright et al., 2011), if appropriate efforts are made to address stigma. For example, practices that have been found to maximize help-seeking and minimize stigmatization include labeling a behaviour or condition rather than the child (Link & Phelan, 2013), and using accurate labels such as "depression" rather than labels such as "mental illness," "stress," or "shyness" (Wright et al., 2007). Continued efforts are needed in this area to correct misinformation and improve the general lack of mental health knowledge about and among young children (Mukolo et al., 2010).

5.2. Overarching Strengths and Limitations

Specific strengths and limitations associated with each empirical analysis have been detailed previously in each empirical chapter of this dissertation (Chapters 2 to 4). Here, several overarching strengths and limitations that have not been previously noted in detail are reviewed. The primary strength of this research was the use of longitudinal population-level datasets made available by the Human Early Learning Partnership, BC Ministries of Health and Education, and Population Data BC (BC Ministry of Health, 2015; Human Early Learning Partnership, 2015; PopulationData BC, 2017). As discussed in Chapter 3, administrative data linkage enables exploration of a vast array of population health research questions, offering the advantages of

being able to study multiple outcomes over multiple time periods, including low prevalence outcomes such as specific mental health conditions (Jutte et al., 2011).

The data collection context in BC furthermore provided an unparalleled opportunity to investigate not only administrative health insurance records, but population-level child development outcomes measured by the EDI and MDI (Janus & Offord, 2007; Schonert-Reichl et al., 2013). The routine administration of these surveys within BC public schools (for the past 12 years and 8 years, respectively) provides a rich resource for investigators examining time trends in child development, population health inequities, contextual factors affecting developmental outcomes, and trajectories of health, development, and academic achievement (Gadermann et al., 2015; Guhn et al., 2016, 2013; Oberle et al., 2014). Furthermore, the range of observer perspectives represented in this research (from physician's records in the administrative data, to teacher-reported EDI responses and child self-reported MDI responses) provided unique opportunities for triangulation of the data, filling gaps in observational opportunities and identification knowledge that are especially prevalent in observations of child mental health and well-being (De Los Reyes & Kazdin, 2005; Donnell et al., 2016; Goodman, 2009; Honkanen et al., 2014; Zachrisson et al., 2006). Few jurisdictions have the advantage of retaining multiple population-based datasets – representative of an entire province of children – that are linkable at an individual level.

While the use of multiple observational measures was a strength of this research, the secondary use of large-scale administrative data also posed some limitations. Primarily, all data sources used in this study likely underestimated the frequency of mental health conditions in the BC child population. In relation to help-seeking for mental health problems, a pathway of filters has been described that young people must pass through – starting with their own (or an adult's)

recognition of symptoms, recognition of symptoms from a health professional, and finally connection to treatment (Zachrisson et al., 2006; Zwaanswijk, Verhaak, Bensing, van der Ende, & Verhulst, 2003). Failures along any part of this pathway result in underestimated prevalence rates in public health records, and more importantly, missed opportunities to help children who could benefit from increased support and targeted treatment. Increased recognition of early symptoms - and further research to help improve identification strategies – are therefore of utmost importance for beginning to address these shortcomings. While under-reported and undiagnosed mental health conditions certainly would have underestimated the outcome measure in Chapter 3 (where mental health data were obtained from MSP billing codes not collected for this specific research purpose), it also may have affected teacher's observations of early childhood social-emotional functioning across all three studies. That is, previous research has indicated that teachers may not have the same opportunities to observe more subtle indicators of childhood emotional problems as parents, and may not be as observant of internalizing behaviours as externalizing behaviours (Bradshaw et al., 2008; De Los Reyes & Kazdin, 2005). This might explain in the current research, for example, why greater variation was observed on the teacher-rated subscales of externalizing behaviours (aggression, hyperactivity) than anxious and fearful behaviour. That said, it is important to reiterate that the EDI is not designed as a diagnostic tool, and the objectives in this dissertation were only to explore the utility of population health monitoring surveys, such as the EDI, for observing population patterns in child mental health and well-being indicators.

A related limitation of this research was potential under-representation of children from very high and very low income families, both in the EDI and MDI surveys as well as the administrative health data. Because the EDI and MDI are administered within the public school

system, this excludes approximately 12% of BC children who attend private school or home schooling. Demographic statistics suggest these children accessing alternative schooling are often from more affluent families (Frenette & Chan, 2015). Furthermore, descriptive analyses within Chapter 3 identified that children from lower income families and who spoke English as a Second Language were more likely to be lost to follow-up by age fourteen and as a result were under-represented in the mental health conditions study. Similarly, children who were missing MDI data in Grade 4 (Chapter 4) had initially lower social-emotional functioning in Kindergarten. Because challenges with mental health and well-being have been found to be more prevalent among children at socioeconomic extremes (Luthar & Latendresse, 2005; Reiss, 2013) and among children with higher initial vulnerabilities (Fanti & Henrich, 2010; Hill et al., 2006; Wiggins et al., 2015), under-representation from these populations in the datasets may have resulted in a selection bias whereby mental health problems and low well-being were underestimated, thus attenuating associations observed in these studies.

Secondary data analysis also precluded the inclusion of several important related variables that could better elucidate the associations between children's social-emotional functioning, sociodemographic characteristics, mental health problems, subjective well-being, and social relationships. For example, parent mental health and infant-caregiver attachment measures were not available in these datasets. Emerging research in this area, including research from several Canadian scholars, is elucidating the ways in which infant social-emotional development is influenced through intergenerational patterns of mental health and attachment, identifying further biological mechanisms of transmission including adrenocortical function and brain structure development (Atkinson et al., 2013; Cassibba, Coppola, Sette, Curci, & Costantini, 2017; Leblanc, Dégeilh, Daneault, Beauchamp, & Bernier, 2017; Unternaehrer et al.,

2017). These studies investigating generational history and biological markers open up new research avenues for exploring the etiology of mental health conditions to further inform early intervention opportunities.

Finally, it is also important to address that the interpretation of latent profile analysis (LPA) requires a certain degree of subjectivity from the researcher and is not diagnostic (Nylund et al., 2007). Based on the relative fit indices across studies, it would have also been justifiable to select a more parsimonious model with fewer classes/population subgroups. However, a reason for selecting model fit solutions with comparatively more subgroups (and consequently, smaller class sizes) is that often in health research the outcomes of interest are at the tails of the population distribution. In child psychology and psychiatry for example, compromising early childhood behaviour and emotional problems are fortunately quite rare (Egger & Angold, 2006; Merikangas et al., 2009). Across all three studies, at least six unique profiles of social-emotional functioning were identified, with the population prevalence of lower functioning profiles corroborating clinical psychiatric rates (3% to 9%) observed within community-based early childhood samples (Egger & Angold, 2006). Although, comparing across the three dissertation analyses, differences were observed with respect to the composition of the lowest social-emotional functioning group(s).

In Chapter 2, children in the lowest functioning profile (2.5%, six-class solution) scored the lowest of any profile group on every measure of social-emotional functioning. Prosocial and anxious behaviour scores were not as low as the other subscales, but overall these subscales generally did not differentiate profile groups well – possibly due to teachers not being as able to readily observe these behaviours. In contrast, while the LPA in Chapter 3 also identified a six-class solution, children in the lowest functioning profile (2.8%) actually scored higher on

readiness to explore than children in Profiles 2 and 4, but also exhibited substantially higher aggression than the next nearest profile group. Finally, in Chapter 4, two lower functioning groups were identified within a seven-class solution. Profile 6 (2.9%) more closely represented the lowest profile pattern identified in Chapter 2, whereas Profile 7 (2.3%) more closely represented the lowest profile pattern identified in Chapter 3. Again, the seven-profile solution was selected based on subjective interpretation, however it may also more broadly reflect the worsening trend in children's social-emotional functioning that has been observed in the BC data over time (children in Chapter 4 represented the most recent cohorts of BC Kindergarten children; Human Early Learning Partnership, 2016). Future research could further investigate these discrepancies by conducting confirmatory LPA with the model fit selections identified in this research, attempting to replicate these patterns using other data sources. Furthermore, alternative person-centered methods could be applied with datasets that that are designed to specifically examine trajectories of mental health outcomes over time (e.g., latent transition analysis, latent growth curve modeling; Berlin et al., 2014b; Lanza, Patrick, & Maggs, 2014). Employing longitudinal approaches in future research may be particularly important as current research has expressed a need for more evidence on the role of time-varying factors such as parenting, peer relationships, and adverse life events (Wichstrøm et al., 2017).

5.3. Conclusions

This dissertation presents evidence that population patterns of children's early mental health and well-being can be observed systematically at Kindergarten school entry, and that social-emotional profiles are related to social factors including socioeconomic status, gender, and ESL status. This research also identifies several levers that can be acted upon for intervention, including focusing on high impact symptoms that are associated with multiple other symptoms

and future conditions (such as high aggression and low social skills), as well as promoting opportunities for connectedness with adults and peers. Moreover, the results highlight several practical benefits of population health monitoring for child social-emotional development including feasibility within school systems, improved recognition of early mental health indicators, and increased awareness and uptake of evidence-based programming that can boost children's resilience during formative periods (Greenberg et al., 2017; Masten & Tellegen, 2012; McGorry et al., 2014). The observed universalism and inequity of young children's social-emotional vulnerabilities furthermore illuminates that addressing childhood mental health requires population-level interventions, in addition to the more traditional focus on individual cases. Early identification and linkage to treatment are helpful strategies once children begin to exhibit symptoms. Addressing the upstream and modifiable *social* conditions that disproportionately predispose specific groups of children to untoward mental health issues is equally important and implies much needed action to improve social, economic, and environmental conditions to prevent problems and support optimal health from the earliest stages of development (Fertman, Delgado, & Tarasevich, 2014; Miles, Espiritu, Horen, Sebian, & Waetzig, 2010; Rose, 1985). Continuing to investigate the underlying causes of childhood mental health and well-being, their mechanisms, intergenerational impacts, and effective interventions, is therefore critical for informing population and public health strategies to create meaningful improvements for children.

Bibliography

Achenbach, T. M. (1991). Child behavior checklist for ages 4-18. Burlington, VT: Department of Psychiatry, University of Vermont.

Achenbach, T. M., Howell, C. ., Quay, H. C., & Connors, C. K. (1991). National survey of problems and competencies among 4 to 16-year-olds: Parents'reports for normative and clinical samples. *Monographs of the Society for Research in Child Development*, *56*, R5–R119.

Alexander, K. L., Entwisle, D. R., & Olson, L. S. (2007). Summer learning and its implications: Insights from the Beginning School Study. *New Directions for Youth Development*, *114*, 11–32. https://doi.org/10.1002/yd.210

Allen, J., Balfour, R., Bell, R., & Marmot, M. (2014). Social determinants of mental health. *International Review of Psychiatry*, *26*(4), 392–407. https://doi.org/10.3109/09540261.2014.928270

American Psychological Association. (2013). Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. Retrieved February 25, 2017, from http://dsm.psychiatryonline.org

Amone-P'Olak, K., Burger, H., Ormel, J., Huisman, M., Verhulst, F. C., & Oldehinkel, A. J. (2009). Socioeconomic position and mental health problems in pre- and early-adolescents. *Social Psychiatry and Psychiatric Epidemiology*, *44*, 231–238. https://doi.org/10.1007/s00127-008-0424-z

Angold, A., Costello, E. J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology & Psychiatry*, *40*(1), 57–87. https://doi.org/10.1111/1469-7610.00424

Antaramian, S. P., Huebner, E. S., Hills, K. J., & Valois, R. F. (2010). A dual-factor model of mental health: Toward a more comprehensive understanding of youth functioning. *American Journal of Orthopsychiatry*, *80*(4), 462–472. https://doi.org/10.1111/j.1939-0025.2010.01049.x

Apouey, B., & Geoffard, P. Y. (2013). Family income and child health in the UK. *Journal of Health Economics*, *32*(4), 715–727. https://doi.org/10.1016/j.jhealeco.2013.03.006

Apter-Levi, Y., Pratt, M., Vakart, A., Feldman, M., Zagoory-sharon, O., & Feldman, R. (2016). Maternal depression across the first years of life compromises child psychosocial adjustment: Relations to child HPA-axis functioning. *Psychoneuroendocrinology, 64*, 47–56. https://doi.org/10.1016/j.psyneuen.2015.11.006

Archambault, I., Vandenbossche-Makombo, J., & Fraser, S. L. (2017). Students' oppositional behaviors and engagement in school: The differential role of the student-teacher relationship. *Journal of Child and Family Studies*, *26*, 1702-1712. https://doi.org/10.1007/s10826-017-0691-y

Atkinson, L., Gonzalez, A., Kashy, D. A., Santo, V., Masellis, M., Pereira, J., … Levitan, R. (2013). Maternal sensitivity and infant and mother adrenocortical function across challenges. *Psychoneuroendocrinology*, *38*(12), 2943–2951. https://doi.org/10.1016/j.psyneuen.2013.08.001

Bakermans-Kranenburg, M. J., Ijzendoorn, M. H. Van, & Juffer, F. (2003). Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin, 129*(2), 195–215. https://doi.org/10.1037/0033-2909.129.2.195

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Barry, M. M. (2009). Addressing the determinants of positive mental health: Concepts, evidence and practice. *International Journal of Mental Health Promotion*, *11*(3), 4–17. https://doi.org/10.1080/14623730.2009.9721788

Basten, M. M. G. J., Althoff, R. R., Tiemeier, H., Jaddoe, V. W. V, Hofman, A., Hudziak, J. J., … Van Der Ende, J. (2013). The dysregulation profile in young children: Empirically defined classes in the generation R study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *52*(8), 841–850. https://doi.org/10.1016/j.jaac.2013.05.007

Bayer, J. K., Ukoumunne, O. C., Mathers, M., Wake, M., Abdi, N., & Hiscock, H. (2012). Development of children's internalising and externalising problems from infancy to five years of age. *The Australian and New Zealand Journal of Psychiatry*, *46*(7), 659–68. https://doi.org/10.1177/0004867412450076

BC Ministry of Health, Health Sector Information, Analysis & Reporting Division. (2016). *MSP Information Resource Manual 2015/2016.*

BC Schools. (2017). Student headcount by grade. Retrieved March 31, 2017, from https://catalogue.data.gov.bc.ca/dataset/bc-schools-student-headcount-by-grade/

Ben-Arieh, A. (2008). The child indicators movement: Past, present, and future. *Child Indicators Research*, *1*(1), 3–16. https://doi.org/10.1007/s12187-007-9003-1

Ben-Shlomo, Y., & Kuh, D. (2002). A life course approach to chronic disease epidemiology:

Conceptual models, empirical challenges, and interdisciplinary perspectives. *International Journal of Epidemiology*, *31*, 285–293. https://doi.org/10.1093/ije/31.2.285

Berger, L. M., Paxspn, C., & Waldfogel, J. (2009). Income and child development. *Child and Youth Services Review*, *31*(9), 978–989. https://doi.org/10.1016/j.childyouth.2009.04.013.

Berlin, K. S., Parra, G. R., & Williams, N. a. (2014a). An introduction to latent variable mixture modeling (part 1): Overview and cros-sectional latent class and latent profile analyses. *Journal of Pediatric Psychology*, *39*(2), 174–87. https://doi.org/10.1093/jpepsy/jst085

Berlin, K. S., Parra, G. R., & Williams, N. A. (2014b). An introduction to latent variable mixture modeling (part 2): Longitudinal latent class growth analysis and growth mixture models. *Journal of Pediatric Psychology, 39*(2), 188–203. https://doi.org/10.1093/jpepsy/jst085

Bernstein, G. A., & Victor, A. M. (2011). Pediatric anxiety disorders. In K. Cheng & K. M. Myers (Eds.), *Child and adolescent psychiatry: The essentials* (2nd ed., pp. 103–121). Philadelphia: Wolters Kluwer.

Biederman, J., Petty, C. R., Clarke, A., Lomedico, A., & Faraone, S. V. (2011). Predictors of persistent ADHD: An 11-year follow-up study. *Journal of Psychiatric Research*, *45*(2), 150–155. https://doi.org/10.1016/j.jpsychires.2010.06.009

Bittner, A., Egger, H. L., Erkanli, A., Jane Costello, E., Foley, D. L., & Angold, A. (2007). What do childhood anxiety disorders predict? *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *48*(12), 1174–83. https://doi.org/10.1111/j.1469-7610.2007.01812.x

Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *The American Psychologist*,

57(2), 111–127. https://doi.org/10.1037/0003-066X.57.2.111

Bongers, I. L., Koot, H. M. ., van der Ende, J., & Verhulst, F. C. (2004). Developmental Trajectories of Externalizing Behaviors in Childhood and Adolescence. *Child Development*, *75*(5), 1523–1537. https://doi.org/10.1111/j.1467-8624.2004.00755.x

Bongers, I. L., Koot, H. M., van der Ende, J., & Verhulst, F. C. (2003). The normative development of child and adolescent problem behavior. *Journal of Abnormal Psychology*, *112*(2), 179–192. https://doi.org/10.1037/0021-843X.112.2.179

Bornstein, M. H., Hahn, C.-S., & Haynes, O. M. (2010). Social competence, externalizing, and internalizing behavioral adjustment from early childhood through early adolescence: Developmental cascades. *Development and Psychopathology*, *22*(4), 717–35. https://doi.org/10.1017/S0954579410000416

Bowlby, J. (1973). *Attachment and loss. Vol. 2: Separation: Anxiety and anger*. New York: Basic Books.

Bradshaw, C. P., Buckley, J. A., & Ialongo, N. S. (2008). School-based service utilization among urban children with early onset educational and mental health problems: The squeaky wheel phenomenon. *School Psychology Quarterly*, *23*(2), 169–186. https://doi.org/10.1037/1045-3830.23.2.169

Brannan, A., & Heflinger, C. (2006). Caregivers, child, family and service system contribution to caregiver strain in two child mental health service systems. *Journal of Behavioural Health Services and Research*, *33*(4), 408–422.

Braungart-Rieker, J. M., Hill-Soderlund, A. L., & Karrass, J. (2010). Fear and anger reactivity

trajectories from 4 to 16 months: The roles of temperament, regulation, and maternal sensitivity. *Developmental Psychology*, *46*(4), 791–804. https://doi.org/10.1037/a0019673

British Columbia Ministry of Health. (2015). Medical Services Plan (MSP) Payment Information File. Population Data BC. Data Extract. MOH (2012). Retrieved from http://www.popdata.bc.ca/data

Broeren, S., Muris, P., Diamantopoulou, S., & Baker, J. R. (2013). The course of childhood anxiety symptoms: Developmental trajectories and child-related factors in normal children. *Journal of Abnormal Child Psychology*, *41*(1), 81–95. https://doi.org/10.1007/s10802-012-9669-9

Broidy, L. M., Nagin, D. S., Tremblay, R. E., Bates, J. E., Brame, B., Dodge, K. A., … Vitaro, F. (2003). Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: A six-site, cross-national study. *Developmental Psychology*, *39*(2), 222–245. https://doi.org/10.1037/0012-1649.39.2.222

Bronfenbrenner, U. (1979). Contexts of child rearing: Problems and prospects. *American Psychologist*, *34*(10), 844–850.

Brownell, M. D., Ekuma, O., Nickel, N. C., Chartier, M., Koseva, I., & Santos, R. G. (2016). A population-based analysis of factors that predict early language and cognitive development. *Early Childhood Research Quarterly*, *35*, 6–18. https://doi.org/10.1016/j.ecresq.2015.10.004

Brownell, M. D., & Yogendran, M. S. (2001). Attention-deficit hyperactivity disorder in Manitoba children: Medical diagnosis and psychostimulant treatment rates. *Canadian*

Journal of Psychiatry, *46*(3), 264–272. https://doi.org/10.1177/070674370104600307

Bruchmüller, K., Margraf, J., & Schneider, S. (2012). Is ADHD diagnosed in accord with diagnostic criteria? Overdiagnosis and influence of client gender on diagnosis. *Journal of Consulting and Clinical Psychology*, *80*(1), 128–138. https://doi.org/10.1037/a0026582

Buck, C. J. (2003). *ICD-9-CM Volumes 1, 2, and 3, and HCPCS Level II* (1st ed.). St Louis, MO: Saunders, Elsevier Science.

Burke, J. D., Hipwell, A. E., & Loeber, R. (2010). Dimensions of oppositional defiant disorder as predictors of depression and conduct disorder in preadolescent girls. *Journal of the Academy of Child and Adolescent Psychiatry*, *49*(5), 484–492. https://doi.org/10.1016/j.jaac.2010.01.016

Byrne, N., Regan, C., & Howard, L. (2005). Administrative registers in psychiatric research: A systematic review of validity studies. *Acta Psychiatrica Scandinavica*, *112*, 409–414. https://doi.org/10.1111/j.1600-0447.2005.00663.x

Campbell, J. D., Assanand, S., & Di Paula, A. (2003). The structure of the self-concept and its relation to psychological adjustment. *Journal of Personality, 71*(1), 115–140. https://doi.org/10.1111/1467-6494.t01-1-00002

Canadian Institute for Health Information (CIHI). (2007). *The Status of Alternative Payment Programs for Physicians in Canada, 2003 – 2004 and Preliminary Information for 2004 – 2005*. Ottawa, ON.

Canadian Mental Health Association. (2016). Fast facts about mental illness. Retrieved February 21, 2017, from http://www.cmha.ca/media/fast-facts-about-mental-illness/

Cannon, M. F., & Weems, C. (2006). Do anxiety and depression cluster into distinct groups? A test of tripartite model predictions in a community sample of youth. *Depression and Anxiety*, *23*, 453–460. https://doi.org/10.1002/da

Carter, A. S., Briggs-Gowan, M. J., & Davis, N. O. (2004). Assessment of young children's social-emotional development and psychopatology: Recent advances and recommendations for practice. *Journal of Abnormal Child Psychology*, *45*(1), 109–134. https://doi.org/10.1046/j.0021-9630.2003.00316.x

Caspi, A., Houts, R. M., Belsky, D. W., Goldman-mellor, S. J., Harrington, H., Meier, M. H., … Moffitt, T. E. (2014). The p Factor: one general psychopathology factor in the structure of psychiatric disorders? *Clinical Psychological Science*, *2*, 119–137. https://doi.org/10.1177/2167702613497473

Cassibba, R., Coppola, G., Sette, G., Curci, A., & Costantini, A. (2017). The transmission of attachment across three generations: A study in adulthood. *Developmental Psychology*, *53*(2), 396–405. https://doi.org/10.1037/dev0000242

Castelao, C. F., & Kröner-Herwig, B. (2013). Different trajectories of depressive symptoms in children and adolescents: Predictors and differences in girls and boys. *Journal of Youth and Adolescence*, *42*(8), 1169–82. https://doi.org/10.1007/s10964-012-9858-4

Chandra, A., & Minkovitz, C. S. (2006). Stigma starts early: Gender differences in teen willingness to use mental health services. *Journal of Adolescent Health*, *38*(6), 1–8. https://doi.org/10.1016/j.jadohealth.2005.08.011

Cheng, K., & Myers, K. M. (Eds.). (2011). *Child and adolescent psychiatry: The essentials* (2nd

editio). Philadelphia: Wolters Kluwer.

Collaboarative for Academic Social and Emotional Learning (CASEL). (2013). *CASEL Guide: Effective Social and Emotional Learning Programs. Preschool and Elementary School Edition.* Chicago, IL.

Constantine, N. A., & Benard, B. (2001). *California Healthy Kids Survey Resilience Assessment Model: Technical Report*. Institute: Berkeley, CA.

Cooke, C. L., Bowie, B. H., & Carrère, S. (2014). Perceived discrimination and children's mental health symptoms. *Advances in Nursing Science*, *37*(4), 299–314. https://doi.org/10.1097/ANS.0000000000000047

Copeland, E. P., Nelson, R. B., Traughber, M. C. (2017). Wellness dimensions relate to happiness in children and adolescents. *Advances in School Mental Health Promotion, 3*(4), 25-37. https://doi.org/10.1080/1754730X.2010.9715689

Copeland, W. E., Shanahan, L., Costello, E. J., & Angold, A. (2009). Childhood and adolescent psychiatric disorders as predictors of young adult disorders. *Archives of General Psychiatry*, *66*(7), 764–772. https://doi.org/10.1001/archgenpsychiatry.2009.85

Copeland, W. E., Shanahan, L., Erkanli, A., Costello, E. J., & Angold, A. (2013). Indirect comorbidity in childhood and adolescence. *Frontiers in Psychology*, *4*, 1–8. https://doi.org/10.3389/fpsyt.2013.00144

Cormier, E. (2008). Attention Deficit/Hyperactivity Disorder: A review and update. *Journal of Pediatric Nursing*, *23*(5), 345–357. https://doi.org/10.1016/j.pedn.2008.01.003

Costello, E. J., Egger, H., & Angold, A. (2005). 10-year research update review: The

epidemiology of child and adolescent psychiatric disorders: I. Methods and public health burden. *Journal of the American Academy of Child & Adolescent Psychiatry*, *44*(10), 972–986. https://doi.org/10.1097/01.chi.0000172552.41596.6f

Costigan, C. L. (2006). Relations between parent – child acculturation differences and adjustment within immigrant chinese families. *Child Development, 77*(5), 1252–1267. https://doi.org/ 10.1111/j.1467-8624.2006.00932.x

Côté, S. M., Boivin, M., Liu, X., Nagin, D. S., Zoccolillo, M., & Tremblay, R. E. (2009). Depression and anxiety symptoms: Onset, developmental course and risk factors during early childhood. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *50*(10), 1201–8. https://doi.org/10.1111/j.1469-7610.2009.02099.x

Crosnoe, R., & Elder, G. H. J. (2004). From childhood to the later years: Pathways of human development. *Research on Aging*, *26*(6), 623–654. https://doi.org/10.1177/0164027504268491

Cuijpers, P., Munoz, R. F., Clarke, G. N., & Lewinsohn, P. M. (2009). Psychoeducational treatment and prevention of depression: The "coping with depression" course thirty years later. *Clinical Psychology Review*, *29*(5), 449–458. https://doi.org/10.1016/j.cpr.2009.04.005

Cummings, C. M., Caporino, N. E., & Kendall, P. C. (2014). Comorbidity of anxiety and depression in children and adolescents: 20 Years After. *Psychological Bulletin*, *140*(3), 816–845. https://doi.org/10.1037/a0034733

Cummings, C. M., & Fristad, M. A. (2012). Anxiety in children with mood disorders: A

treatment help or hindrance? *Journal of Abnormal Child Psychology*, *40*(3), 339–351. https://doi.org/10.1007/s10802-011-9568-5

Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. *Journal of Economic Literature*, *47*(1), 87–122. https://doi.org:10.1257/jel.47.1.87

Danese, A., Moffitt, T. E., Harrington, H., Milne, B. J., Polanczyk, G., Pariante, C. M., … Caspi, A. (2009). Adverse childhood experiences and adult risk factors for age-related disease. *Archives of Pediatrics and Adolescent Medicine*, *163*(12), 1135–1143. https://doi.org:10.1001/archpediatrics.2009.214.

Danforth, J. S., Connor, D. F., & Doerfler, L. A. (2016). The development of comorbid conduct problems in children with ADHD. *Journal of Attention Disorders*, *20*(3), 214–229. https://doi.org/10.1177/1087054713517546

Davidson, R. J., & McEwen, B. S. (2012). Social influences on neuroplasticity: Stress and interventions to promote well-being. *Nature Neuroscience*, *15*(5), 689–95. https://doi.org/10.1038/nn.3093

Davies, S., Janus, M., Duku, E., & Gaskin, A. (2016). Using the Early Development Instrument to examine cognitive and non-cognitive school readiness and elementary student achievement. *Early Childhood Research Quarterly*, *35*, 63–75. https://doi.org/10.1016/j.ecresq.2015.10.002

De Los Reyes, A., & Kazdin, A. E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations

for further study. *Psychological Bulletin*, *131*(4), 483–509. https://doi.org/10.1037/0033-2909.131.4.483

Dearing, E., McCartney, K., & Taylor, B. A. (2006). Within-child associations between family income and externalizing and internalizing problems. *Developmental Psychology*, *42*(2), 237–52. https://doi.org/10.1037/0012-1649.42.2.237

Deighton, J., Croudace, T., Fonagy, P., Brown, J., Patalay, P., & Wolpert, M. (2014). Measuring mental health and wellbeing outcomes for children and adolescents to inform practice and policy: A review of child self-report measures. *Child and Adolescent Psychiatry and Mental Health, 8*(14), 1-14. https://doi.org/10.1186/1753-2000-8-14

Dekker, M. C., Ferdinand, R. F., Lang, N. D. J. Van, Bongers, I. L., Ende, J. Van Der, & Verhulst, F. C. (2007). Developmental trajectories of depressive symptoms from early childhood to late adolescence: Gender differences and adult outcome. *Journal of Child Psychology and Psychiatry*, *7*, 657–666. https://doi.org/10.1111/j.1469-7610.2007.01742.x

Denham, S. A., Bassett, H., Mincic, M., Kalb, S., Way, E., Wyatt, T., & Segal, Y. (2012). Social-emotional learning profiles of preschoolers' early school success: A person-centered approach. *Learning and Individual Differences*, *22*(2), 178–189. https://doi.org/10.1016/j.lindif.2011.05.001

Denham, S. A, Blair, K. A, DeMulder, E., Levitas, J., Sawyer, K., Auerbach-Major, S., & Queenan, P. (2003). Preschool emotional competence: pathway to social competence? *Child Development*, *74*(1), 238–256. https://doi.org/10.1111/1467-8624.00533

Diener, E., Emmons, R. A., Larsen, R. J., &, & Griffin, S. (1985). The Satisfaction with Life

Scale. *Journal of Personality Assessment*, *49*, 71–75.

Diener, E., Heintzelman, S. J., Kushlev, K., Tay, L., Wirtz, D., & Lutes, L. D. (2017). Findings all psychologists should know from the new science on subjective well-being. *Canadian Psychology*, *58*(2), 87–104. http://dx.doi.org/10.1037/cap0000063

Diener, E., & Seligman, M. E. P. (2002). Very happy people. *Psychological Science*, *13*(1), 81 84. https://doi.org/10.1111/1467-9280.00415

Diener, E., Suh, E., & Oishi, S. (1997). Recent findings on subjective well-being. *Indian Journal of Clinical Psychology, 24*, 25-41.

Domitrovich, C. E., Durlak, J. A., Staley, K. C., & Weissberg, R. P. (2017). Social-emotional competence: An essential factor for promoting positive adjustment and reducing risk in school children. *Child Development*, *8*(2), 408-416. https://doi.org/10.1111/cdev.12739

Donnell, S. O., Vanderloo, S., Mcrae, L., Onysko, J., Patten, S. B., & Pelletier, L. (2016). Comparison of the estimated prevalence of mood and/or anxiety disorders in Canada between self-report and administrative data. *Epidemiology and Psychiatric Services*, *25*, 360–369. https://doi.org/10.1017/S2045796015000463

Duchesne, S., Vitaro, F., Larose, S., & Tremblay, R. E. (2008). Trajectories of anxiety during elementary-school years and the prediction of high school noncompletion. *Journal of Youth and Adolescence*, *37*(9), 1134–1146. https://doi.org/10.1007/s10964-007-9224-0

Duckworth, A. L., & Seligman, M. E. P. (2006). Self-discipline gives girls the edge: Gender in self-discipline, grades, and achievement test scores. *Journal of Educational Psychology*, *98*(1), 198–208. https://doi.org/10.1037/0022-0663.98.1.198

Dunlop, S., Coyte, P. C., & Mcisaac, W. (2000). Socio-economic status and the utilisation of physicians' services: Results from the Canadian National Population Health Survey. *Social Science and Medicine*, *51*, 123–133. https://doi.org/10.1016/S0277-9536(99)00424-4

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, *82*(1), 405–432. https://doi.org/10.1111/j.1467-8624.2010.01564.x

Eccles, J. (2004). Schools, academic motivation and stage-environment fit. In R. Lerner & L. Steinberg (Eds.), *Handbook of Adolescent Development* (pp. 125–153). Hoboken, NJ: Wiley.

Egger, H. L., & Angold, A. (2006). Common emotional and behavioral disorders in preschool children: Presentation, nosology, and epidemiology. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *47*(3–4), 313–337. https://doi.org/10.1111/j.1469-7610.2006.01618.x

Egger, H. L., Erkanli, A., Keeler, G., Potts, E., Walter, B. K., & Angold, A. (2006). Test-retest reliability of the Preschool Age Psychiatric Assessment (PAPA). *Journal of the American Academy of Child & Adolescent Psychiatry*, *45*(5), 538–549. https://doi.org/10.1097/01.chi.0000205705.71194.b8

Elder, G. H. (1998). The life course as developmental theory. *Child Development*, *69*(1), 1–12.

Ellard, K. K., Fairholme, C. P., Boisseau, C. L., Farchione, T. J., & Barlow, D. H. (2010). Unified protocol for the transdiagnostic treatment of emotional disorders: Protocol

development and initial outcome data. *Cognitive and Behavioral Practice*, *17*(1), 88–101. https://doi.org/10.1016/j.cbpra.2009.06.002

Elovainio, M., Pulkki-Raback, L., Jokela, M., Kivimaki, M., Hintsanen, M., Hintsa, T., … Keltikangas-Jarvinen, L. (2012). Socioeconomic status and the development of depressive symptoms from childhood to adulthood: A longitudinal analysis across 27 years of follow-up in the Young Finns study. *Social Science & Medicine*, *74*(6), 923–929. https://doi.org/10.1016/j.socscimed.2011.12.017

Evans, G. W., & English, K. (2002). The environment of poverty: Multiple stressor exposure, psychophysiological stress, and socioemotional adjustment. *Child Development*, *73*(4), 1238–1248. https://doi.org/10.1111/1467-8624.00469

Fanti, K. a, & Henrich, C. C. (2010). Trajectories of pure and co-occurring internalizing and externalizing problems from age 2 to age 12: Findings from the National Institute of Child Health and Human Development Study of Early Child Care. *Developmental Psychology*, *46*(5), 1159–1175. https://doi.org/10.1037/a0020659

Ferdinand, R. F., De Nijs, P. F. A., Van Lier, P., & Verhulst, F. C. (2005). Latent class analysis of anxiety and depressive symptoms in referred adolescents. *Journal of Affective Disorders*, *88*(3), 299–306. https://doi.org/10.1016/j.jad.2005.08.004

Fergusson, D. M., & Woodward, L. J. (2002). Mental health, educational, and social role outcomes of adolescents with depression. *Archives of General Psychiatry*, *59*, 225–231. https://doi.org/ 10.1001/archpsyc.59.3.225

Fertman, C. I., Delgado, M. M., & Tarasevich, S. L. (2014). *Promoting child and adolescent mental health*. Burlington, MA: Jones & Bartlett Learning.

Fichter, M. M., Kohlboeck, G., Quadflieg, N., Wyschkon, A., & Esser, G. (2009). From childhood to adult age: 18-year longitudinal results and prediction of the course of mental disorders in the community. *Social Psychiatry and Psychiatric Epidemiology*, *44*(9), 792–803. https://doi.org/10.1007/s00127-009-0501-y

First Call BC Child and Youth Advocacy Coalition. (2016). 2016 BC Child Poverty Report Card. Retrieved from http://still1in5.ca/report-card/

Flouri, E., & Sarmadi, Z. (2016). Prosocial behavior and childhood trajectories of internalizing and externalizing problems: The role of neighborhood and school contexts. *Developmental Psychology*, *52*(2), 253–258. https://doi.org/10.1037/dev0000076

Frenette, M., & Chan, P. (2015). *Why Are Academic Prospects Brighter for Private High School Students?* Retrieved from http://www.statcan.gc.ca/pub/11-626-x/11-626-x2015044-eng.htm#n8

Gadermann, A. M., Guhn, M., Schonert-Reichl, K. A., Hymel, S., Thomson, K., & Hertzman, C. (2015). A population-based study of children's well-being and health: The relative importance of social relationships, health-related activities, and income. *Journal of Happiness Studies*, *17*, 1847–1872. https://doi.org/10.1007/s10902-015-9673-1

Gadermann, A. M., Guhn, M., & Zumbo, B. D. (2011). Investigating the substantive aspect of construct validity for the satisfaction with life scale adapted for children: A focus on cognitive processes. *Social Indicators Research*, *100*, 37–60.

https://doi.org/10.1007/s11205-010-9603-x

Gadermann, A. M., Guhn, M., & Zumbo, B. D. (2012). Estimating ordinal reliability for likert-type and ordinal item response data: A conceptual, empirical, and practical guide. *Practical Assessment, Research & Evaluation*, *17*(3), 1–13.

Gadermann, A. M., Schonert-Reichl, K. A., & Zumbo, B. D. (2010). Investigating validity evidence of the satisfaction with life scale adapted for children. *Social Indicators Research*, *96*, 229–247. https://doi.org/10.1007/s11205-009-9474-1

Geiser, C. (2012). Latent class analysis. In *Data analysis with MPlus* (pp. 232–270). New York: Guildford Press.

Gillham, J., Adams-Deutsch, Z., Werner, J., Reivich, K., Linkins, M., Winder, B., … Seligman, M. E. P. (2011). Character strengths predict subjective well-being during adolescence. *The Journal of Positive Psychology*, *6*, 31–44. https://doi.org/10.1080/17439760.2010.536773

Gillham, J., & Reivich, K. (2004). Cultivating optimism in childhood and adolescence. *The Annals of the American Academy of Political and Social Science*, *591*, 146–163. https://doi.org/10.1177/0002716203260095

Gilliom, M., & Shaw, D. S. (2004). Codevelopment of externalizing and internalizing problems in early childhood. *Development and Psychopathology*, *16*(2), 313–333. https://doi.org/10.1017/S0954579404044530

Gilman, R., & Huebner, E. S. (2006). Characteristics of adolescents who report very high life satisfaction. *Journal of Youth and Adolescence*, *35*(3), 311–319. https://doi.org/10.1007/s10964-006-9036-7

Goodman, A. (2009). Strengths and Difficulties Questionnaire as a dimensional measure of child mental health. *Journal of the American Academy of Child & Adolescent Psychiatry*, *48*(4), 400–403. https://doi.org/10.1097/CHI.0b013e3181985068

Goodman, R. (2001). Psychometric properties of the Strengths and Difficulties Questionnaire, *Journal of the American Academy of Child & Adolescent Psychiatry, 40*(11), 1337–1345. https://doi.org/10.1097/00004583-200111000-00015

Government of British Columbia. (2017a). Medicare Protection Act. Victoria, BC, Canada: Queen's Printer. Retrieved from http://www.bclaws.ca/civix/document/id/consol26/consol26/00_96286_01

Government of British Columbia. (2017b). British Columbia School Act. Victoria, British Columbia, Canada: Queen's Printer. Retrieved from http://www.bclaws.ca/civix/document/id/complete/statreg/96412_00

Greenberg, M. T., & Abenavoli, R. (2017). Universal interventions: Fully exploring their impacts and potential to produce population-level impacts. *Journal of Research on Educational Effectiveness*, *10*, 40–67. https://doi.org/10.1080/19345747.2016.1246632

Greenberg, M. T., Domitrovich, C. E., Weissberg, R. P., & Durlak, J. A. (2017). Social and emotional learning as a public health approach to education. *Future of Children*, *27*(1), 13–32. http://www.jstor.org/stable/44219019

Greenspoon, P. J., & Saklofske, D. H. (2001). Toward an integration of subjective well-being and psychopathology. *Social Indicators Research*, *54*, 81–108.

Groh, A. M., & Bakermans-Kranenburg, M. J. (2014). The significance of attachment security

for children's social competence with peers: A meta-analytic study. *Attachment & Human Development*, *16*(2), 103–136. https://doi.org/10.1080/14616734.2014.883636

Groh, A. M., Fearon, R. M. P., Ijzendoorn, M. H. Van, Bakermans-Kranenburg, M. J., & Roisman, G. I. (2017). Attachment in the early life course: Meta-analytic evidence for its role in socioemotional development. *Child Development Perspectives*, *11*, 70–76. https://doi.org/10.1111/cdep.12213

Guhn, M., Gadermann, A. M., Almas, A., Schonert-Reichl, K. A., & Hertzman, C. (2016). Associations of teacher-rated social, emotional, and cognitive development in Kindergarten to self-reported wellbeing, peer relations, and academic test scores in middle childhood. *Early Childhood Research Quarterly*, *35*, 76–84. https://doi.org/10.1016/j.ecresq.2015.12.027

Guhn, M., Gadermann, A. M., Hertzman, C., & Zumbo, B. D. (2009). Children's development in Kindergarten: A multilevel, population-based analysis of ESL and gender effects on socioeconomic gradients. *Child Indicators Research*, *3*(2), 183–203. https://doi.org/10.1007/s12187-009-9053-7

Guhn, M., Gadermann, A., & Zumbo, B. D. (2007). Does the EDI measure school readiness in the same way across different groups of children? *Early Education & Development*, *18*(3), 453–472. https://doi.org/10.1080/10409280701610838

Guhn, M., & Goelman, H. (2011). Bioecological theory, early child development and the validation of the population-level Early Development Instrument. *Social Indicators Research*, *103*, 193–217. https://doi.org/10.1007/sl 1205-01 1-9842-5

Guhn, M., Schonert-Reichl, K. A., Gadermann, A. M., Hymel, S., & Hertzman, C. (2013). A population study of victimization, relationships, and well-being in middle childhood. *Journal of Happiness Studies*, *14*(5), 1529–1541. https://doi.org/10.1007/s10902-012-9393-8

Guhn, M., Schonert-Reichl, K. A., Gadermann, A. M., Marriott, D., Pedrini, L., Hymel, S., & Hertzman, C. (2012). Well-being in middle childhood: An assets-based population-level research-to-action project. *Child Indicators Research*, *5*(2), 393–418. https://doi.org/10.1007/s12187-012-9136-8

Guhn, M., Zumbo, B. D., Janus, M., & Hertzman, C. (2011). Validation theory and research for a population-level measure of children's development, wellbeing, and school readiness. *Social Indicators Research*, *103*(2), 183–191. https://doi.org/10.1007/sl

Gulliver, A., Griffiths, K. M., & Christensen, H. (2010). Perceived barriers and facilitators to mental health help-seeking in young people: A systematic review. *BMC Psychiatry*, *10*(1), 113. https://doi.org/10.1186/1471-244X-10-113

Halle, T. G., Whittaker, J. V., Zepeda, M., Rothenberg, L., Anderson, R., Daneri, P., … Buysse, V. (2014). The social-emotional development of dual language learners: Looking back at existing research and moving forward with purpose. *Early Childhood Research Quarterly*, *29*(4), 734–749. https://doi.org/10.1016/j.ecresq.2013.12.002

Hankin, B., Mermelstein, R., & Roesch, L. (2007). Sex differences in adolescent depression: Stress exposure and reactivity models. *Child Development*, *78*(1), 279–295. https://doi.org/10.1111/j.1467-8624.2007.00997.x

Hannigan, L. J., Mcadams, T. A., Plomin, R., & Eley, T. C. (2016). Parent- and child-driven effects during the transition to adolescence: A longitudinal, genetic analysis of the home environment. *Developmental Science, 20,* e12432. https://doi.org/10.1111/desc.12432

Hannigan, L., Walaker, N., Waszczuk, M., McAdams, T., & Eley, T. (2016). Aetiological influences on stability and change in emotional and behavioural problems across development: A systematic review. *Psychopathology Review*, *4*(1), 52–108. https://doi.org/10.5127/pr.038315

Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *British Journal of Mathmatical and Statistical Psychology*, *67*, 451–470. https://doi.org/10.1111/bmsp.12028

Hayes, A. F., & Rockwood, N. J. (2017). Regression-based statistical mediation and moderation analysis in clinical research: Observations, recommendations, and implementation. *Behaviour Research and Therapy*, *98*, 39–57. https://doi.org/10.1016/j.brat.2016.11.001

Heim, C., & Binder, E. B. (2012). Current research trends in early life stress and depression: Review of human studies on sensitive periods, gene-environment interactions, and epigenetics. *Experimental Neurology*, *233*(1), 102–11. https://doi.org/10.1016/j.expneurol.2011.10.032

Henninger, W. R., & Luze, G. (2013). Moderating effects of gender on the relationship between poverty and children's externalizing behaviors. *Journal of Child Health Care*, *17*(1), 72–81. https://doi.org/10.1177/1367493512447532

Hertzman, C., & Boyce, T. (2010). How experience gets under the skin to create gradients in

developmental health. *Annual Review of Public Health*, *31*, 329–347. https://doi.org/10.1146/annurev.publhealth.012809.103538

Hertzman, C., & Power, C. (2003). Health and human development: Understandings from life-course research. *Developmental Neuropsychology*, *24*(2–3), 719–44. https://doi.org/10.1080/87565641.2003.9651917

Hill, A. L., Degnan, K. A., Calkins, S. D., & Keane, S. P. (2006). Profiles of externalizing behavior problems for boys and girls across preschool: The roles of emotion regulation and inattention. *Developmental Psychology*, *42*(5), 913–28. https://doi.org/10.1037/0012-1649.42.5.913

Hone, L. C., Jarden, A., Schofield, G., & Duncan, S. (2014). Measuring flourishing: The impact of operational definitions on the prevalence of high levels of wellbeing. *International Journal of Wellbeing*, *4*(1), 62–90. https://doi.org/10.5502/ijw.v4i1.4

Honkanen, M., Ed, M., Määttä, H., Hurtig, T., Ph, D., Ebeling, H., … H, M. P. (2014). Teachers' assessments of children's mental problems with respect to adolescents' subsequent self-reported mental health. *Journal of Adolescent Health*, *54*(1), 81–87. https://doi.org/10.1016/j.jadohealth.2013.07.041

Hostinar, C. E., Sullivan, R. M., & Gunnar, M. R. (2014). Psychobiological mechanisms underlying the social buffering of the hypothalamic – pituitary – adrenocortical axis: A review of animal models and human studies across development. *Psychological Bulletin, 140*(1), 256–282. https://doi.org/10.1037/a0032671

Howell, A. J., Keyes, C. L. M., & Passmore, H. (2013). Flourishing among children and

adolescents: Structure and correlates of positive mental health, and interventions for its enhancement. In C. Proctor & P. A. Linley (Eds.), *Research, Applications, and Interventions for Children and Adolescents: A Positive Psychology Perspective* (pp. 59–79). Dordrecht: Springer Science & Business Media. https://doi.org/10.1007/978-94-007-6398-2

Huang, K.Y., Cheng, S., Calzada, E., & Brotman, L. M. (2012). Symptoms of anxiety and associated risk and protective factors in young Asian American children. *Child Psychiatry and Human Development*, *43*(5), 761–74. https://doi.org/10.1007/s10578-012-0295-0

Huang, K.Y., Cheng, S., & Theise, R. (2013). School contexts as social determinants of child health: Current practices and implications for future public health practice. *Public Health Reports*, *128 Suppl*, 21–8. https://doi.org/10.1177/00333549131286S304

Human Early Learning Partnership, BC Ministry of Health, BC Ministry of Education (2015): *Developmental Trajectories linked data file*. Population Data BC. Vancouver, BC: University of British Columbia, School of Population and Public Health. http://www.popdata.bc.ca/data.

Human Early Learning Partnership. (2016). *EDI BC 2016 Provincial Report*. University of British Columbia, Vancouver, BC. Retrieved from http://www.edibc2016.ca/

Humphreys, K. L., Katz, S. J., Lee, S. S., Hammen, C., Brennan, P. A., & Najman, J. M. (2013). The association of ADHD and depression: Mediation by peer problems and parent–child difficulties in two complementary samples. *Journal of Abnormal Psychology*, *122*(3), 854–867. https://doi.org/10.1037/a0033895

IBM Corporation. (2013). IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY.

Janson, H., & Mathiesen, K. S. (2008). Temperament profiles from infancy to middle childhood: development and associations with behavior problems. *Developmental Psychology*, *44*(5), 1314–1328. https://doi.org/10.1037/a0012713

Janus, M., & Offord, D. R. (2007). Development and psychometric properties of the Early Development Instrument (EDI): A measure of children's school readiness. *Canadian Journal of Behavioural Science / Revue Canadienne Des Sciences Du Comportement*, *39*(1), 1–22. https://doi.org/10.1037/cjbs2007001

Jarrett, M. A., & Ollendick, T. H. (2008). A conceptual review of the comorbidity of attention-deficit/hyperactivity disorder and anxiety: Implications for future research and practice. *Clinical Psychology Review*, *28*(7), 1266–1280. https://doi.org/10.1016/j.cpr.2008.05.004

Jutte, D. P., Roos, L. L., & Brownell, M. D. (2011). Administrative record linkage as a tool for public health research. *Annual Review of Public Health*, *32*(1), 91–108. https://doi.org/10.1146/annurev-publhealth-031210-100700

Kamphaus, R. W., DiStefano, C., & Lease, a M. (2003). A self-report typology of behavioral adjustment for young children. *Psychological Assessment*, *15*(1), 17–28. https://doi.org/10.1037/1040-3590.15.1.17

Kamphaus, R. W., Petoskey, M. D., Cody, a H., Rowe, E. W., Huberty, C. J., & Reynolds, C. R. (1999). A typology of parent rated child behavior for a national U.S. sample. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *40*(4), 607–16. https://doi.org/10.1111/1469-7610.00477

Kan, K. J., Dolan, C. V., Nivard, M. G., Middeldorp, C. M., Van Beijsterveldt, C. E. M.,

Willemsen, G., & Boomsma, D. I. (2013). Genetic and environmental stability in attention problems across the lifespan: Evidence from the netherlands twin register. *Journal of the American Academy of Child and Adolescent Psychiatry*, *52*(1), 12–25. https://doi.org/10.1016/j.jaac.2012.10.009

Kang, H. S., Haddad, E., Chen, C., & Greenberger, E. (2014). Limited English proficiency and socioemotional well-being among Asian and Hispanic children from immigrant families. *Early Education and Development*, *25*(6), 915–931. https://doi.org/10.1080/10409289.2014.883664

Karazsia, B. T., & van Dulmen, M. H. M. (2008). Regression models for count data. *Journal of Pediatric Psychology*, *33*(10), 1076–84. https://doi.org/10.1093/jpepsy/jsn055

Keenan, K., & Shaw, D. (1997). Developmental and social influences on young girls' early problem behavior. *Psychological Bulletin*, *121*(1), 95–113.

Keiley, M. K., Bates, J. E., Dodge, K. A., & Pettit, G. S. (2000). A cross-domain growth analysis: Externalizing and internalizing behaviors during 8 years of childhood. *Journal of Abnormal Child Psychology*, *28*(2), 161–179. https://doi.org/10.1023/A:1005122814723

Kendall, P. C., Safford, S., Flannery-Schroeder, E., & Webb, A. (2004). Child anxiety treatment: Outcomes in adolescence and impact on substance use and depression at 7.4-year follow-up. *Journal of Consulting and Clinical Psychology*, *72*(2), 276–287. https://doi.org/10.1037/0022-006X.72.2.276

Kern, M. L., Benson, L., Steinberg, E. A., & Steinberg, L. (2016). The EPOCH Measure of Adolescent Well-Being. *Psychological Assessment, 28*(5), 586–597. http://dx.doi.org/10.1037/pas0000201

Kessler, R. C., Avenevoli, S., Costello, E. J., Georgiades, K., Green, J. G., Gruber, M. J., … Merikangas, K. R. (2012). Prevalence, persistence, and sociodemographic correlates of DSM-IV disorders in the National Comorbidity Survey Replication Adolescent Supplement. *Archives of General Psychiatry*, *69*(4), 372–80. https://doi.org/10.1001/archgenpsychiatry.2011.160

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*, *62*, 593–602. https://doi.org/10.1001/archpsyc.62.6.593

Keyes, C. (2009). The nature and importance of positive mental health in America's adolescents. In R. Gilman, E. S. Huebner, & M. J. Furlong (Eds.), *Handbook of Positive Psychology in Schools* (pp. 9–23). New York: Routledge.

Kieling, C., Baker-Henningham, H., Belfer, M., Conti, G., Ertem, I., Omigbodun, O., … Rahman, A. (2011). Child and adolescent mental health worldwide: Evidence for action. *The Lancet*, *378*(9801), 1515–25. https://doi.org/10.1016/S0140-6736(11)60827-1

King, S., Waschbusch, D. A., Frankland, B. W., Andrade, B. F., Thurston, C. M., McNutt, L., & Terrio, B. (2005). Taxonomic examination of ADHD and conduct problem comorbidity in elementary school children using cluster analyses. *Journal of Psychopathology and Behavioral Assessment*, *27*(2), 77–88. https://doi.org/10.1007/s10862-005-5382-0

Kingery, J. N., Erdley, C. A., Marshall, K. C., Newman, J., Hobart, K., Colleges, W. S., … Colleges, W. S. (2011). Peer acceptance and friendship as predictors of early adolescents' adjustment across the middle school transition. *Merrill-Palmer Quarterly*, *57*(3), 215–243.

Kingston, D., Heaman, M., Brownell, M., & Ekuma, O. (2015). Predictors of childhood anxiety: A population-based cohort study. *PLoS ONE*, *10*(7), 1–13. https://doi.org/10.1371/journal.pone.0129339

Kjeldsen, A., Janson, H., Stoolmiller, M., Torgersen, L., & Mathiesen, K. S. (2014). Externalising behaviour from infancy to mid-adolescence: Latent profiles and early predictors. *Journal of Applied Developmental Psychology*, *35*(1), 25–34. https://doi.org/10.1016/j.appdev.2013.11.003

Korczak, D. J., & Goldstein, B. I. (2009). Childhood onset major depressive disorder: Course of illness and psychiatric comorbidity in a community sample. *The Journal of Pediatrics*, *155*(1), 118–123. https://doi.org/10.1016/j.jpeds.2009.01.061

Korhonen, M., Luoma, I., Salmelin, R. K., Helminen, M., Kaltiala-Heino, R., & Tamminen, T. (2014). The trajectories of child's internalizing and externalizing problems, social competence and adolescent self-reported problems in a Finnish normal population sample. *School Psychology International*, *35*(6), 561–579. https://doi.org/10.1177/0143034314525511

Kovacs, M. (1996). Presentation and course of major depressive disorder during childhood and later years of the life span. *Journal of the American Academy of Child and Adolescent Psychiatry*, *35*(6), 705–15. https://doi.org/10.1097/00004583-199606000-00010

Kuny, A. V., Althoff, R. R., Copeland, W., Bartels, M., Van Beijsterveldt, C. E. M., Baer, J., & Hudziak, J. J. (2013). Separating the domains of oppositional behavior: Comparing latent models of the Conners' Oppositional Subscale. *Journal of the American Academy of Child and Adolescent Psychiatry*, *52*(2), 172–183.e8. https://doi.org/10.1016/j.jaac.2012.10.005

Kusche, C. A., Greenberg, M. T., &, & Beilke, R. (1998). *Seattle Personality Questionnaire for young school-aged children*. Seattle, OR: University of Washington, Department of Psychology.

La Greca, A. M., & Harrison, H. M. (2005). Adolescent peer relations, friendships, and romantic relationships: Do they predict social anxiety and depression? *Journal of Clinical Child and Adolescent Psychology, 34*, 49-61. https://doi.org/10.1207/s15374424jccp3401_5

La Paro, K. M., & Pianta, R. C. (2000). Predicting children's competence in the early school years: A meta-analytic review. *Review of Educational Research*, *70*(4), 443–484.

Lanza, S., & Rhoades, B. (2013). Latent class analysis: An alternative perspective on subgroup analysis in prevention and treatment. *Prevention Science*, *14*(2), 157–168. https://doi.org/10.1007/s11121-011-0201-1.Latent

Lanza, S. T., Patrick, M. E., & Maggs, J. L. (2014). Latent transition analysis: Benefits of a latent variable approach to modeling transitions in substance use. *Journal of Drug Issues*, *40*(1), 1–14. https://doi.org/10.1177/002204261004000106

Lasser, K. E., Himmelstein, D. U., & Woolhandler, S. (2006). Access to care, health status, and health disparities in the United States and Canada: Results of a cross-national population-based survey. *American Journal of Public Health*, *96*(7), 1300–7.

https://doi.org/10.2105/AJPH.2004.059402

Lavigne, C., Cicchetti, R., Gibbon, H. J., Binns, H. J., Larsen, L., DeVito, C., & Al, E. (2001). Oppositional defiant disorder with onset of preschool years: Longitudinal stability and pathways to other disorders. *Journal of the Academy of Child and Adolescent Psychiatry*, *40*, 1393–1400. https://doi.org/10.1097/00004583-200112000-00009

Law, E. C., Sideridis, G. D., Prock, L. A., & Sheridan, M. A. (2014). Attention-deficit/hyperactivity disorder in young children: Predictors of diagnostic stability. *Pediatrics*, *133*(4), 569–667. https://doi.org/10.1542/peds.2013-3433

Leblanc, É., Dégeilh, F., Daneault, V., Beauchamp, M. H., & Bernier, A. (2017). Attachment security in infancy: A preliminary study of prospective links to brain morphometry in late childhood. *Frontiers in Psychology*, *8*, 1–13. https://doi.org/10.3389/fpsyg.2017.02141

Lee, E. J., & Bukowski, W. M. (2012). Co-development of internalizing and externalizing problem behaviors: Causal direction and common vulnerability. *Journal of Adolescence*, *35*(3), 713–729. https://doi.org/10.1016/j.adolescence.2011.10.008

Leve, L. D., Kim, H. K., & Pears, K. C. (2005). Childhood temperament and family environment as predictors of internalizing and externalizing trajectories from ages 5 to 17. *Journal of Abnormal Child Psychology*, *33*(5), 505–520. https://doi.org/10.1007/s10802-005-6734-7

Link, B. G., & Phelan, J. C. (2013). Labeling and stigma. In *Handbook of the sociology of mental health* (pp. 525–541). Springer Netherlands.

Lloyd, J. E. V, & Hertzman, C. (2009). From Kindergarten readiness to fourth-grade assessment: Longitudinal analysis with linked population data. *Social Science & Medicine*, *68*(1), 111–

23. https://doi.org/10.1016/j.socscimed.2008.09.063

López-Romero, L., Romero, E., & Luengo, M. Á. (2012). Disentangling the role of psychopathic traits and externalizing behaviour in predicting conduct problems from childhood to adolescence. *Journal of Youth and Adolescence*, *41*(11), 1397–1408. https://doi.org/10.1007/s10964-012-9800-9

Lubke, G. H., & Muthén, B. (2005). Investigating population heterogeneity with factor mixture models. *Psychological Methods*, *10*(1), 21–39. https://doi.org/http://dx.doi.org/10.1037/1082-989X.10.1.21

Luby, J. L., Gaffrey, M. S., Tillman, R., April, L. M., & Belden, A. C. (2014). Trajectories of preschool disorders to full DSM depression at school age and early adolescence: Continuity of preschool depression. *American Journal of Psychiatry*, *171*(7), 768–776. https://doi.org/10.1176/appi.ajp.2014.13091198

Luthar, S. S., & Latendresse, S. J. (2005). Children of the affluent: Challenges to well-being. *Current Directions in Psychological Science*, *14*(1), 49–53. https://doi.org/10.1111/j.0963-7214.2005.00333.x

Lyons, M. D., Huebner, E. S., Hills, K. J., & Shinkareva, S. V. (2012). The dual-factor model of mental health: Further study of the determinants of group differences. *Canadian Journal of School Psychology*, *27*, 183–196. https://doi.org/10.1177/0829573512443669

Mackinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology*, *58*, 593–614. https://doi.org/10.1146/annurev.psych.58.110405.085542

Mackinnon, D. P., Krull, J. L., & Lockwood, C. M. (2000). Equivalence of the mediation,

confounding and suppression effect. *Prevention Science*, *1*(4), 1–13.

Malti, T., & Noam, G. (2009). A developmental approach to the prevention of adolescent's aggressive behavior and the promotion of resilience. *International Journal of Developmental Science*, *3*, 235–246. https://doi.org/10.3233/DEV-2009-3303

Mann, M., Hosman, C. M. H., Schaalma, H. P., & De Vries, N. K. (2004). Self-esteem in a broad-spectrum approach for mental health promotion. *Health Education Research*, *19*(4), 357–372. https://doi.org/10.1093/her/cyg041

Marmot, M., & Bell, R. (2012). Fair society, healthy lives. *Public Health*, *126 Suppl*, S4-10. https://doi.org/10.1016/j.puhe.2012.05.014

Marsh, H. W. (1988). Self-Description Questionnaire: A theoretical and empirical basis for the measurement of multiple dimensions of preadolescent self-concept: A test manual and a research monograph. San Antonio, Texas.

Marsh, H. W. (1995). A multidimensional, hierarchical model of self-concept: Theoretical and empirical justification. *Educational Psychology Review*, *2*, 77–172.

Marsh, H. W., & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: First- and higher order factor models and their invariance across groups. *Psychological Bulletin*, *97*, 562–582.

Masten, A. S., & Tellegen, A. (2012). Resilience in developmental psychopathology: Contributions of the Project Competence longitudinal study. *Development and Psychopathology*, *24*(2), 345–61. https://doi.org/10.1017/S095457941200003X

Mathiesen, K. S., Sanson, A., Stoolmiller, M., & Karevold, E. (2009). The nature and predictors

of undercontrolled and internalizing problem trajectories across early childhood. *Journal of Abnormal Child Psychology*, *37*(2), 209–222. https://doi.org/10.1007/s10802-008-9268-y

McCauley, E., Gudmundsen, G. R., Rockhill, C., & Banh, M. (2011). Child and adolescent depressive disorders. In K. Cheng & K. M. Myers (Eds.), *Child and adolescent psychiatry: The essentials* (2nd ed., pp. 177–196). Philadelphia: Wolters Kluwer.

McCullough, G., Huebner, E. S., & Laughlin, J. E. (2000). Life events, self-concept, and adolescents' positive subjective well-being. *Psychology in the Schools*, *37*, 281–290.

McGorry, P. D., & Goldstone, S. (2011). Is this normal? Assessing mental health in young people. *Australian Family Physician, 40*(3), 94–97.

McGorry, P., Keshavan, M., Goldstone, S., Amminger, P., Allott, K., Berk, M., … Hickie, I. (2014). Biomarkers and clinical staging in psychiatry. *World Psychiatry*, *13*(3), 211–223. https://doi.org/10.1002/wps.20144

McGuire, S., & Shanahan, L. (2010). Sibling experiences in diverse family contexts. *Child Development Perspectives*, *4*(2), 72–79. https://doi.org/10.1111/j.1750-8606.2010.00121.x

Meinzer, M. C., Pettit, J. W., & Viswesvaran, C. (2014). The co-occurrence of attention-deficit/hyperactivity disorder and unipolar depression in children and adolescents: A meta-analytic review. *Clinical Psychology Review*, *34*(8), 595–607. https://doi.org/10.1016/j.cpr.2014.10.002

Merikangas, K. R., Nakamura, E. F., & Kessler, R. C. (2009). Epidemiology of mental disorders in children and adolescents. *Dialogues in Clinical Neuroscience*, *11*, 7–20.

Miles, J., Espiritu, R. C., Horen, N. M., Sebian, J., & Waetzig, E. (2010). *A public health*

approach to children's mental health: A conceptual framework. Washington, DC.

Miller, G. E., & Chen, E. (2013). The biological residue of childhood poverty. *Child Development Perspectives, 7*(2), 67–73. https://doi.org/10.1111/cdep.12021

Miller, G. E., Chen, E., Fok, A. K., Walker, H., Lim, A., Nicholls, E. F., … Kobor, M. S. (2009). Low early-life social class leaves a biological residue manifested by decreased glucocorticoid and increased proinflammatory signaling. *PNAS, 106*(34), 14716-14721. https://doi.org/10.1073/pnas.0902971106

Mindirila, D. L. (2016). A typology of child school behavior: Investigation using latent profile analysis and cluster analysis. *Psychology in the Schools*, *53*(5), 471–487. https://doi.org/10.1002/pits

Miner, J. L., & Clarke-Stewart, K. A. (2008). Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. *Developmental Psychology*, *44*(3), 771–786. https://doi.org/10.1037/0012-1649.44.3.771

Mistry, R. S., Benner, A. D., Biesanz, J. C., & Clark, S. L. (2010). Family and social risk, and parental investments during the early childhood years as predictors of low-income children's school readiness outcomes. *Early Childhood Research Quarterly*, *25*, 432–449. https://doi.org/10.1016/j.ecresq.2010.01.002

Mukolo, A., Heflinger, C. A., & Wallston, K. a. (2010). The stigma of childhood mental disorders: A conceptual framework. *Journal of the American Academy of Child & Adolescent Psychiatry*, *49*(2), 92–103. https://doi.org/10.1016/j.jaac.2009.10.011

Muthen, L. K., & Muthen, B. O. (2017a). Chapter 7: Examples: Mixture modeling with cross-

sectional data. In *Mplus User's Guide* (7th ed., pp. 153–208). Los Angeles, CA: Muthen & Muthen.

Muthen, L. K., & Muthen, B. O. (2017b). *Mplus User's Guide* (7th ed.). Los Angeles, CA: Muthen & Muthen.

Nagin, D. S., & Odgers, C. L. (2010). Group-based trajectory modeling in clinical research. *Annual Review of Clinical Psychology*, *6*, 109–38. https://doi.org/10.1146/annurev.clinpsy.121208.131413

Nagin, D., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development*, *70*(5), 1181–1196. https://doi.org/10.1111/1467-8624.00086

Najman, J. M., Aird, R., Bor, W., Callaghan, M. O., Williams, G. M., & Shuttlewood, G. J. (2004). The generational transmission of socioeconomic inequalities in child cognitive development and emotional health. *Social Science & Medicine*, *58*, 1147–1158. https://doi.org/10.1016/S0277-9536(03)00286-7

Nandi, A., Beard, J. R., & Galea, S. (2009). Epidemiologic heterogeneity of common mood and anxiety disorders over the lifecourse in the general population: A systematic review. *BMC Psychiatry*, *9*, 31. https://doi.org/10.1186/1471-244X-9-31

Nantel-Vivier, A., Pihl, R. O., Cote, S., & Tremblay, R. E. (2014). Developmental association of prosocial behaviour with aggression, anxiety and depression from infancy to preadolescence. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *55*(10), 1135–1144. https://doi.org/10.1111/jcpp.12235

Narad, M. E., Garner, A. A., Peugh, J. L., Tamm, L., Antonini, T. N., Kingery, K. M., … Epstein, J. N. (2015). Parent-teacher agreement on ADHD symptoms across development. *Psychological Assessment*, *27*(1), 239–48. https://doi.org/10.1037/a0037864

Nicholson, J. M., Lucas, N., Berthelsen, D., & Wake, M. (2012). Socioeconomic inequality profiles in physical and developmental health from 0-7 years: Australian National Study. *Journal of Epidemiology & Community Health*, *66*(1), 81–87. https://doi.org/10.1136/jech.2009.103291

Nigg, J. T., Goldsmith, H. H., & Sachek, J. (2004). Temperament and attention deficity hyperactivity disorder: The development of a multiple pathway model. *Journal of Clinical Child and Adolescent Psychology*, *33*(1), 42–53. https://doi.org/10.1207/S15374424JCCP3301

Nivard, M. G., Dolan, C. V., Kendler, K. S., Kan, K.-J., Willemsen, G., van Beijsterveldt, C. E. M., … Boomsma, D. I. (2015). Stability in symptoms of anxiety and depression as a function of genotype and environment: A longitudinal twin study from ages 3 to 63 years. *Psychological Medicine*, *45*(5), 1039–1049. https://doi.org/10.1017/S003329171400213X

Noam, G. G., & Goldstein, L. S. (1998). *The Resilience Inventory*. Unpublished protocol.

Nolen-Hoeksema, S. (2006). The etiology of gender differences in depression. In C. Mazure & G. Keita (Eds.), *Understanding depression in women: Applying empirical research to practice and policy* (pp. 9–43). Washington, DC, US: American Psychological Association. https://doi.org/10.1037/11434-001

Nolen-Hoeksema, S., & Girgus, J. S. (1994). The emergence of gender differences in depression

during adolescence. *Psychological Bulletin, 115*(3), 424–443. https://doi.org/10.1037/0033-2909.115.3.424

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling*, *14*(4), 535–569. https://doi.org/10.1080/10705510701575396

Oberle, E., Schonert-Reichl, K. A., Guhn, M., Zumbo, B. D., & Hertzman, C. (2014). The role of supportive adults in promoting positive development in middle childhood: A population-based study. *Canadian Journal of School Psychology*, *29*(4), 296–316. https://doi.org/10.1177/0829573514540116

Oberle, E., Schonert-Reichl, K. A., & Thomson, K. C. (2010). Understanding the link between social and emotional well-being and peer relations in early adolescence: Gender-specific predictors of peer acceptance. *Journal of Youth and Adolescence*, *39*, 1330–1342. https://doi.org/10.1007/s10964-009-9486-9

Obradovic, J., Burt, K. B., & Masten, A. S. (2010). Testing a dual cascade model linking competence and symptoms over 20 years from childhood to adulthood. *Journal of Clinical Child and Adolescent Psychology*, *39*(1), 90–102. https://doi.org/10.1080/15374410903401120

Odgers, C. L., Moffitt, T. E., Broadbent, J. M., Dickson, N., Hancox, R. J., Harrington, H., … Caspi, A. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development and Psychopathology*, *20*(2), 673–716. https://doi.org/10.1017/S0954579408000333

Olino, T. M., Klein, D. N., Lewinsohn, P. M., Rohde, P., & Seeley, J. R. (2010). Latent trajectory classes of depressive and anxiety disorders from adolescence to adulthood: Descriptions of classes and associations with risk factors. *Comprehensive Psychiatry*, *51*(3), 224–235. https://doi.org/10.1016/j.comppsych.2009.07.002

Olsson, C. A., McGee, R., Nada-Raja, S., & Williams, S. M. (2013). A 32-year longitudinal study of child and adolescent pathways to well-being in adulthood. *Journal of Happiness Studies*, *14*(3), 1069–1083. https://doi.org/10.1007/s10902-012-9369-8

Onise, K. D., Lynch, J. W., Sawyer, M. G., & Mcdermott, R. A. (2010). Can preschool improve child health outcomes? A systematic review. *Social Science & Medicine*, *70*(9), 1423–1440. https://doi.org/10.1016/j.socscimed.2009.12.037

Orpana, H., Vachon, J., Dykxhoorn, J., McRae, L., & Jayaraman, G. (2016). Monitoring positive mental health and its determinants in Canada: The development of the positive mental health surveillance indicator framework. *Chronic Diseases and Injuries in Canada*, *36*(1), 1–10.

Pachter, L. M., & Garcia Coll, C. (2009). Racism and child health: A review of the literature and future directions. *Journal of Developmental and Behavioral Pediatrics*, *30*(3), 255–263. https://doi.org/10.1097/DBP.0b013e3181a7ed5a

Patel, V. (2013). Reducing the burden of depression in youth: What are the implications of neuroscience and genetics on policies and programs? *Journal of Adolescent Health*, *52*(2 suppl.2), S36–S38. https://doi.org/10.1016/j.jadohealth.2012.04.016

Patterson, G. R., & Capaldi, D. M. (1990). A mediational model for boys' depressed mood. In J.

Rolf, A. Masten, D. Cicchetti, K. Nuechterlein, & S. Weintraub (Eds.), *Risk and protective factors in the development of psychopathology* (pp. 141–163). New York: Cambridge University Press.

Patterson, G. R., Degarmo, D. S., & Knutson, N. (2000). Hyperactive and antisocial behaviors: Comorbid or two points in the same process? *Development and Psychopathology*, *12*(1), 91-106. https://doi.org/10.1017/S0954579400001061

Pearlin, L. I., Schieman, S., Fazio, E. M., & Meersman, S. C. (2005). Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior*, *46*, 205 219. https://doi.org/10.1177/002214650504600206

Perpletchikova, F. (2011). Oppositional defiant disorder and conduct disorder. In K. Cheng & K. M. Myers (Eds.), *Child and adolescent psychiatry: The essentials* (2nd ed., pp. 70–88). Philadelphia: Wolters Kluwer.

Pescosolido, B. A., Jensen, P. S., Martin, J. K., Perry, B. L., Olafsdottir, S., & Fettes, D. (2008). Public knowledge and assessment of child mental health problems: Findings from the National Stigma Study-Children. *Journal of the American Academy of Child and Adolescent Psychiatry*, *47*(3), 339–49. https://doi.org/10.1097/CHI.0b013e318160e3a0

Phelan, J. C., Link, B. G., & Tehranifar, P. (2010). Social conditions as fundamental causes of health inequalities: Theory, evidence, and policy implications. *Journal of Health and Social Behavior*, *51*, S28–S40. https://doi.org/10.1177/0022146510383498

Phinney, J. S., Horenczyk, G., & Vedder, P. (2001). Ethnic identity, immigration, and well being: An interactional perspective. *Journal of Social Issues*, *57*(3), 493–510. https://doi.org/ 10.1111/0022-4537.00225

Piccinelli, M., & Wilkinson, G. (2000). Gender differences in depression: Critical review. *British Journal of Psychiatry*, *177*, 486–492. https://doi.org/10.1192/bjp.177.6.486

Pingault, J.B., Tremblay, R. E., Vitaro, F., Carbonneau, R., Genolini, C., Falissard, B., & Côté, S. M. (2011). Childhood trajectories of inattention and hyperactivity and prediction of educational attainment in early adulthood: A 16-year longitudinal population-based study. *American Journal of Psychiatry*, *168*, 1164–1170. https://doi.org/10.1176/appi.ajp.2011.10121732

PopulationData BC. (2017). Medical Service Plan (MSP) Payment Information File. Retrieved June 12, 2017, from https://www.popdata.bc.ca/data/internal/health/msp

Preacher, K. J., & Kelley, K. (2011). Effect size measures for mediation models: Quantitative strategies for communicating indirect effects. *Psychological Methods*, *16*(2), 93–115. https://doi.org/10.1037/a0022658

Puyat, J. H., Kazanjian, A., Goldner, E. M., & Wong, H. (2016). How often do individuals with major depression receive minimally adequate treatment? A population-based, data linkage study. *Canadian Journal of Psychiatry*, *6*, 394–404. https://doi.org/10.1177/0706743716640288

Puyat, J. H., Sc, M., Ph, D., Kazanjian, A., Wong, H., Ph, D., … Sc, M. H. (2017). Comorbid chronic general health conditions and depression care: A population-based analysis.

Psychological Services, *68*, 907–915. https://doi.org/10.1176/appi.ps.201600309

Qualter, P., Brown, S. L., Rotenberg, K. J., Vanhalst, J., Harris, R. A., Goossens, L., … Munn, P. (2013). Trajectories of loneliness during childhood and adolescence: Predictors and health outcomes. *Journal of Adolescence*, *36*(6), 1283–1293. https://doi.org/10.1016/j.adolescence.2013.01.005

Raat, H., Wijtzes, A., Jaddoe, V. W. V, Moll, H. A., Hofman, A., & Mackenbach, J. P. (2011). The health impact of social disadvantage in early childhood: the Generation R study. *Early Human Development*, *87*(11), 729–733. https://doi.org/10.1016/j.earlhumdev.2011.08.022

Ranta, K., Kaltiala-Heino, R., Pelkonen, M., & Marttunen, M. (2009). Associations between peer victimization, self-reported depression and social phobia among adolescents: The role of comorbidity. *Journal of Adolescence*, *32*(1), 77–93. https://doi.org/10.1016/j.adolescence.2007.11.005

Rasmussen, H. N., Scheier, M. F., & Greenhouse, J. B. (2009). Optimism and physical health: A meta-analytic review. *Annals of Behavioral Medicine*, *37*, 239–256. https://doi.org/10.1007/s12160-009-9111-x.Optimism

Ravens-Sieberer, U., Devine, J., Bevans, K., Riley, A. W., Moon, J., Salsman, J. M., & Forrest, C. B. (2014). Subjective well-being measures for children were developed within the PROMIS project: Presentation of first results. *Journal of Clinical Epidemiology, 67*(2), 207–218. https://doi.org/10.1016/j.jclinepi.2013.08.018

Reef, J., Diamantopoulou, S., Van Meurs, I., Verhulst, F. C., & Van Der Ende, J. (2011). Developmental trajectories of child to adolescent externalizing behavior and adult DSM-IV

disorder: Results of a 24-year longitudinal study. *Social Psychiatry and Psychiatric Epidemiology*, *46*(12), 1233–1241. https://doi.org/10.1007/s00127-010-0297-9

Reiss, F. (2013). Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. *Social Science & Medicine*, *90*, 24–31. https://doi.org/10.1016/j.socscimed.2013.04.026

Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin, 128*(2), 330–366. https://doi.org/10.1037//0033-2909.128.2.330

Rettew, D. C. (2010). Refining our diagnostic system - cake or bread and fudge? *Journal of the American Academy of Child & Adolescent Psychiatry*, *49*(5), 441–443. https://doi.org/10.1016/j.jaac.2010.02.008

Rettew, D. C., Althoff, R. R., Dumenci, L., Ayer, L., & Hudziak, J. J. (2008). Latent profiles of temperament and their relations to psychopathology and wellness. *Journal of the American Academy of Child and Adolescent Psychiatry*, *47*(3), 273–281. https://doi.org/10.1097/CHI.0b013e318160b403

Riggs, N. R., Jahromi, L. B., Razza, R. P., Dillworth-Bart, J. E., & Mueller, U. (2006). Executive function and the promotion of social-emotional competence. *Journal of Applied Developmental Psychology*, *27*(4), 300–309. https://doi.org/10.1016/j.appdev.2006.04.002

Roberson-Nay, R., Leibenluft, E., Brotman, M. A., Myers, J., Larsson, H., Lichtenstein, P., & Kendler, K. S. (2015). Longitudinal stability of genetic and environmental influences on irritability: From childhood to young adulthood. *The American Journal of Psychiatry*,

172(7), 657–664. https://doi.org/10.1176/appi.ajp.2015.14040509

Rose, G. (1985). Sick individuals and sick populations. *International Journal of Epidemiology*, *14*(1), 32–38.

Rose, T., Joe, S., Williams, A., Harris, R., Betz, G., & Stewart-Brown, S. (2017). Measuring mental wellbeing among adolescents: A systematic review of instruments. *Journal of Child and Family Studies*, 2349–2362. https://doi.org/10.1007/s10826-017-0754-0

Rothbart, M. K., & Bates, J. E. (1998). Temperament. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology: Vol 3. Social, emotional, and personality development* (5th ed., pp. 105–176). New York: Wiley.

Rueger, S. Y., Malecki, C. K., Pyun, Y., Aycock, C., & Coyle, S. (2016). A meta-analytic review of the association between perceived social support and depression in childhood and adolescence. *Psychological Bulletin*, *142*(10), 1017–1067. https://doi.org/10.1037/bul0000058

Savage, J., Verhulst, B., Copeland, W., Althoff, R. R., Lichtenstein, P., & Roberson-Nay, R. (2015). A genetically informed study of the longitudinal relation between irritability and anxious/depressed symptoms. *Journal of the American Academy of Child and Adolescent Psychiatry*, *54*(5), 377–384. https://doi.org/10.1016/j.jaac.2015.02.010

Schinka, K. C., van Dulmen, M. H. M., Mata, A. D., Bossarte, R., & Swahn, M. (2013). Psychosocial predictors and outcomes of loneliness trajectories from childhood to early adolescence. *Journal of Adolescence*, *36*(6), 1251–60. https://doi.org/10.1016/j.adolescence.2013.08.002

Schonert-Reichl, K. A, Guhn, M., Gadermann, A. M., Hymel, S., Sweiss, L., & Hertzman, C. (2013). Development and validation of the Middle Years Development Instrument (MDI): Assessing children's well-being and assets across multiple contexts. *Social Indicators Research*, *114*, 345–369. https://doi.org/10.1007/s11205-012-0149-y

Schwartz, S. J., Unger, J. B., Zamboanga, B. L., & Szapocznik, J. (2010). Rethinking the concept of acculturation: Implications for theory and research. *American Psychologist*, *65*(4), 237–251. https://doi.org/10.1037/a0019330

Schwartz, S., & Meyer, I. H. (2010). Mental health disparities research: The impact of within and between group analyses on tests of social stress hypotheses. *Social Science and Medicine*, *70*(8), 1111–1118. https://doi.org/10.1016/j.socscimed.2009.11.032

Sciutto, M. J., Nolfi, C. J., & Bluhm, C. (2004). Effects of child gender and symptom type on referrals for ADHD by elementary school teachers. *Journal of Emotional and Behavioral Disorders*, *12*(4), 247–253. https://doi.org/10.1177/10634266040120040501

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, *55*(1), 5–14. https://doi.org/10.1037//0003-066X.55.1.5

Sesma, A. J., Mannes, M., & Scales, P. C. (2012). Positive adaptation, resilience and the developmental assets framework. In *Handbook of Resilience in Children* (pp. 427–442). Springer, Boston, MA.

Shevlin, M., Mcelroy, E., & Murphy, J. (2017). Homotypic and heterotypic psychopathological continuity: A child cohort study. *Social Psychiatry and Psychiatric Epidemiology*. https://doi.org/10.1007/s00127-017-1396-7

Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *The Journal of the American Medical Association*, *301*(21), 2252–9. https://doi.org/10.1001/jama.2009.754

Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, *129*(1), e232-46. https://doi.org/10.1542/peds.2011-2663

Sibley, M. H., Pelham, W. E., Molina, B. S. G., Coxe, S., Kipp, H., Gnagy, E. M., … Lahey, B. B. (2014). The role of early childhood ADHD and subsequent CD in the initiation and escalation of adolescent cigarette, alcohol, and marijuana use. *Journal of Abnormal Psychology*, *123*(2), 362–374. https://doi.org/10.1037/a0036585

Silver, R. B., Measelle, J. R., Armstrong, J. M., & Essex, M. J. (2005). Trajectories of classroom externalizing behavior: Contributions of child characteristics, family characteristics, and the teacher-child relationship during the school transition. *Journal of School Psychology*, *43*(1), 39–60. https://doi.org/10.1016/j.jsp.2004.11.003

Sourander, A. (2005). Childhood predictors of externalizing and internalizing problems in adolescence. *European Child and Adolescent Psychiatry, 14*, 415–423. https://doi.org/10.1007/s00787-005-0475-6

Spoth, R., Guyll, M., Redmond, C., Greenberg, M., & Feinberg, M. (2011). Six-year sustainability of evidence-based intervention implementation quality by community-university partnerships: The PROSPER Study. *American Journal of Community Psychology*, *48*(3–4), 412–425. https://doi.org/10.1007/s10464-011-9430-5

Sroufe, A. L. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & Human Development*, *7*, 349–367. https://doi.org/10.1080/14616730500365928

Statistics Canada. (2007). *CANSIM Table 051-0020: Number of non-permanent residents, Canada, provinces and territories.* Retrieved March 31, 2017, from http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=510020

Statistics Canada. (2016). National Household Survey focus on geography series. Retrieved March 31, 2017, from http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/fogs-spg/Pages/FOG.cfm?lang=E&level=2&GeoCode=59

Steinberg, E. A., & Drabick, D. A. G. (2015). A developmental psychopathology perspective on ADHD and comorbid conditions: The role of emotion regulation. *Child Psychiatry and Human Development*, *46*(6), 951–966. https://doi.org/10.1007/s10578-015-0534-2

Sterba, S., Egger, H. L., & Angold, A. (2007). Diagnostic specificity and nonspecificity in the dimensions of preschool psychopathology. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *48*(10), 1005–13. https://doi.org/10.1111/j.1469-7610.2007.01770.x

Sterba, S. K., Prinstein, M. J., & Cox, M. J. (2007). Trajectories of internalizing problems across childhood : Heterogeneity, external validity, and gender differences. *Development and Psychopathology*, *19*, 345–366. https://doi.org/10.1017/S0954579407070174

Stice, E., Rohde, P., Seeley, J. R., & Gau, J. M. (2009). Brief cognitive-behavioral depression prevention program for high-risk adolescents outperforms two alternative interventions: A randomized efficacy trial. *Journal of Clinical Psychology*, *76*(4), 595–606.

https://doi.org/10.1037/a0012645.Brief

Stice, E., Shaw, H., Bohon, C., & Marti, C. N. (2010). A meta-analytic review of depression prevention programs for children and adolescents: Factors that predict magnitude of intervention effects. *Journal of Consulting and Clinical Psychology*, *77*(3), 486–503. https://doi.org/10.1037/a0015168.A

Stringhini, S., Carmeli, C., Jokela, M., Avendaño, M., Muennig, P., Guida, F., … Shipley, M. J. (2017). Socioeconomic status and the 25 × 25 risk factors as determinants of premature mortality: A multicohort study and meta-analysis of 1.7 million men and women. *The Lancet*, *16*, 7–9. https://doi.org/10.1016/S0140-6736(16)32380-7

Stubbe, D. E. (2011). Attention-Deficit/Hyperaticity Disorder. In K. Cheng & K. M. Myers (Eds.), *Child and adolescent psychiatry: The essentials* (2nd ed., pp. 51–69). Philadelphia: Wolters Kluwer.

Suldo, S. M., Huebner, E. S., Freidrich, A. A., & Gilman, R. (2009). Life Satisfaction. In R. Gilman, E. S. Huebner, & M. J. Furlong (Eds.), *Handbook of Positive Psychology in Schools* (pp. 27–39).

Suldo, S. M., & Shaffer, E. J. (2008). Looking beyond psychopathology: The dual-factor model of mental health in youth. *School Psychology Review*, *37*(1), 52–68.

Tabachnick, B. G. ., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education.

Thapar, A., Harrington, R., & Mcguffin, P. (2001). Examining the comorbidity of ADHD-related behaviours and conduct problems using a twin study design. *The British Journal of*

Psychiatry, *179*(3), 224–229. https://doi.org/10.1192/bjp.179.3.224

Theokas, C., Almerigi, J. B., Lerner, R. M., Dowling, E. M., Benson, P. L., Scales, P. C., & Eye, A. Von. (2005). Conceptualizing and modeling individual and ecological asset components of thriving in early adolescence. *Journal of Early Adolescence*, *25*(1), 113–143. https://doi.org/10.1177/0272431604272460

Thomson, K. C., Guhn, M., Richardson, C. G., Ark, T. K., & Shoveller, J. (2017). Profiles of children's social-emotional health at school entry and associated income, gender and language inequalities: A cross-sectional population-based study in British Columbia. *BMJ Open*, *7*, 1–11. https://doi.org/10.1136/bmjopen-2016-015353

Thomson, K. C., Oberle, E., Gadermann, A. M., Guhn, M., Rowcliffe, P., & Schonert-Reichl, K. A. (2017). Measuring social-emotional development in middle childhood: The Middle Years Development Instrument. *Journal of Applied Developmental Psychology*. https://doi.org/10.1016/j.appdev.2017.03.005

Thomson, K. C., Oberle, E., & Schonert-Reichl, K. A. (2015). Optimism in early adolescence: Relations to individual characteristics and ecological assets in families, school, and neighbourhoods. *Journal of Happiness Studies*, *16*, 889–913. https://doi.org/10.1007/s10902-014-9539-y

Tobias, M. (2017). Social rank: A risk factor whose time has come? *The Lancet*, *17*, 9–10. https://doi.org/10.1016/S0140-6736(17)30191-5

Tremblay, R. E. (2000). The development of aggressive behaviour during childhood: What have we learned in the past century? *International Journal of Behavioral Development*, *24*(2),

129-141. https://doi.org/10.1080/016502500383232

Trompetter, H. R., Lamers, S. M. A., Westerhof, G. J., Fledderus, M., & Bohlmeijer, E. T. (2017). Both positive mental health and psychopathology should be monitored in psychotherapy: Confirmation for the dual-factor model in acceptance and commitment therapy. *Behaviour Research and Therapy*, *91*, 58–63. https://doi.org/10.1016/j.brat.2017.01.008

Trott, G. E. (2006). Attention-deficit/hyperactivity disorder (ADHD) in the course of life. *European Archives of Psychiatry and Clinical Neuroscience*, *256*(suppl. 1), 21–25. https://doi.org/10.1007/s00406-006-1003-5

Twenge, J. M., & Nolen-Hoeksema, S. (2002). Age, gender, race, socioeconomic status, and birth cohort difference on the children's depression inventory: A meta-analysis. *Journal of Abnormal Psychology*, *111*(4), 578–588. https://doi.org/10.1037//0021-843X.111.4.578

Umberson, D., Williams, K., Thomas, P. A, Liu, H., & Thomeer, M. B. (2014). Race, gender, and chains of disadvantage: Childhood adversity, social relationships, and health. *Journal of Health and Social Behavior*, *55*(1), 20–38. https://doi.org/10.1177/0022146514521426

Unternaehrer, E., Greenlaw, K., Hari Dass, S., Chen, L., Bouvette-Turcot, A., Cost, K., … Meaney, M. (2017). Intergenerational transmission of well being–genetic and epigenetic mechanisms. Presented at the 25th European Congress of Psychiatry. Florence, Italy. https://doi.org/http://dx.doi.org/10.1016/j.eurpsy.2017.01.146

Van den Akker, A. L., Deković, M., Asscher, J. J., Shiner, R. L., & Prinzie, P. (2013). Personality types in childhood: Relations to latent trajectory classes of problem behavior

and overreactive parenting across the transition into adolescence. *Journal of Personality and Social Psychology*, *104*(4), 750–64. https://doi.org/10.1037/a0031184

Varni, J. W., Limbers, C. A., & Burwinkle, T. M. (2007). How young can children reliably and validly self-report their health-related quality of life? An analysis of 8,591 children across age subgroups with the PedsQL™ 4.0 Generic Core Scales. *Health and Quality of Life Outcomes, 13*, 1–13. https://doi.org/10.1186/1477-7525-5-1

Waszczuk, M. A., Zavos, H. M. S., Gregory, A. M., & Eley, T. C. (2016). The stability and change of etiological influences on depression, anxiety symptoms and their co-occurrence across adolescence and young adulthood. *Psychological Medicine*, *46*(1), 161–175. https://doi.org/10.1017/S0033291715001634

Watson, D. (2005). Rethinking the mood and anxiety disorders: A quantitative hierarchical model for DSM-V. *Journal of Abnormal Psychology*, *114*(4), 522–536. https://doi.org/10.1037/0021-843X.114.4.522

Weeks, M., Cairney, J., Wild, T. C., Ploubidis, G. B., Naicker, K., & Colman, I. (2014). Early-life predictors of internalizing symptom trajectories in Canadian children. *Depression and Anxiety*, *31*(7), 608–616. https://doi.org/10.1002/da.22235

Whalen, D. J., Luby, J. L., Tilman, R., Mike, A., Barch, D., & Belden, A. C. (2016). Latent class profiles of depressive symptoms from early to middle childhood: Predictors, outcomes, and gender effects. *Journal of Child Psychology and Psychiatry*, *7*, 794–804. https://doi.org/10.1111/jcpp.12518

Whalen, D. J., Sylvester, C. M., & Luby, J. L. (2017). Depression and anxiety in preschoolers.

Child and Adolescent Psychiatric Clinics of North America, 26(3), 503-522. https://doi.org/10.1016/j.chc.2017.02.006

Whelan, D. C., & Zelenski, J. M. (2012). Experimental evidence that positive moods cause sociability. *Social Psychological and Personality Science*, *3*, 430–437. https://doi.org/10.1177/1948550611425194

Wichstrøm, L., Belsky, J., & Steinsbekk, S. (2017). Homotypic and heterotypic continuity of symptoms of psychiatric disorders from age 4 to 10 years: A dynamic panel model. *Journal of Child Psychology & Psychiatry*. https://doi.org/10.1111/jcpp.12754

Wichstrøm, L., & Berg-Nielsen, T. S. (2014). Psychiatric disorders in preschoolers: The structure of DSM-IV symptoms and profiles of comorbidity. *European Child and Adolescent Psychiatry*, *23*(7), 551–562. https://doi.org/10.1007/s00787-013-0486-7

Wiggins, J. L., Mitchell, C., Hyde, L. W., & Monk, C. S. (2015). Identifying early pathways of risk and resilience: The codevelopment of internalizing and externalizing symptoms and the role of harsh parenting. *Development and Psychopathology*, *27*, 1295–1312. https://doi.org/10.1017/S0954579414001412

Wise, P. H. (2009). Confronting social disparities in child health: A critical appraisal of life-course science and research. *Pediatrics*, *124 Suppl*(November), S203-11. https://doi.org/10.1542/peds.2009-1100H

Wodtke, G. T., & Almirall, D. (2017). Estimating moderated causal effects with time-varying treatments and time-varying moderators: Structural nested mean models and regression with residuals. *Causal Inference*, *47*(1), 212–245. https://doi.org/10.1177/0081175017701180

Wolke, D., Waylen, A., Samara, M., Steer, C., Goodman, R., & Ford, T. (2009). Selective drop-out in longitudinal studies and non-biased prediction of behaviour disorders. *The British Journal of Psychiatry*, *195*, 249–256. https://doi.org/10.1192/bjp.bp.108.053751

World Health Organization. (2016). Mental health: Strengthening our response. Retrieved February 10, 2017, from http://www.who.int/mediacentre/factsheets/fs220/en/

Wright, A., Jorm, A. F., Harris, M. G., & McGorry, P. D. (2007). What's in a name? Is accurate recognition and labelling of mental disorders by young people associated with better help-seeking and treatment preferences? *Social Psychiatry and Psychiatric Epidemiology*, *42*(3), 244–250. https://doi.org/10.1007/s00127-006-0156-x

Wright, A., Jorm, A. F., & Mackinnon, A. J. (2011). Labeling of mental disorders and stigma in young people. *Social Science and Medicine*, *73*(4), 498–506. https://doi.org/10.1016/j.socscimed.2011.06.015

Yoshikawa, H., Aber, J. L., & Beardslee, W. R. (2012). The effects of poverty on the mental, emotional, and behavioral health of children and youth: Implications for prevention. *The American Psychologist*, *67*(4), 272–84. https://doi.org/10.1037/a0028015

Zachrisson, H. D., Rödje, K., & Mykletun, A. (2006). Utilization of health services in relation to mental health problems in adolescents: A population based survey. *BMC Public Health*, *6*, 34. https://doi.org/10.1186/1471-2458-6-34

Zwaanswijk, M., Verhaak, P. F. M., Bensing, J. M., van der Ende, J., & Verhulst, F. C. (2003). Help seeking for emotional and behavioural problems in children and adolescents. *European Child and Adolescent Psychiatry*, *161*, 153–161. https://doi.org/10.1007/s00787-003-0322-6

Appendices

Appendix A: Measures Key

EARLY DEVELOPMENT INSTRUMENT (EDI) SOCIAL-EMOTIONAL SUBSCALES[5]

Overall social competence

1 overall social/emotional development

2 ability to get along with peers

3 plays and works cooperatively with other children at the level appropriate for his/her age

4 is able to play with various children

8 shows self-confidence

Responsibility and respect

5 follows rules and instructions

6 respects the property of others

7 demonstrates self-control

9 demonstrates respect for adults

10 demonstrates respect for other children

11 accepts responsibility for actions

16 takes care of school materials

[5] Janus & Offord, 2007. All items rated as 0 (Never), 5 (Sometimes or somewhat true), 10 (Often or very true), or no score (Don't know) except items 1 and 2 rated as 0 (Poor/very poor), 5 (Average), 10 (Very good/good), or no score (Don't know).

27 shows tolerance to someone who made a mistake (e.g., when a child gives a wrong answer to a question posed by the teacher)

Approaches to learning

12 listens attentively

13 follows directions

14 completes work on time

15 works independently

17 works neatly and carefully

22 is able to solve day-to-day problems by him/herself

23 is able to follow one-step instructions

24 is able to follow class routines without reminders

25 is able to adjust to changes in routines

Readiness to explore

18 is curious about the world

19 is eager to play with a new toy

20 is eager to play a new game

21 is eager to play with/read a new book

Prosocial and helping behaviour

28 will try to help someone who has been hurt

29 volunteers to help clear up a mess someone else has made

30 if there is a quarrel or dispute will try to stop it

31 offers to help other children who have difficulty with a task

32 comforts a child who is crying or upset

33 spontaneously helps to pick up objects which another child has dropped (e.g., pencils, books)

34 will invite bystanders to join in a game

35 helps other children who are feeling sick

Anxious and fearful behaviour

36 is upset when left by parent/guardian

51 seems to be unhappy, sad, or depressed

52 appears fearful or anxious

53 appears worried

54 cries a lot

55 is nervous, high-strung, or tense

56 is incapable of making decisions

57 is shy

Aggressive behaviour

37 gets into physical fights

38 bullies or is mean to others

39 kicks, bites, hits other children or adults

40 takes things that do not belong to him/her

41 laughs at other children's discomfort

45 is disobedient

46 has temper tantrums

Hyperactive and inattentive behaviour

42 can’t sit still, is restless

43 is distractible, has trouble sticking to any activity

44 fidgets

47 is impulsive, acts without thinking

48 has difficulty awaiting turn in games or groups

49 cannot settle to anything for more than a few moments

50 is inattentive

MIDDLE YEARS DEVELOPMENT INSTRUMENT (MDI) WELL-BEING AND SOCIAL CONNECTEDNESS SCALES[6]

Life satisfaction

16	In most ways my life is close to the way I would want it to be.
17	The things in my life are excellent.
18	I am happy with my life.
19	So far I have gotten the important things I want in life.
20	If I could live my life over, I would have it the same way.

Optimism

4	I have more good times than bad times.
5	I believe more good things than bad things will happen to me.
6	I start most days thinking I will have a good day.

Self-concept

7	In general, I like being the way I am.
8	Overall, I have a lot to be proud of.
9	A lot of things about me are good.

Sadness

10	I feel unhappy a lot of the time.
11	I feel upset about things.
12	I feel that I do things wrong a lot.

[6] Schonert-Reichl et al., 2013. All items rated from 1 (Disagree a lot) to 5 (Agree a lot) except Adult Connectedness items rated from 1 (Not at all true) to 4 (Very much true).

Worries

13 I worry about what other kids might be saying about me.

14 I worry a lot that other people might not like me.

15 I worry about being teased.

Adult connectedness

At my school there is a teacher or another adult…

25 …who really cares about me.

26 …who believes that I will be a success.

27 …who listens to me when I have something to say.

In my home, there is a parent or another adult…

28 …who believes that I will be a success.

29 …who listens to me when I have something to say.

30 … who I can talk to about my problems.

31 … I care about what my parents (or guardians) think of me.

In my neighbourhood/community (not from your school or family), there is an adult…

32 …who really cares about me.

33 …who believes that I will be a success.

34 …who listens to me when I have something to say.

Peer connectedness

37 I feel part of a group of friends that do things together.

38 I feel that I usually fit in with other kids around me.

39 When I am with other kids my age, I feel I belong.

40 I have at least one really good friend I can talk to when something is bothering me.

41 I have a friend I can tell everything to.

42 There is somebody my age who really understands me.

Appendix B: Correlations Matrix of EDI Subscales

Table B1: Correlations of EDI Social-Emotional Subscales (Wave 2)

	1	2	3	4	5	6	7	8
1. Overall social competence	1							
2. Responsibility and respect	.58**	1						
3. Approaches to learning	.60**	.65**	1					
4. Readiness to explore	.39**	.29**	.41**	1				
5. Prosocial and helping	.45**	.38**	.40**	.33**	1			
6. Anxious and fearful (R)	.38**	.17**	.26**	.23**	.18**	1		
7. Aggressive behaviour (R)	.45**	.66**	.44**	.13**	.28**	.16**	1	
8. Hyperactive & inattentive (R)	.47**	.62**	.64**	.21**	.30**	.18**	.54**	1

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

Legend: Subscales range from 0-10 with higher scores indicating better social-emotional functioning. (R) indicates scale was reverse-coded.

Appendix C: Path Coefficients for Chapter 4 Mediation Models

Table C1. Mediation Model for Adult and Peer Connectedness on Life Satisfaction

	Relative Total Effect	Relative indirect Effect	Relative Direct Effect	Mediation Pathway (95% CI)			
	path c	paths a, b	path c'	path ab	lower	upper	% change (ab/c)
	X>M>Y	X>M, M>Y	X>Y				
Adult connectedness							
LP2	-0.05*	-0.05**	-0.02	-0.03**	-0.05	-0.01	57%
LP3	-0.14***	-0.05**	-0.12***	-0.03**	-0.04	-0.01	18%
LP4	-0.14***	-0.14***	-0.07*	-0.08***	-0.10	-0.05	54%
LP5	-0.21***	-0.08***	-0.16***	-0.04***	-0.06	-0.02	20%
LP6	-0.21***	-0.10**	-0.15**	-0.06**	-0.10	-0.02	28%
LP7	-0.29***	-0.11**	-0.22***	-0.06**	-0.10	-0.02	22%
Boys	-0.03*	-0.13***	0.05***				
ESL	-0.06***	-0.16***	0.03				
Adults		0.56***					
Peer connectedness							
LP2	-0.05*	-0.09***	-0.01	-0.04***	-0.06	-0.02	82%
LP3	-0.14***	-0.14***	-0.08***	-0.06***	-0.08	-0.05	44%
LP4	-0.15***	-0.24***	-0.04	-0.11***	-0.13	-0.08	72%
LP5	-0.21***	-0.20***	-0.12***	-0.09***	-0.11	-0.07	42%
LP6	-0.21***	-0.28***	-0.09	-0.12***	-0.16	-0.09	59%
LP7	-0.29***	-0.43***	-0.10*	-0.19***	-0.24	-0.15	67%
Boys	-0.03*	-0.10***	0.02				
ESL	-0.06***	-0.03*	-0.05**				
Peers		0.45***					

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

Table C2. Mediation Model for Adult and Peer Connectedness on Optimism

	Relative Total Effect	Relative indirect Effect	Relative Direct Effect	Mediation Pathway (95% CI)			
	path c	paths a, b	path c'	path ab	lower	upper	% change (ab/c)
	X>M>Y	X>M, M>Y	X>Y				
Adult connectedness							
LP2	-0.02	-0.05**	0.01	-0.03**	-0.04	-0.01	173%
LP3	-0.10***	-0.05**	-0.08***	-0.02**	-0.04	-0.01	23%
LP4	-0.12***	-0.14***	-0.05	-0.07***	-0.10	-0.05	62%
LP5	-0.12***	-0.07***	-0.08**	-0.04***	-0.06	-0.02	32%
LP6	-0.06	-0.11**	-0.01	-0.06**	-0.09	-0.02	90%
LP7	-0.15**	-0.11**	-0.10*	-0.06**	-0.09	-0.02	38%
Boys	-0.12***	-0.13***	-0.05***				
ESL	-0.01	-0.16***	0.08***				
Adults		0.53***					
Peer connectedness							
LP2	-0.02	-0.09***	0.02	-0.04***	-0.06	-0.02	240%
LP3	-0.10***	-0.13***	-0.05*	-0.06***	-0.07	-0.04	54%
LP4	-0.12***	-0.23***	-0.02	-0.10***	-0.12	-0.07	81%
LP5	-0.12***	-0.19***	-0.04	-0.08***	-0.10	-0.06	66%
LP6	-0.06	-0.27***	0.06	-0.11***	-0.15	-0.08	209%
LP7	-0.15**	-0.43***	0.03	-0.18***	-0.22	-0.13	117%
Boys	-0.12***	-0.10***	-0.08***				
ESL	-0.01	-0.03*	0.00				
Peers		0.42**					

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

Table C3. Mediation Model for Adult and Peer Connectedness on Self-Concept

	Relative Total Effect	Relative indirect Effect	Relative Direct Effect	Mediation Pathway (95% CI)			
	path c X>M>Y	paths a, b X>M, M>Y	path c' X>Y	path ab	lower	upper	% change (ab/c)
Adult connectedness							
LP2	-0.06**	-0.05**	-0.04*	-0.02**	-0.04	-0.01	41%
LP3	-0.13***	-0.04**	-0.11***	-0.02**	-0.03	-0.01	17%
LP4	-0.16***	-0.14***	-0.09***	-0.07***	-0.09	-0.05	42%
LP5	-0.17***	-0.07***	-0.14***	-0.04***	-0.05	-0.02	21%
LP6	-0.21***	-0.11**	-0.15***	-0.05**	-0.08	-0.02	25%
LP7	-0.30***	-0.11**	-0.25***	-0.05**	-0.09	-0.02	18%
Boys	-0.10***	-0.13***	-0.04***				
ESL	-0.09***	-0.16***	-0.02				
Adults		0.48***					
Peer connectedness							
LP2	-0.06**	-0.09***	-0.03	-0.03***	-0.05	-0.02	51%
LP3	-0.13***	-0.13***	-0.08***	-0.05***	-0.06	-0.03	38%
LP4	-0.16***	-0.23***	-0.08**	-0.08***	-0.11	-0.06	52%
LP5	-0.17***	-0.19***	-0.11***	-0.07***	-0.09	-0.05	40%
LP6	-0.21***	-0.28***	-0.11**	-0.10***	-0.13	-0.07	48%
LP7	-0.30***	-0.43***	-0.15**	-0.15***	-0.20	-0.12	50%
Boys	-0.10***	-0.10***	-0.07***				
ESL	-0.09***	-0.03*	-0.08***				
Peers		0.36***					

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

Table C4. Mediation Model for Adult and Peer Connectedness on Sadness

	Relative Total Effect	Relative indirect Effect	Relative Direct Effect	Mediation Pathway (95% CI)			
	path c X>M>Y	paths a, b X>M, M>Y	path c' X>Y	path ab	lower	upper	% change (ab/c)
Adult connectedness							
LP2	0.06*	-0.05**	0.04	0.02**	0.01	0.03	29%
LP3	0.21***	-0.04**	0.19***	0.02**	0.01	0.03	8%
LP4	0.24***	-0.14***	0.19***	0.05***	0.03	0.07	20%
LP5	0.25***	-0.08***	0.22***	0.03***	0.02	0.04	11%
LP6	0.29***	-0.10**	0.26***	0.04**	0.02	0.06	13%
LP7	0.49***	-0.11**	0.45***	0.04**	0.02	0.07	9%
Boys	-0.04*	-0.13***	-0.09***				
ESL	0.12***	-0.16***	0.06**				
Adults		-0.36***					
Peer connectedness							
LP2	0.06*	-0.09***	0.03	0.03***	0.01	0.04	47%
LP3	0.21***	-0.14***	0.17***	0.04***	0.03	0.06	20%
LP4	0.24***	-0.23***	0.17***	0.07***	0.05	0.09	30%
LP5	0.25***	-0.19***	0.19***	0.06***	0.05	0.08	24%
LP6	0.30***	-0.28***	0.21***	0.09***	0.06	0.12	29%
LP7	0.49***	-0.42***	0.36***	0.13***	0.10	0.17	26%
Boys	-0.04*	-0.10***	-0.07***				
ESL	0.12***	-0.04*	0.11***				
Peers		-0.31***					

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

Table C5. Mediation Model for Adult and Peer Connectedness on Worries

	Relative Total Effect	Relative indirect Effect	Relative Direct Effect	Mediation Pathway (95% CI)			
	path c X>M>Y	paths a, b X>M, M>Y	path c' X>Y	path ab	lower	upper	% change (ab/c)
Adult connectedness							
LP2	0.03	-0.05**	0.02	0.01**	0.00	0.02	40%
LP3	0.20***	-0.05**	0.19***	0.01**	0.00	0.02	5%
LP4	0.24***	-0.14***	0.21***	0.03***	0.02	0.04	11%
LP5	0.28***	-0.08***	0.27***	0.01***	0.01	0.02	5%
LP6	0.25***	-0.10**	0.23***	0.02**	0.01	0.04	8%
LP7	0.44***	-0.11**	0.42***	0.02**	0.01	0.04	5%
Boys	-0.31***	-0.13***	-0.34***				
ESL	0.11***	-0.16***	0.08**				
Adults		-0.20***					
Peer connectedness							
LP2	0.03	-0.09***	0.00	0.02***	0.01	0.03	85%
LP3	0.20***	-0.14***	0.17***	0.03***	0.02	0.04	17%
LP4	0.24***	-0.23***	0.18***	0.06***	0.04	0.07	24%
LP5	0.28***	-0.19***	0.23***	0.05***	0.04	0.06	17%
LP6	0.25***	-0.28***	0.18**	0.07***	0.05	0.10	28%
LP7	0.45***	-0.42***	0.34***	0.10***	0.08	0.14	23%
Boys	-0.31***	-0.10***	-0.34***				
ESL	0.11***	-0.03*	0.10***				
Peers		-0.25***					

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