

**Risk Factors for mental health problems in children and youth during the COVID-19
pandemic**

Tessa Ritchie

Thesis submitted to the University of Ottawa
in partial fulfillment of the requirements for the
degree of Doctor of Philosophy in Clinical Psychology

School of Psychology
Faculty of Social Sciences
University of Ottawa

Table of Contents

Table of Contents	ii
Acknowledgements	iv
Contribution of Authors	v
Abstract	vi
Preface	1
Chapter 1: Background	4
The COVID-19 Pandemic in Canada	5
Previous Large-scale Traumas	7
Life Course Framework	9
Risk Factors for Mental Health Problems	12
Risk Factors for Poor Mental Health During the Pandemic	20
Overview of Current Studies	24
References	26
Chapter 2: Longitudinal tracking of mental health in kindergarten students throughout the pandemic	40
Abstract	41
Introduction	42
Research Methods	51
Results	58
Discussion	64
References	69
Appendix A	78

Chapter 3: Vulnerability to internalizing symptoms among Canadian children across the**pandemic era: A life course perspective 82**

Abstract..... 83

Introduction 84

Research Methods 94

Discussion..... 106

Appendix A 124

Chapter 4: General Discussion 129

The Life Course Framework 130

Main Findings..... 132

Risk Factors and Protective Factors for Higher Mental Health Symptoms 133

Strengths and Limitations..... 137

Conclusion..... 139

References 141

Acknowledgements

There is no question that this thesis would not have been possible without many people supporting me. First, I'd like to thank my supervisor, Dr. Maria Rogers, for giving me the gift of being accepted into this program and being able to study and now practice clinical psychology. Above and beyond your guidance and support, your kindness has been instrumental in my getting to graduation. I would also like to thank my committee members, Dr. Jess Whitely, Dr. Julia Ogg, Dr. Stuart Hammond, and Dr. Karen Milligan, for the insight and direction that have helped produce this dissertation.

My family. Thomas and Annie, you are truly two of the most dedicated and hardworking people I know, and I am so grateful for your unwavering support through the pursuit of my biggest dreams and in my greatest failures. I am so lucky to be your sister. To my mom, you are a woman of action, and in every moment I wanted to quit, you put me back together and helped me see that this career was not only possible but that it was where I was meant to be. And to my dad, who walked the same path 35 years ago. Thank you for reading every draft and thank you for reminding me that the end is worth the means. To be a psychologist is the greatest privilege and the most meaningful life's work. Thank you for believing in me.

To Ryan, my wonderful husband-to-be. You have always seen all of me, even in times when I didn't see myself. You have supported me as I chase my dreams of being a psychologist, all while reminding me to make time for my dream of having a beautiful life full of love, family, and laughter outside work or school. You have given me unconditional love, grace, and many, many home-cooked meals. Thank you—I could not have done this without you.

And finally, to those still enduring the mental health consequences of the pandemic, you are not alone, and we should have done better.

Contribution of Authors

Both studies described in the current dissertation are a part of larger interscholastic research projects. The author (Tessa Ritchie) is the first author of both manuscripts and is responsible for the unique conceptualization of the research questions, literature review, method design, participant recruitment, data collection, data analysis, and manuscript editing and writing. Dr. Maria Rogers is the second author on both manuscripts, her contributions include editing and support with the broader projects design and supervision of research activities. For study one, the primary investigator on the broader project is Dr. Maria Rogers from Carleton University and was launched in collaboration with Dr. Julia Ogg, Dr. Liz Shelleby and Dr. Alecia Santuzzi from the University of Illinois and Dr. Jess Whitley from the University of Ottawa. Co-investigators contributed to the broader method design, data management and participant recruitment, as well as consultation with data analysis.

The second study is also subsumed within an interscholastic project involving professors from five universities under the lead of my supervisor, Dr. Maria Rogers. Data collection and data management was management by Tessa Ritchie and Amanda Krause. The primary co-investigators on the research team include Dr. Emma Climie from the University of Calgary, Dr. Janet Mah from the University of British Columbia, Dr. Penny Corkum from Dalhousie University, and Dr. Yuanyuan Jiang from St. Paul's University. Co-investigators contributed to broader method design and participant recruitment.

Abstract

All Canadian children have been impacted by the restrictions employed to stop the spread of the novel coronavirus (COVID-19). Whilst the impact has been universal, preliminary research suggests that the pandemic's consequences, specifically on mental health, have not been uniform (Cost et al., 2021). The goal of this dissertation is to examine what risk factors made children more vulnerable to mental health problems during the pandemic. Utilizing the Life Course Framework as a guide, two longitudinal research studies investigate the impact of individual and cumulative risk factors on mental health trajectories during the pandemic. Chapter 1 is an overview of the pandemic in Canada and a review of the background literature on risk factors for mental health problems in children and youth, specifically looking at current research on the impact of the COVID-19 pandemic on mental health and wellbeing. Study 1 (Chapter 2) tracks a cohort of kindergarten students' symptoms of anxiety and depression over two years during the pandemic, throughout school shutdowns and mandatory lockdowns. Pre-pandemic academic, attention and demographic variables are assessed as potential risk factors for increased symptoms of anxiety and depression. Results suggested no overall increases in depression or anxiety across the two years of the pandemic, while higher attention symptoms prior to the pandemic did significantly predict increases in anxiety across the later time points in the pandemic. Study 2 (Chapter 3), again, tracks symptoms of anxiety and depression in a Canada-wide sample of children and youth. Analyses of relative importance identified baseline anxiety and depression symptoms, positive learning behaviours, familial income, school modality, and parental COVID-19 stress as the key risk factors contributing to increased vulnerability to mental health symptoms in children and adolescents during the pandemic. Finally, Chapter 4 integrates the overall findings from each chapter and discusses the implications for practice and research.

Specifically, how the current studies can inform public health and education officials on the impact of the pandemic and the subsequent school and societal restrictions on children's mental health and wellbeing. Building on this understanding can help inform interventions and supports for the children and adolescents whom the pandemic and its restrictions have most impacted and help inform decision-making for future large-scale disasters or traumatic events.

Preface

On March 11, 2020, the World Health Organization declared a global pandemic due to the rapid spread of the novel coronavirus (COVID-19). COVID-19 is a highly contagious respiratory disease caused by the SARS-CoV-2 virus (World Health Organization, n.d.). This declaration would mark the beginning of a series of restrictions for 5.7 million school-aged children in Canada, regulations that would directly impact their day-to-day lives for weeks, months and ultimately years to come (Statistics Canada, May 2020). The subsequent transition to virtual schooling, limitations in social interactions, as well as the cancellation of sports, arts, religious and recreational activities, coupled with increased familial stress from the health and economic implications of the pandemic, prompted many to raise alarms about both the immediate and long-term impacts of COVID-19 on child mental health. A wealth of pre-COVID research has focused on risk factors related to children's mental health problems; however, the unprecedented pandemic context has raised several questions: How has the pandemic impacted mental health? Which children were most vulnerable? Furthermore, why are some children at a greater risk of developing mental health problems?

The current dissertation focuses on building our understanding of the impact of the COVID-19 pandemic on children's mental health and wellbeing in Canada using two large-scale research initiatives. The first study, which was already in the early stages of data collection when the pandemic began, was adapted to track the long-term changes in children's mental health during the pandemic. The second study was commissioned in response to the pandemic to assess the pandemic's impact on Canadian children specifically. Study 2 aimed to track mental health longitudinally again, but with a diverse sample, gaining reports from parents of children of different ages, from different regions across Canada, and with different diagnostic backgrounds. When Study 2 was initiated, very little research had been

published on the impact of the pandemic in Canada, and there were no known nationwide studies examining mental health symptoms in children and youth from diverse backgrounds.

Given the novelty of the pandemic and the subsequent impact of public health measures on children's mental health, the Life Course Framework was used as a guide to develop the specific methodology, research questions and statistical analysis in both research studies. The Life Course Framework emphasizes that while evaluating vulnerability or risk, it is important to consider the intertwined nature of individual and contextual factors when examining the adverse effects on an individual's wellbeing (Benner & Mistry, 2020). While early pandemic research examined individual and contextual risk factors separately for their impact on mental health, limited studies had explored the cumulative effect of both on the mental health of children and youth in Canada.

Outline of the Current Dissertation

Chapter 1 provides an overview of the existing research on the COVID-19 pandemic and other large-scale traumatic events, with a focus on their impact on mental health. It then introduces the Life Course Framework as a lens through which individual and cumulative risk factors can be identified and further understood in terms of how they contribute to the worsening of children's mental health, both prior to and during the pandemic.

Chapter 2 introduces the first study of the dissertation. The longitudinal design used reports from parents of kindergarten students across two years beginning in the Fall of 2019. Data collection occurred in the Spring of 2020, Fall of 2020 and Spring of 2021 in a major city in Eastern Ontario. Changes in anxiety and depression were explored in conjunction with pre-existing risk factors identified using the Life Course Framework. Linear Growth Curve Models were used to examine increases in parent reports of anxiety and depression symptoms across the first two years of the pandemic. Each timepoint reflected substantially different restriction levels in the region, ranging from mandatory school closures to

optional in-person schooling. Interestingly, no changes in depression or anxiety were observed in the young cohort of children. Attention symptoms did significantly predict increases in anxiety across the later time points in the pandemic, suggesting that as the pandemic progressed, children with attention difficulties were more prone to symptoms of anxiety.

Similarly to Study 1, Study 2 (Chapter 3) used a longitudinal study design to examine increases in anxiety and depression scores. In this study, parents of children aged 3-18 years from across Canada were asked to report on their child's mental health in conjunction with their child's experience of the pandemic. Samples of children with and without pre-existing mental health diagnoses were included. Although the Life Course Framework advocates for concurrently examining multiple risk factors, the limited sample size made it statistically challenging to assess these factors simultaneously, even though the study collected data on many of the model's identified risk variables. Models of relative importance were used to examine the impact of public health restrictions, routine disruptions, and parental COVID-19 stress, alongside critical learning behaviours, attention symptoms, and pre-existing mental health diagnoses, on mental health outcomes. The risk factors in the Spring of 2021 predicted almost 40% of the variance in ratings of anxiety and just under one-third of the variance in ratings of depression one year later. Implications for future research and interventions are discussed. Results from both studies support the increase in mental health symptoms for vulnerable students throughout the COVID-19 pandemic. Risk and protective factors are further discussed. Implications for future research and policy are outlined.

Chapter 1: Background

The COVID-19 Pandemic in Canada

In early March 2020, Canada's chief public health officer, Dr. Theresa Tam, announced that communities should brace for strict public health measures, including closing schools and workplaces to stop the spread of COVID-19. Provincial governments were individually responsible for determining when and how long school boards' physical buildings closed. Ontario was the first province to close schools, announcing a temporary closure on March 14, with all provinces and territories following suit in the subsequent weeks. For parts of Canada (Quebec, British Columbia, Prince Edward Island and Manitoba), some students returned to in-person learning before the end of the school year (June 2020). However, most in-person learning was not resumed until September 2020.

In addition to school closures, many daycares, after-school programs, workplaces, non-essential stores and even parks were closed to reduce the virus' transmission. Restrictions on private gatherings and the mixing of households were also implemented. Public health rules and regulations were often dependent on region but were also impacted by COVID-19 exposures and positive tests. If a child or a member of a household was in close contact with a positive case of COVID-19, contracted COVID-19 or was told to quarantine for other reasons (travelling outside the region/country), they were often asked to stay home for upwards of 14 days. For students, quarantining resulted in additional missed school days and extreme social isolation (Government of Canada, August 2021). While the government enforced public shutdowns, the restrictions on private gatherings often depended more on the family's choices. For children and youth, the extent to which they followed public health rules and recommendations often depended on the comfort level of their parents and families. While most of the population complied with the pandemic's rules and restrictions, studies reported that not all parents reported the same degree of compliance with public health measures (Brankston et al., 2021).

By September 2020, many provinces and territories offered elementary and secondary education through a virtual format if parents opted to do so; however, in-person learning was resumed, most often in a modified format. Alternating between in-person and virtual classes, reducing the number of students in classrooms, physical distancing, plexiglass barriers and mask-wearing are just a few examples of the restrictions implemented in schools. Cohorting during recess and lunch hours reduced contact with students outside their respective classrooms, as children had to remain with a small group of students (Government of Canada, August 2021). Frequently, as case numbers rose in the provinces and regions, schools were closed again and reverted to virtual formatting. Ontario, which saw the most school shutdowns of any province, had 23 weeks of shutdowns between March 2020 and June 2021 for primary and secondary students (Vaillancourt et al., 2021).

The general pattern of school closures across Canada followed the “waves” reflecting the greatest increases in COVID-19 cases, hospitalizations, and deaths. The first wave occurred in the Spring of 2020, with death rates peaking through early May 2020. The second wave happened in the Fall/Winter of 2020/2021, with death rates peaking at the end of January. The third wave was observed in Spring 2021, with relatively lower death rates. However, increased hospitalizations and stressed healthcare systems were noted through late April and early May. Vaccination becoming widely available in the Spring of 2021 greatly reduced both the number of hospitalizations and deaths (Detsky et al., 2021; Vaillancourt et al., 2021). Consequently, as vaccines became more available, COVID-19 restrictions were generally eased.

A global review study determined that the local rates of COVID-19 transmission impacted stress rates but not overall anxiety or depression (Varma et al., 2021). Overall, meta-analyses have found that the pandemic led to a high prevalence of mental health problems in children and adolescents (Deng et al., 2023; Statistics Canada, 2024). In Canada, the rates of transmission and restrictions differed between

provinces and regions. However, to the author's knowledge, no research has examined whether there were concurrent observable differences in the rates of mental health problems in children and adolescents as transmission and restriction rates fluctuated cross Canada.

The secondary effects of the COVID-19 restrictions on children and youth are postulated to be the derivatives of the disruption in routine, reduced learning, increased isolation, and familial financial stresses (Newlove-Delgado et al., 2021). Between March 2020 and April 2021, 54% of parents with children under 15 years reported their stress levels had worsened since the beginning of the pandemic, compared to only 43% of those not living with children, according to Statistics Canada (September 2021). Such findings highlight the need to examine further the impact of the pandemic on children and families. Additionally, the school closures as with other hardships from the pandemic, were hypothesized to disproportionately affect students with disabilities who were receiving additional support or accommodations in school prior to the pandemic (Asbury et al., 2021). However, rigorous research testing of these hypotheses thus far is limited, particularly with respect to the impact on Canadian children and youth.

Previous Large-scale Traumas

The pandemic was a global, collective event. Whereby it impacted nearly every person across the globe, with common shared emotional experiences of such as fear, loneliness, uncertainty and grief (Irwin et al., 2022). Currently, the long-term consequences are still unknown, though to postulate the effects, comparison can be drawn from previous large-scale traumas that resulted in similar disruptions for children and adolescents. The isolated effects of the Spanish Flu are difficult to assess given the close immediacy of World War 1; however, a comparative study investigated the impact of both pandemics on children and adolescents. Dalekou and colleagues (2023) found that similar to the current pandemic, reports suggest that children and adolescents experienced consequences of familial financial

hardships and disruptions to daily routine. However, they concluded that the lack of social interaction and subsequent increase in mental health problems, alcohol abuse and rise in strain on parent-child connections was unique to the current pandemic as they were most commonly associated with the restrictive measures (Dalekou et al., 2023). In contrast, the Spanish Flu had higher rates of morbidity, mortality, and long-term physical disability (both for children and their parents).

More recently, sudden school closures, mass fear portrayed on the media, and increased restriction of activity were associated with the attack on the World Trade Centre September 11, 2001, in the United States. The mental health effects on children and adolescents following 9/11 may provide us with a long-term picture of what can occur following a mass trauma. A study from New York City public school children (N=8236) found that the indirect effects (job loss, restricted activity post-disaster) were associated with higher symptoms of posttraumatic stress disorder and other anxiety disorders (Comer et al., 2010).

Following a massive trauma, previous studies have demonstrated that children and youth often display greater symptoms of posttraumatic stress, aggression, hyperactivity, and depression (Mistry & Benner, 2020). Over time, psychological symptoms can be classified as acute and chronic, with children's trajectories of wellbeing changing over time. Following Hurricane Katrina, one study classified children's trajectories three years post-disaster as either stress-resistant, normal response and recovery, delayed breakdown, or breakdown without recovery. Three years following the disaster, the trajectories of 27.7% of children were classified as breakdown without recovery or delayed breakdown. This suggests that although the majority of children do recover, a significant portion continue to have long-term psychological consequences years following the disaster (Kronenberg et al., 2010).

With COVID-19 and its recovery still relatively recent, the current research is focused on understanding and examining the mental health consequences during and shortly after the pandemic.

The long-term consequences remain unknown, though previous research is clear that the psychiatric vulnerability of children and adolescents suggests that early intervention and support are required to mitigate the long-term consequences (Irwin et al., 2022). The current study seeks to determine, in the first few years of the pandemic, who were the most vulnerable to mental health symptoms to help identify and support these children and youth moving forward.

Life Course Framework

The *Life Course Framework* is a theoretical model that conceptualizes how various vulnerabilities or risk factors shape an individual's long-term wellbeing (Elder, 1988). Benner and Mistry (2020) were the first to suggest applying this Framework to analyze the impact of the COVID-19 pandemic on children's wellbeing, acknowledging that the impact of the mass traumatic event would likely continue for years, decades and even generations to come. This comprehensive and dynamic framework offers a strategic way to understand how the pandemic and the subsequent public health restrictions, which affected nearly every aspect of children's lives, may have impacted their mental health in the long-term. The current dissertation utilized the Life Course Framework to identify and explore risk factors that may have altered the mental health trajectories of children and youth during the COVID-19 pandemic.

Initially developed to study the effects of the Great Depression on human development, the Life Course Framework emphasizes how significant life events interact with critical developmental stages to produce varied wellbeing outcomes (Elder, 1988). The Framework offers a valuable approach to examining how stressors interact with children's unique developmental trajectories, highlighting vulnerability's dynamic and interdependent nature. The Life Course Framework provides an essential structure for identifying and understanding vulnerability throughout this unprecedented time.

Vulnerability is a central concept in many psychology theories (e.g., diathesis-stress models), as psychopathology is often understood as the result of the interaction between vulnerability and stressful life events (Ingram, 2005). Unlike other frameworks, the Life-Course Framework does not consider vulnerabilities or risk factors as only latent or stable pre-disposing factors. Instead, it acknowledges that vulnerabilities are dynamic factors that develop or change across time and are impacted by the loss of resources or as a consequence of stressors (Spini et al., 2017).

At its core, the Life Course Framework suggests risk factors are to be conceptualized as multidimensional, multilevel and multidirectional (Spini et al., 2017). Multidimensional refers to the various domains of life (Spini et al., 2017). For school-aged children, multiple domains of their lives may include home, school, and social and emotional domains, to name a few. Multilevel refers to the levels ranging from proximal (micro) to more distant (macro) contexts and the interactions between them. For example, it examines the interplay between individuals and their contexts (Elder, 1988; Spini et al., 2017). Rather than the historical context being considered in isolation, such that an individual is only exposed to the pandemic, it acknowledges that individuals interacted with the pandemic through many levels of their environment, impacting their access to resources and other coping mechanisms, which in turn impacts their long-term wellbeing. Finally, multidirectional emphasizes that vulnerability is interdependent and focuses on understanding how accumulating (dis)advantages can impact long-term wellbeing trajectories.

One structure used to identify possible levels of the Life Course Framework was initially proposed by Elder and Giele (2009) and later adapted by Benner and Mistry (2020) for the pandemic. The visual, later used in Study 2, identifies distinct levels that should be considered when identifying sources of possible vulnerability or risk (multilevel). The levels are meant to be considered across all life

domains (multidomain) and are then considered individually, cumulatively, and in terms of their interaction (multidirectionality).

Levels include the developmental stage at the time the stressor, as the Life Course Framework emphasizes how the timing of a historical event can alter its impact on an individual's developmental trajectory (Benner & Mistry, 2020). A child's stage of development is most often conceptualized in terms of their chronological age. However, it could also be conceptualized as their cognitive or social development or level of education. A child's position within society's stratification systems is also a distinct level identified within the model (Benner & Mistry, 2020). The current dissertation identifies several individual and familial factors which could render a child more vulnerable to increased mental health problems during the pandemic based on the positioning within a broader system.

The next two levels in the model focus on more distant or broader contexts that may still render children more vulnerable to stressors (Benner & Mistry, 2020). In the original Life Course Theory, Elder (1988), introduced the concept of 'Linked Lives,' emphasizing how the unique trajectories of individuals closely connected to a person, influence that person's ability to respond to environmental stressors (Benner & Mistry, 2020). For children living through the pandemic, this includes the trajectories of their parents or teachers. The theory would suggest that how a parent was impacted by the pandemic could impact vulnerability, or further, how a teacher interacted with a child (virtually or in person) may render a child more or less vulnerable (Spini et al., 2017). Finally, there is the broadest level, which is the historical context, which refers to the influence of historical events, societal and cultural shifts on an individual's trajectory. Understanding the broadest level is critical for children when considering the impact of the pandemic. As outlined earlier in this chapter, provinces and regions across Canada experienced vastly different public health restrictions, notwithstanding the significant variance in individual families' impact of the pandemic on their day-to-day activities. Understanding

children's unique experiences of the pandemic and this unique historical time is essential to understanding their overall vulnerabilities to mental health problems.

To identify and understand risk factors when exploring vulnerability to mental health problems during the pandemic, one must consider multiple domains and levels of the child's life. Further, the framework suggests that the risk factors are analyzed individually and cumulatively to best understand how they may affect a child's wellbeing trajectory long-term (Spini et al., 2017). For clarity and cohesion, the remainder of the chapter organizes risk factors according to three broad categories of risk: Individual and familial, educational and academic, and mental health. Within each category, the multidimensional, multilevel and multidirectional principals of the Life Course Framework are highlighted.

Risk Factors for Mental Health Problems

Before the pandemic, the Mental Health Commission of Canada reported that mental illness directly impacted approximately 1.2 million children and youth in Canada (Mental Health Commission of Canada, July 2021). An estimated 20% of Canadian youth meet the criteria for a mental health disorder (Canadian Institute for Health Information, 2020).

When COVID-19 lockdown measures began, many researchers began forming hypotheses regarding which groups of children would be rendered more vulnerable to the effects of school closures (Jefsen et al., 2020). However, the unprecedented circumstances of the pandemic left questions regarding which children were at greatest risk for mental health problems and how risk factors may interact and compound one another (Benner & Mistry, 2020).

Individual and Familial Risk Factors

Demographic factors are categories used to capture the diversity among the population. Similarly, it can help identify an individual's stage of development as well as their position within stratification

systems as outlined in the Life Course Framework. Previous research has identified risk factors for increased mental health symptoms based on differences in the age, gender/sex, race, ethnicity, and Social Economic Status (SES) of children and youth.

Regarding stage of development, pre-pandemic research has identified that behaviour disorders are more likely to be identified among children (ages 4-11 years), whereas youth (ages 12-17 years) are more likely to have an internalizing disorder such as anxiety and depression (Georgiades et al., 2019). These results suggest that internalizing symptoms may be a less likely reaction to the pandemic in the youngest (3-6 years) cohort of children, as they are more likely to express emotions through externalizing behaviours (Gillom & Shaw, 2004).

Boys are also at greater risk of developing behaviour disorders compared to girls, and girls are at a greater risk for developing mood and anxiety disorders (Georgiades et al., 2019; Kessler et al., 2012). In the pandemic, similar gender patterns are emerging, with an Icelandic study finding girls reporting worsening symptoms of wellbeing compared to boys (Halldorsdottir et al., 2021). Similarly, a global meta-analysis of mental health symptoms in children and youth found that girls and older children were both associated with a higher prevalence of anxiety and depressive symptoms (Racine et al., 2021). There is a distinct change in peer relations between early childhood and adolescence, whereby gender differences become more pronounced and adolescent girls display greater awareness and reactivity to the distress of peers (Yoon et al., 2021). Results showing significant differences in mental health symptoms based on age and gender align with the Life Course Framework, which suggests that the developmental stage at which a person experiences a stressor (e.g., the pandemic) can influence their vulnerability to its impact. The youngest children may be less vulnerable to the internalizing mental health consequences of the pandemic (Racine et al., 2021), whereas older children (adolescents) may be more vulnerable.

One of the most common stratification systems is Social Economic Status (SES). SES is a measure used to reflect an individual's position relative to others and is often a reflection of income, education, occupation or wealth (Starfield et al., 2002). As a composite score of family education and income, family SES has been negatively correlated with children's mental health problems (Starfield et al., 2002). The increased mental health problems, based on the social causation hypothesis, are attributed to the stress associated with lowered SES and the reduced access to resources for support. Conversely, the social selection hypothesis posits that those with mental health problems are more likely to end up having lower SES due to secondary academic and vocational difficulties (Jin et al., 2020). For children, the increased rates of mental health problems are hypothesized to be multidirectional as children from families with low SES are more likely to have parents with mental health problems and experience greater stress in the family environment (Starfield et al., 2002).

When SES factors were studied individually, low parent employment/ income predicted all mental health symptoms and disorders. At the same time, parental education level has been identified as a stronger predictor of externalizing disorders compared to internalizing disorders (Bøe et al., 2012). The overall relationship between SES and child mental health problems is often graded, whereby increased internalizing and externalizing symptoms are reported in children and youth from families with lower income and parent education levels (Boe et al., 2021; Chen et al., 2011; Starfield et al., 2002).

Again, during the pandemic, low pre-pandemic SES was significantly associated with more emotional symptoms in children and youth (Moulin et al., 2023). Factors that likely contribute to the association between worsened child mental health and low SES during the pandemic include smaller homes, unhealthy lifestyle behaviours (e.g., increased screen time, exposure to media) and greater health-based fears (Ng & Ng, 2022).

Beyond SES, a review of the prevalence of internalizing disorders among youth who identify as minoritized offered robust evidence of higher rates of depression and anxiety in minority youth in the United States (Anderson & Mayes, 2010). In Canada, geographic and socioeconomic factors have also been associated with the prevalence of mental health problems in children (Ghandour et al., 2012; Huynh et al., 2013). Increased prevalence of mental health problems has been found in those living in rural areas, as well as children who identify as being from minority and Indigenous backgrounds. The geographic and racial/ethnic discrepancies are hypothesized to be a result of socioeconomic and societal barriers that restrict access to services, as well as the harmful impacts of racism and racial-based trauma (Beiser, 2002; Yeh et al., 2003).

In addition to the pre-existing socioeconomic and societal barriers, research has highlighted how the pandemic's restrictions have amplified pre-existing inequalities (Buder & Jennings, 2023). Healthcare workers notwithstanding, jobs which require higher education were more likely to accommodate work from home. In comparison, those with lower education and SES were more likely to be deemed essential workers (unable to work from home) or laid off during the pandemic's restrictions (Buder & Jennings, 2023). One current study found that while children and youth from all income groups experienced impacts on their mental wellbeing, the changes are more pronounced in lower-income families (Mendolia et al., 2021). However, these results have not been consistent. A Canadian study found that children whose parents reported greater economic concerns during the early stages of the pandemic experienced improvements in anxiety, attention, and obsessions/compulsions during the early stages of the pandemic (Cost et al., 2021). This finding was attributed to the reduced familial stress of contracting COVID-19 as parents were no longer working and emergency government benefits were introduced to mitigate the impact of financial hardships (Cost et al., 2021).

The current dissertation sought to include multiple demographic measures of stratification systems, to investigate how factors such as gender, racial/ethnic backgrounds, and SES impacted mental health outcomes during the pandemic.

Academics and Learning Risk Factors

Academic setbacks were projected because of the pandemic; however, with standardized testing mostly being cancelled across the country, the extent of academic disruption was largely unknown during the early stages of the pandemic (Aurini, 2021). As children have returned to school, broad-scale meta-analyses have revealed substantial impacts on children's learning, across primary and secondary students (Betthäuser et al., 2023; Di Petro, 2023). Overall disruption in education is reflected in reports from the Canadian Teachers' Federation (CTF), which state that only two-thirds of teachers had regular contact with half or more of their students in the spring of 2020 (Canadian Teachers' Federation, 2020). Given the overwhelming evidence that the pandemic impacted children's education, it is important for research to further explore which children were most vulnerable to these impacts. Based on the Life Course Framework, children's pre-existing abilities and achievement when their educational disruptions began, may reflect another point of vulnerability during the pandemic as some children would have been better prepared or have greater access to resources when the pandemic hit.

Academic achievement has a longstanding history of a complex and reciprocal relationship to mental health outcomes. Students with mental health problems are likely to have greater difficulty in academic and learning tasks. Conversely, poor academic achievement contributes to low self-concept and low self-control, which in turn has been found to result in increased mental health problems (Bradshaw et al., 2010; Reinke et al., 2008; Valdez et al., 2011). While academics are typically studied as an outcome and sequela of mental health problems, a longitudinal study revealed academic decline in

childhood (ages 7-11) to be associated with the development of depression and self-harm behaviours in adolescence (Rahman et al., 2018).

Pre-existing academic difficulties and school disruptions will likely increase student stress, resulting in lower academic attendance. Chronic absenteeism, the closest parallel in pre-pandemic research, would suggest that for students with poor academic achievement and learning behaviours, school disruptions are likely to result in increased internalizing symptoms (Aurini, 2021). In addition, virtual schooling and school disruptions have been associated with lower overall reading and numeracy scores and increased dropout rates for older students (Conto et al., 2021). For students participating online for the first time, decreased motivation was also reported (Trout, 2020).

While previous research would suggest that those with academic and learning-based risk factors would be at greater risk of developing mental health problems during the pandemic, the academic demands during the pandemic were reported to be significantly reduced in many districts (Ardington et al., 2021). Those who received special education services prior to the pandemic have been reported to have experienced more significant anxiety at its outset (O'Hagan & Kingdom, 2020) as well as over time (Sideropolous et al., 2021) when compared to their typically developing peers.

Mental Health Risk-Factors

Finally, one cannot consider the risk of future mental health problems before considering past and pre-existing conditions. Prior to COVID-19, pre-existing mental health disorders such as anxiety and depression were associated with a greater risk of negative outcomes when exposed to significant trauma (Hapke et al., 2006). Additionally, for youth with mental health problems, loneliness and isolation have been associated with increasing severity of mental health problems (Hards et al., 2021). In addition to pre-existing mood and anxiety disorders, children and youth with pre-existing neurodevelopmental disorders have also been associated with the exacerbation of mental health symptoms with increased

loneliness (Hards et al., 2021). While several studies have examined how the pandemic has impacted those with pre-existing mental health conditions, the findings have not always been consistent. One study found improved mental wellbeing in adults with severe mental illness during the early stages of the pandemic (Pinkham et al., 2020).

Due to the unique circumstances of the pandemic, one group that was identified as being at a greater risk of developing mental health problems during the pandemic are those with attention difficulties, such as those with Attention-Deficit/Hyperactivity Disorder (ADHD). Those with ADHD are more sensitive to frequent changes in routine, have more difficulty accessing online schooling, and are more likely to have increased conflict at home with their parents (Becker et al., 2020; Cortese et al., 2020).

Attention Difficulties. Attention difficulties are most often conceptualized through the presence of symptoms of inattention, impulsivity and hyperactivity. When the symptoms of inattention, impulsivity, and/or hyperactivity interfere with functioning or development, a child may meet the criteria for ADHD, a neurodevelopmental disorder (APA, 2013). Current estimates place the prevalence of ADHD at approximately 5.9% of children, making it one of the most common psychological childhood disorders (Faraone et al., 2021). The initial signs of ADHD are often noted by parents when the child is a toddler; however, attention difficulties often persist into adulthood, with 2.5% of adults meeting the criteria for the disorder (APA, 2013; Faraone et al., 2021). For a formal clinical diagnosis of ADHD, an individual must demonstrate developmentally inappropriate symptoms of inattention and/or developmentally inappropriate hyperactivity and impulsivity present for more than six months before the age of 12 years. Symptoms must be present in multiple settings, such as home and school; however, there is an acknowledgment that context can influence how and which symptoms are displayed. In addition, the impairment must be to a degree that is not in line with developmental age and significantly negatively

impacts social and academic or occupational activities (APA, 2013). Children and youth with ADHD frequently experience increased difficulties with academics and peer interactions (Faraone et al., 2021; Frazier et al., 2004; Ros & Graziano, 2018) and have a more challenging time regulating emotions in the face of stressful events (Faraone et al., 2021; Graziano & Garcia, 2016).

Modern research has also strongly endorsed studying symptoms of ADHD along a continuum; such an approach is considered a more comprehensive conceptualization of the disorder (Heidbreder, 2015). Meta-analyses reveal that the symptoms of ADHD are dimensional rather than qualitatively discrete symptom clusters (McLennan, 2016). Examining the symptoms of ADHD on a continuum allows researchers to capture the variability in severity within the clinical disorder, as well as account for those with the sub-clinical presentation of the disorder (Heidbreger, 2015). The continuum approach to attention difficulties in community samples allows the frequency and severity of symptoms to be considered rather than just identification (McLennan, 2016).

The core symptoms of ADHD, which will be considered on a continuum for Study 1, are inattention and hyperactivity/ impulsivity. High levels of inattention are often characterized as difficulty sustaining attention and remaining focused on a task. Examples of symptoms of inattention characteristic of ADHD are difficulty following through on instructions and being easily distracted. Hyperactivity is excessive motor activity, which can appear as excessive fidgeting, tapping or talking when not appropriate. Impulsivity refers to acting without thinking. Examples of symptoms of hyperactivity/impulsivity characteristic of ADHD are often leaving their seat when inappropriate, talking excessively and having difficulty waiting their turn (APA, 2013). While all individuals experience some degree of inattention, hyperactivity and impulsivity, critical criteria of the disorder stipulate that symptoms occur outside what would be typically expected for a given stage of development and lead to impairment in one or more settings (Faraone et al., 2021).

Prior to the pandemic, children and youth with ADHD were at a greater risk of developing comorbid mental health problems (Faraone et al., 2021). While the source of the association between ADHD and comorbid mental health problems is likely multifaceted, studies have identified genetic vulnerabilities (Brainstorm Consortium et al., 2018) and environmental factors such as familial stress to be linked to the increase in mental health problems for children with ADHD (Uddin et al., 2020). As previously mentioned, children with attention difficulties may have experienced more significant difficulties during the COVID-19 pandemic. During the first wave of the pandemic (Spring 2020), children aged 5-17 years with ADHD reported decreased enjoyment in activities, as well as increases in sad/depressed mood (Sciberras et al., 2020). In a second study, when youth with ADHD were compared to their same-aged peers, they were not at a greater risk of developing symptoms of anxiety and depression unless the ADHD diagnosis was paired with poor pre-pandemic emotion regulation skills (Breux et al., 2021). Such results highlight the need to examine risk factors individually and cumulatively when investigating the impact of the pandemic on children's mental health.

Risk Factors for Poor Mental Health During the Pandemic

Initial research has identified discrete risk factors for mental health problems in children and youth during the pandemic. Preliminary research was initially conflicting, with some reports of improvements in mental health. For example, when mental health symptoms and problematic experiences were compared between a sample of clinically referred youth before and during the pandemic, reductions in interpersonal conflicts, as well as bullying, were reported. At the same time, there was no increase in symptoms of anxiety or depression (Stewart et al., 2021). Similarly, in a sample of young African American children, internalizing symptoms in the low SES sample decreased in the first wave of the pandemic (May 2020) before rising again in August 2020 (Bhagal et al., 2021). Additionally, the risk factors identified prior to the pandemic do not always align with the published results on children's

mental health during the pandemic. For example, one study found that boys experienced more significant increases in mental health problems at the beginning of the pandemic than girls (Browne et al., 2021).

Despite such findings, which suggest mental health problems are not increasing, most of the research still suggests that the pandemic has been overwhelmingly negative for the mental health of children and youth. A review paper examining the outcomes of 12 longitudinal studies reported a moderate increase in depressive symptoms in adolescents (Barendse et al., 2021). A second systematic review saw rates of 18-60% of children and youth meeting clinically significant thresholds for distress, with the distress being comprised of symptoms of anxiety and depression (Viner et al., 2021). Regarding the impact of COVID-19 on children's and youths' mental health in Canada, many of the initial reports describe an increase in the frequency of symptoms (Pfefferbaum & North, 2020) with concomitant increases in problematic behaviours (Dion et al., 2022). In Ontario, there was a tenfold increase in the utilization of outpatient physician-based mental health services between March 2020 and February 2021, and authors suspect that this still underrepresents the overall need as it does not include allied-health professionals or those not seeking services (Benton et al., 2022). Globally, a meta-analysis has found that symptoms of anxiety and depression doubled in children and adolescents during the pandemic (Racine et al., 2021).

The adverse mental health problems throughout the pandemic are now well documented throughout the literature through broad meta-analyses and review articles. In one study, a Spanish research team tracked the impact of lockdowns on emotional and behavioural changes among children. They highlighted that changes in children's wellbeing were associated with parent stress and subsequent parenting practices (Romero et al., 2020). As parents and families become stressed, parenting practices were found to be more punitive, resulting in increased externalizing behaviours for children and

increased internalizing symptoms for adolescents (Romero et al., 2020; Westrupp et al., 2021). As these studies tracked child and youth mental health in conjunction with the local COVID restrictions, results suggest that stricter COVID measures add risk factors for mental health problems in children and youth (Romero et al., 2020; Westrupp et al., 2021). However, these findings are not stable across all settings, with one study finding that remote learning was associated with decreases in anxiety and improved sleep patterns in adolescents (Stone et al., 2021). Investigating the risks associated with Canadian children's COVID experiences should prove invaluable, moving forward, particularly as society endeavours to respond to ongoing changes in needs. Understanding the impact on children's mental health and its interrelation with academic achievement can support appropriate resource allocation and inform future public health decision-making.

As noted above, children from lower SES and racialized backgrounds, as well as those who have difficulties with attention, academics, and emotional regulation, were posited to be among those most impacted by the pandemic (Breux et al., 2021). Several studies have reported that children from lower SES families experienced more significant mental health problems during the pandemic, a finding that was consistent with pre-pandemic research into SES and child mental health. During the initial months of the pandemic, fear and anxiety were higher in children from lower SES backgrounds (Bhagal et al., 2021; Westrupp et al., 2021). Other sociodemographic variables emerged, including being white and of high income, which was found to be protective against some of the pandemic's distress (Holigue et al., 2020). Once again, not all studies rendered consistent results, with one finding that higher-income parents reported a more significant increase in behavioural problems during lockdown than their lower-income counterparts (Pearcey et al., 2020).

Difficulty with online school and avoidance of online school have also been reported to increase mental health problems (Tamsin et al., 2021). Further, children who receive extra academic support,

such as those with disabilities and individual education plans, were reported to have a qualitatively more difficult time grasping materials online (Ayda et al., 2020; Lambert & Schuck, 2021). Additionally, children and youth with special needs scored lower on general wellbeing during the pandemic than children without special needs (Sancho et al., 2021). However, for students with pre-existing academic and learning difficulties that had not been identified, their transition to online school and subsequent mental health outcomes have not been investigated. Further research is needed to understand which children struggled most with online school and the pandemic's restrictions.

Finally, children with ADHD and attention difficulties were found to demonstrate increased vulnerability in terms of depressive and anxiety symptoms (Westrupp et al., 2020). For children with ADHD, the repeated disruption to their daily routines both at home and at school prompted researchers to raise alarms regarding the potential short and long-term impacts of the pandemic on mental health (Jefsen et al., 2020; Breaux et al., 2021). Initial studies suggest increases in negative interactions with parents, as well as increased social isolation caused by school closures and public health restrictions, may have contributed to an uptick in mental health problems in children and youth (Gadermann et al., 2021; Brannen et al., 2023). Children with Attention-Deficit/Hyperactivity Disorder (ADHD) were furthermore reported to have difficulty engaging in online school and struggled with low motivation and increased social isolation (Sibley et al., 2021).

The postulation of adverse mental health was more remarkable for children and youth in Canada from already vulnerable groups, including those with pre-existing disabilities, minority status, and living in poverty (Mental Health Commission of Canada, 2021). Early predictive modelling suggested that students from low-income families, minority backgrounds and students with disabilities were likely to have long-term academic and social-emotional developmental impacts from COVID's restrictions (Santibañez & Guarino, 2021). However, results from current studies have been inconsistent and, at

times, lacked rigorous and comprehensive methodologies (Solmi et al., 2021). While the students and their families' individual risk factors may have rendered them vulnerable to increases in mental health problems during the pandemic, contextual factors such as school closures have also been suggested to contribute to the pandemic's impact on mental health. The goal of the current studies is to examine the individual and contextual risk factors that may have made Canadian children and youth more vulnerable to mental health problems during the pandemic.

Overview of Current Studies

The current dissertation employs two studies which utilize parental reports throughout the COVID-19 pandemic to examine their child's experience, risk factors and subsequent symptoms of parent reported anxiety and depression. Specifically, we will seek to answer the following questions: 1) How was children's mental health during the pandemic? 2) Did individual and contextual risk factors result in more significant parent-reported anxiety and mood symptoms during the pandemic? 3) Which risk factors most significantly contributed to increased parent-reported mental health problems during the pandemic? Risk factors were identified using the Life Course Framework to help conceptualize different individual and contextual areas of vulnerability for children and youth living in Canada.

The first investigation is a longitudinal study that collected information beginning prior to the pandemic, as well as three additional time points throughout the pandemic. Kindergartners' academic ratings and parent reports were collected in 2019 and followed bi-annually until spring 2021. Changes in children's internalizing symptoms (anxiety and depression) across three-time points within the pandemic were examined in comparison to pre-pandemic levels. Multiple linear regression analysis was used to examine changes in anxiety and depression over two years using the identified risk factors as predictors in the models. Overall, consistent with previous research, the young children did not experience

significant increases in symptoms of anxiety or depression across any of the pandemic data collection periods.

The second study examined the mental health ratings by parents of children aged 3-18 years from across Canada. This study used the Life Course Framework to identify and analyze risk factors from the beginning of the pandemic for internalizing symptoms in children and adolescents during the pandemic. Again, multiple linear regression was used to predict change in anxiety and depression in separate models. For effect sizes, the measures of relative importance were used to determine the proportion of R^2 that was contributed by each risk factor. Risk factors were identified using the life course framework. Increased risk was associated with higher rates of anxiety and depression symptoms in children and youth.

These studies provided evidence to support previous stipulations that the pandemic disproportionately impacted vulnerable children and youth. Further, results highlight the need to consider risk not as isolated events of adverse circumstances; but as cumulative factors that continue to put children at risk for persisting mental health consequences.

References

- American Psychiatric Association. (2013). DSM-5 Diagnostic Classification. In *Diagnostic and Statistical Manual of Mental Disorders*.
<https://doi.org/10.1176/appi.books.9780890425596.x00diagnosticclassification>
- Anderson, E. R., & Mayes, L. C. (2010). Race/ethnicity and internalizing disorders in youth: A review. *Clinical psychology review*, 30(3), 338-348.
- Ardington, C., Wills, G., & Kotze, J. (2021). COVID-19 learning losses: Early grade reading in South Africa. *International Journal of Educational Development*, 86, 102480.
- Asbury, K., Fox, L., Deniz, E., Code, A., & Toseeb, U. (2021). How is COVID-19 affecting the mental health of children with special educational needs and disabilities and their families?. *Journal of autism and developmental disorders*, 51(5), 1772-1780.
- Aurini, J., & Davies, S. (2021). COVID-19 school closures and educational achievement gaps in Canada: Lessons from Ontario summer learning research. *Canadian Review of Sociology*, 58(2).
<https://doi.org/10.1111/cars.12334>
- Barendse, M. E. A., Flannery, J., Cavanagh, C., Aristizabal, M., Becker, S. P., Berger, E., Breaux, R., Campione-Barr, N., Church, J. A., Crone, E. A., Dahl, R. E., Dennis-Tiway, T. A., Dvorsky, M. R., Dziura, S. L., van de Groep, S., Ho, T. C., Killoren, S. E., Langberg, J. M., Larguinho, T. L., Magis-Weinberg, L., ... Pfeifer, J. H. (2023). Longitudinal Change in Adolescent Depression and Anxiety Symptoms from before to during the COVID-19 Pandemic. *Journal of research on adolescence : the official journal of the Society for Research on Adolescence*, 33(1), 74–91.
<https://doi.org/10.1111/jora.12781>
- Becker, S. P., Breaux, R., Cusick, C. N., Dvorsky, M. R., Marsh, N. P., Sciberras, E., & Langberg, J. M. (2020). Remote Learning During COVID-19: Examining School Practices, Service Continuation,

and Difficulties for Adolescents With and Without Attention-Deficit/Hyperactivity Disorder.

Journal of Adolescent Health, 67(6). <https://doi.org/10.1016/j.jadohealth.2020.09.002>

Beiser, M., Hou, F., Hyman, I., & Tousignant, M. (2002). Poverty, family process, and the mental health of immigrant children in Canada. *American Journal of Public Health*, 92(2).

<https://doi.org/10.2105/AJPH.92.2.220>

Benner, A. D., & Mistry, R. S. (2020). Child Development During the COVID-19 Pandemic Through a Life Course Theory Lens. *Child Development Perspectives*, 14(4).

<https://doi.org/10.1111/cdep.12387>

Benton, T., Njoroge, W. F. M., & Ng, W. Y. K. (2022). Sounding the Alarm for Children's Mental Health During the COVID-19 Pandemic. *JAMA Pediatrics*, 176(4), e216295–e216295.

<https://doi.org/10.1001/jamapediatrics.2021.6295>

Bethhäuser, B. A., Bach-Mortensen, A. M., & Engzell, P. (2023). A systematic review and meta-analysis of the evidence on learning during the COVID-19 pandemic. *Nature human behaviour*, 7(3), 375-385.

Bhogal, A., Borg, B., Jovanovic, T., & Marusak, H. A. (2021). Are the kids really alright? Impact of COVID-19 on mental health in a majority Black American sample of schoolchildren. *Psychiatry Research*, 304. <https://doi.org/10.1016/j.psychres.2021.114146>

Bøe, T., Øverland, S., Lundervold, A. J., & Hysing, M. (2012). Socioeconomic status and children's mental health: Results: from the Bergen Child Study. *Social Psychiatry and Psychiatric Epidemiology*, 47(10). <https://doi.org/10.1007/s00127-011-0462-9>

Boyes, M. E., Tebbutt, B., Preece, K. A., & Badcock, N. A. (2018). Relationships between reading ability and child mental health: Moderating effects of self-esteem. *Australian Psychologist*, 53(2), 125-133.

- Bradshaw, C. P., Schaeffer, C. M., Petras, H., & Ialongo, N. (2010). Predicting negative life outcomes from early aggressive–disruptive behavior trajectories: Gender differences in maladaptation across life domains. *Journal of Youth and Adolescence*, 39(8), 953–966.
<https://doi.org/10.1007/s10964-009-9442-8>
- Brainstorm Consortium, Anttila, V., Bulik-Sullivan, B., Finucane, H. K., Walters, R. K., Bras, J., ... & Neale, B. M. (2018). Analysis of shared heritability in common disorders of the brain. *Science*, 360(6395), eaap8757. <https://doi.org/10.1126/science.aap8757>
- Brankston, G., Merkley, E., Fisman, D.N. *et al.* Quantifying contact patterns in response to COVID-19 public health measures in Canada. *BMC Public Health* 21, 2040 (2021).
<https://doi.org/10.1186/s12889-021-12080-1>
- Brannen, D. E., Wynn, S., Shuster, J., & Howell, M. (2023). Pandemic Isolation and Mental Health Among Children. *Disaster medicine and public health preparedness*, 17, e353.
<https://doi.org/10.1017/dmp.2023.7>
- Breaux, R., Dvorsky, M. R., Marsh, N. P., Green, C. D., Cash, A. R., Shroff, D. M., Buchen, N., Langberg, J. M., & Becker, S. P. (2021). Prospective impact of COVID-19 on mental health functioning in adolescents with and without ADHD: protective role of emotion regulation abilities. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 62(9).
<https://doi.org/10.1111/jcpp.13382>
- Browne, D. T., Wade, M., May, S. S., Maguire, N., Wise, D., Estey, K., & Frampton, P. (2021). Children’s mental health problems during the initial emergence of COVID-19. *Canadian Psychology*, 62(1). <https://doi.org/10.1037/cap0000273>

- Buder, I., & Jennings, J. (2023, April). Pandemics, Socioeconomic Gaps, and Macroeconomic Policy: The Ugly Truth Highlighted by COVID-19. In *Forum for Social Economics* (Vol. 52, No. 2, pp. 172-185). Routledge.
- Canadian Institute for Health Information. *Child and youth mental health in Canada* [infographic]. Ottawa, ON: CIHI, 2020.
- Canadian Teachers' Federation. (2020). *Mental health*. Canadian Teachers' Federation. <https://www.ctf-fce.ca/tag/mental-health/>
- Chen, J. Q., & McNamee, G. D. (2011). Positive Approaches to Learning in the Context of Preschool Classroom Activities. *Early Childhood Education Journal*. <https://doi.org/10.1007/s10643-010-0441-x>
- Cicchetti, D., & Toth, S. L. (2005). Child maltreatment. *Annual Review of Clinical Psychology*. <https://doi.org/10.1146/annurev.clinpsy.1.102803.144029>
- Comer, J. S., Fan, B., Duarte, C. S., Wu, P., Musa, G. J., Mandell, D. J., ... Hoven, C. W. (2010). Attack-Related Life Disruption and Child Psychopathology in New York City Public Schoolchildren 6-Months Post-9/11. *Journal of Clinical Child & Adolescent Psychology*, 39(4), 460–469. <https://doi.org/10.1080/15374416.2010.486314>
- Conto, C. A., Akseer, S., Dreesen, T., Kamei, A., Mizunoya, S., & Rigole, A. (2021). Potential effects of COVID-19 school closures on foundational skills and Country responses for mitigating learning loss. *International Journal of Educational Development*, 87, 102434.
- Cortese, S., Asherson, P., Sonuga-Barke, E., Banaschewski, T., Brandeis, D., Buitelaar, J., Coghill, D., Daley, D., Danckaerts, M., Dittmann, R. W., Doepfner, M., Ferrin, M., Hollis, C., Holtmann, M., Konofal, E., Lecendreux, M., Santosh, P., Rothenberger, A., Soutullo, C., ... Simonoff, E. (2020). ADHD management during the COVID-19 pandemic: guidance from the European

ADHD Guidelines Group. In *The Lancet Child and Adolescent Health* (Vol. 4, Issue 6).

[https://doi.org/10.1016/S2352-4642\(20\)30110-3](https://doi.org/10.1016/S2352-4642(20)30110-3)

Cost, K. T., Crosbie, J., Anagnostou, E., Birken, C. S., Charach, A., Monga, S., Kelley, E., Nicolson, R., Maguire, J. L., Burton, C. L., Schachar, R. J., Arnold, P. D., & Korczak, D. J. (2021). Mostly worse, occasionally better: impact of COVID-19 pandemic on the mental health of Canadian children and adolescents. *European Child and Adolescent Psychiatry*.

<https://doi.org/10.1007/s00787-021-01744-3>

Dalekou, S., Michaleas, S. N., Tsitsika, A. K., & Karamanou, M. (2023). Comparative study of pandemics and their impact on children and adolescents: COVID-19 and Spanish Flu. *Le Infezioni in Medicina*, 31(2), 131-139. <https://doi.org/10.53854/liim-3102-1>

Deng, J., Zhou, F., Hou, W., Heybati, K., Lohit, S., Abbas, U., ... & Heybati, S. (2023). Prevalence of mental health symptoms in children and adolescents during the COVID-19 pandemic: A meta-analysis. *Annals of the New York Academy of Sciences*, 1520(1), 53-73.

Dion, J., Hamel, C., Clermont, C., Blackburn, M. È., Hébert, M., Paquette, L., Lalande, D., & Bergeron, S. (2022). Changes in Canadian Adolescent Well-being since the COVID-19 Pandemic: The Role of Prior Child Maltreatment. *International journal of environmental research and public health*, 19(16), 10172. <https://doi.org/10.3390/ijerph191610172>

Di Pietro G. (2023). The impact of Covid-19 on student achievement: Evidence from a recent meta-analysis. *Educational research review*, 39, 100530. <https://doi.org/10.1016/j.edurev.2023.100530>

Duncan, M. J., Patte, K. A., & Leatherdale, S. T. (2021). Mental Health Associations with Academic Performance and Education Behaviors in Canadian Secondary School Students. *Canadian Journal of School Psychology*. <https://doi.org/10.1177/0829573521997311>

- Elder, G. H. (1998). The Life Course as Developmental Theory. *Child Development*, 69(1).
<https://doi.org/10.1111/j.1467-8624.1998.tb06128.x>
- Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin*, 139(6). <https://doi.org/10.1037/a0031808>
- Faraone, S. V., Banaschewski, T., Coghill, D., Zheng, Y., Biederman, J., Bellgrove, M. A., ... & Wang, Y. (2021). The world federation of ADHD international consensus statement: 208 evidence-based conclusions about the disorder. *Neuroscience & biobehavioral reviews*, 128, 789-818.
- Frazier, T. W., Demaree, H. A., & Youngstrom, E. A. (2004). Meta-analysis of intellectual and neuropsychological test performance in attention-deficit/hyperactivity disorder. *Neuropsychology*, 18(3). <https://doi.org/10.1037/0894-4105.18.3.543>
- Gadermann, A. C., Thomson, K. C., Richardson, C. G., Gagné, M., McAuliffe, C., Hirani, S., & Jenkins, E. (2021). Examining the impacts of the COVID-19 pandemic on family mental health in Canada: findings from a national cross-sectional study. *BMJ Open*, 11(1), e042871.
<https://doi.org/10.1136/bmjopen-2020-042871>
- Gallagher-Mackay, K., Srivastava, P., Underwood, K., et al. (2021). COVID-19 and education disruption in Ontario: emerging evidence on impacts. *Science Briefs of the Ontario COVID-19 Science Advisory Table*, 2(34). <https://doi.org/10.47326/ocsat.2021.02.34.1.0>
- Georgiades, K., Duncan, L., Wang, L., Comeau, J., Boyle, M. H., 11for the 2014 Ontario Child Health Study Team. (2019). Six-month prevalence of mental disorders and service contacts among children and youth in Ontario: Evidence from the 2014 Ontario Child Health Study. *Canadian Journal of Psychiatry*, 64(4), 246–255. <https://doi.org/10.1177/0706743719830024>
- Ghandour, R. M., Kogan, M. D., Blumberg, S. J., Jones, J. R., & Perrin, J. M. (2012). Mental health conditions among school-aged children: Geographic and sociodemographic patterns in

prevalence and treatment. *Journal of Developmental and Behavioral Pediatrics*, 33(1).

<https://doi.org/10.1097/DBP.0b013e31823e18f>

Gilliom, M., & Shaw, D. S. (2004). Codevelopment of externalizing and internalizing problems in early childhood. *Development and psychopathology*, 16(2), 313-333

Government of Canada. (n.d.). *COVID-19 vaccination: the 2021-2022 school year and public health measures - Canada.ca*. Retrieved November 19, 2021, from <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/planning-2021-2022-school-year-vaccination.html>

Graziano, P. A., & Garcia, A. (2016). Attention-deficit hyperactivity disorder and children's emotion dysregulation: A meta-analysis. *Clinical psychology review*, 46, 106-123.

Hapke, U., Schumann, A., Rumpf, H. J., John, U., & Meyer, C. (2006). Post-traumatic stress disorder: the role of trauma, pre-existing psychiatric disorders, and gender. *European archives of psychiatry and clinical neuroscience*, 256, 299-306.

Halldorsdottir, T., Thorisdottir, I. E., Meyers, C. C. A., Asgeirsdottir, B. B., Kristjansson, A. L., Valdimarsdottir, H. B., Allegrante, J. P., & Sigfusdottir, I. D. (2021). Adolescent well-being amid the COVID-19 pandemic: Are girls struggling more than boys?. *JCPP advances*, 1(2), e12027. <https://doi.org/10.1002/jcv2.12027>

Hards, E., Loades, M. E., Higson-Sweeney, N., Shafran, R., Serafimova, T., Brigden, A., ... & Borwick, C. (2022). Loneliness and mental health in children and adolescents with pre-existing mental health problems: A rapid systematic review. *British Journal of Clinical Psychology*, 61(2), 313-334

- Heidbreder, R. (2015). ADHD symptomatology is best conceptualized as a spectrum: a dimensional versus unitary approach to diagnosis. *ADHD Attention Deficit and Hyperactivity Disorders*, 7(4), 249-269.
- Huynh, Q., Craig, W., Janssen, I., & Pickett, W. (2013). Exposure to public natural space as a protective factor for emotional well-being among young people in Canada. *BMC Public Health*, 13(1).
<https://doi.org/10.1186/1471-2458-13-407>
- Ingram, R. E. (2005). *Vulnerability-Stress Models. Development of Psychopathology: A vulnerability stress perspective*/Sage Publications Inc.
- Irwin, M., Lazarevic, B., Soled, D., & Adesman, A. (2022). The COVID-19 pandemic and its potential enduring impact on children. *Current Opinion in Pediatrics*, 34(1), 107-115.
<https://doi.org/10.1097/MOP.0000000000001097>
- Jefsen, O. H., Rohde, C., Nørremark, B., & Østergaard, S. D. (2021). Editorial Perspective: COVID-19 pandemic-related psychopathology in children and adolescents with mental illness. In *Journal of Child Psychology and Psychiatry and Allied Disciplines* (Vol. 62, Issue 6).
<https://doi.org/10.1111/jcpp.13292>
- Jin, Y., Zhu, D., & He, P. (2020). Social causation or social selection? The longitudinal interrelationship between poverty and depressive symptoms in China. *Social Science & Medicine*, 249, 112848.
- Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H.-U. (2012). Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. *International journal of methods in psychiatric research*, 21(3), 169–184.
- Kronenberg, M. E., Hansel, T. C., Brennan, A. M., Osofsky, H. J., Osofsky, J. D., & Lawrason, B. (2010). *Children of Katrina: lessons learned about postdisaster symptoms and recovery*

patterns. *Child development*, 81(4), 1241–1259. <https://doi.org/10.1111/j.1467-8624.2010.01465.x>

McLennan, J. D. (2016). Understanding attention deficit hyperactivity disorder as a continuum. In *Canadian Family Physician* (Vol. 62, Issue 12).

Mendolia, S., Suziedelyte, A., Zhu, A. (2021) Have Girls Been Left behind during the COVID-19 Pandemic? Gender Differences in Pandemic Effects on Children's Mental Wellbeing, IZA Discussion Papers, No. 14665, Institute of Labor Economics(IZA), Bonn

Mental Health Commission of Canada. (2021). COVID-19 and early childhood mental health: *Fostering systems change and resilience — Policy brief*. Ottawa, Canada: Mental Health Commission of Canada.

Moulin, F., Bailhache, M., Monnier, M., Thierry, X., Vandentorren, S., Côté, S. M., Falissard, B., Simeon, T., Geay, B., Marchand, L., Dufourg, M. N., Ancel, P. Y., Charles, M. A., Rouquette, A., Melchior, M., Galéra, C., & SAPRIS study group (2023). Longitudinal impact of psychosocial status on children's mental health in the context of COVID-19 pandemic restrictions. *European child & adolescent psychiatry*, 32(6), 1073–1082.
<https://doi.org/10.1007/s00787-022-02010-w>

Newlove-Delgado, T., McManus, S., Sadler, K., Thandi, S., Vizard, T., Cartwright, C., Ford, T., & Mental Health of Children and Young People group (2021). Child mental health in England before and during the COVID-19 lockdown. *The lancet. Psychiatry*, 8(5), 353–354.
[https://doi.org/10.1016/S2215-0366\(20\)30570-8](https://doi.org/10.1016/S2215-0366(20)30570-8)

Ng, C. S., & Ng, S. S. (2022). Impact of the COVID-19 pandemic on children's mental health: A systematic review. *Frontiers in Psychiatry*, 13, 975936. <https://doi.org/10.3389/fpsyt.2022.975936>

- O'Hagan, B., & Kingdom, S. (2020). Experiences of children with special educational needs and disabilities and their families in the United Kingdom during the coronavirus pandemic. *Tizard Learning Disability Review*, 25(4). <https://doi.org/10.1108/TLDR-09-2020-0025>
- Pinkham, A. E., Ackerman, R. A., Depp, C. A., Harvey, P. D., & Moore, R. C. (2020). A longitudinal investigation of the effects of the COVID-19 pandemic on the mental health of individuals with pre-existing severe mental illnesses. *Psychiatry research*, 294, 113493.
- Racine, N., McArthur, B. A., Cooke, J. E., Eirich, R., Zhu, J., & Madigan, S. (2021). Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: A meta-analysis. *JAMA Pediatrics*, 175(11), 1142–1150.
<https://doi.org/10.1001/jamapediatrics.2021.2482>
- Rahman, F., Webb, R. T., & Wittkowski, A. (2021). Risk factors for self-harm repetition in adolescents: a systematic review. *Clinical psychology review*, 88, 102048.
- Reinke, W. M., Herman, K. C., Petras, H., & Ialongo, N. S. (2008). Empirically derived subtypes of child academic and behavior problems: Co-occurrence and distal outcomes. *Journal of abnormal child psychology*, 36, 759-770.
- Pfefferbaum, B., & North, C. S. (2020). Mental Health and the Covid-19 Pandemic.
<https://doi.org/10.1056/NEJMp2008017>, 383(6), 510–512.
<https://doi.org/10.1056/NEJMP2008017>
- Romero, E., López-Romero, L., Domínguez-Álvarez, B., Villar, P., & Gómez-Fraguela, J. A. (2020). Testing the effects of COVID-19 confinement in Spanish children: The role of parents' distress, emotional problems, and specific parenting. *International Journal of Environmental Research and Public Health*, 17(19), 6975. <https://doi.org/10.3390/ijerph17196975>

- Ros, R., & Graziano, P. A. (2018). Social Functioning in Children With or At Risk for Attention Deficit/Hyperactivity Disorder: A Meta-Analytic Review. *Journal of Clinical Child and Adolescent Psychology*, 47(2). <https://doi.org/10.1080/15374416.2016.1266644>
- Santibanez, L., & Guarino, C. M. (2021). The effects of absenteeism on academic and social-emotional outcomes: Lessons for COVID-19. *Educational Researcher*, 50(6), 392-400. *Child Abuse and Neglect*, 80. <https://doi.org/10.1016/j.chiabu.2018.04.005>
- Sciberras, E., Patel, P., Stokes, M. A., Coghill, D., Middeldorp, C. M., Bellgrove, M. A., Becker, S. P., Efron, D., Stringaris, A., Faraone, S. v., Bellows, S. T., Quach, J., Banaschewski, T., McGillivray, J., Hutchinson, D., Silk, T. J., Melvin, G., Wood, A. G., Jackson, A., ... Westrupp, E. (2020). Physical Health, Media Use, and Mental Health in Children and Adolescents With ADHD During the COVID-19 Pandemic in Australia. *Journal of Attention Disorders*. <https://doi.org/10.1177/1087054720978549>
- Sibley, M. H., Ortiz, M., Gaias, L. M., Reyes, R., Joshi, M., Alexander, D., & Graziano, P. (2021). Top problems of adolescents and young adults with ADHD during the COVID-19 pandemic. *Journal of Psychiatric Research*, 136. <https://doi.org/10.1016/j.jpsychires.2021.02.009>
- Sideropoulos, V., Dukes, D., Hanley, M., Palikara, O., Rhodes, S., Riby, D. M., Samson, A. C., & van Herwegen, J. (2021). The Impact of COVID-19 on Anxiety and Worries for Families of Individuals with Special Education Needs and Disabilities in the UK. *Journal of Autism and Developmental Disorders*. <https://doi.org/10.1007/s10803-021-05168-5>
- Solmi, F., Downs, J. L., & Nicholls, D. E. (2021). COVID-19 and eating disorders in young people. *The Lancet. Child & Adolescent Health*, 5(5), 316.
- Spini, D., Bernardi, L., & Oris, M. (2017). Toward a life course framework for studying vulnerability. *Research in Human Development*, 14(1), 5-25.

Statistics Canada. (2020). Impacts on parents and children (Catalogue No. 11-631-X) [Survey results].

<https://www150.statcan.gc.ca/n1/pub/11-631-x/2020004/s8-eng.htm>

Statistics Canada. (2021). Canadian Social Survey – COVID-19 and Wellbeing.

<https://www150.statcan.gc.ca/n1/daily-quotidien/210924/dq210924a-eng.htm>

Statistics Canada. (2024). *Canadian Health Survey on Children and Youth: Changes in the mental health of respondents from the 2019 survey*. Statistics Canada. Retrieved from

<https://www150.statcan.gc.ca/n1/en/daily-quotidien/240910/dq240910a-eng.pdf?st=IWqw4DkL>

Starfield, B., Robertson, J., & Riley, A. W. (2002). Social class gradients and health in childhood.

Ambulatory Pediatrics, 2(4), 238-246.

Stewart, S. L., Toohey, A., Celebre, A., & Poss, J. W. (2021). Abuse, mental state, and health factors pre and during the COVID-19 pandemic: A comparison among clinically referred adolescents in

Ontario, Canada. *International Journal of Environmental Research and Public Health*, 18(19).

<https://doi.org/10.3390/ijerph181910184>

Stone, S. (2007). Child maltreatment, out-of-home placement and academic vulnerability: A fifteen-year review of evidence and future directions. *Children and Youth Services Review*, 29(2), 139-161.

<https://doi.org/10.1016/j.childyouth.2006.05.001>

Trout, B. S. (2020). The Coronavirus-Induced Transition to Online Learning: Perceptions and Intentions of First-Time Online Students. *Quarterly Review of Distance Education*, 21(1).

Uddin, J., Alharbi, N., Uddin, H., Hossain, M. B., Hatipoğlu, S. S., Long, D. L., & Carson, A. P. (2020).

Parenting stress and family resilience affect the association of adverse childhood experiences with children's mental health and attention-deficit/hyperactivity disorder. *Journal of affective disorders*, 272, 104-109.

- Valdez, C. R., Lambert, S. F., & Ialongo, N. S. (2011). Identifying patterns of early risk for mental health and academic problems in adolescence: A longitudinal study of urban youth. *Child Psychiatry and Human Development*, 42(5). <https://doi.org/10.1007/s10578-011-0230-9>
- Vaillancourt, T., Szatmari, P., Georgiades, K., & Krygsman, A. (2021). COVID-19 school closures and social isolation in children and youth: Prioritizing relationships in education. *Canadian Journal of School Psychology*, 36(1), 55-69. <https://doi.org/10.1177/0829573520985416>
- Varma, P., Junge, M., Meaklim, H., & Jackson, M. L. (2021). Younger people are more vulnerable to stress, anxiety and depression during COVID-19 pandemic: A global cross-sectional survey. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 109. <https://doi.org/10.1016/j.pnpbp.2020.110236>
- Viner, R. M., Russell, S. J., Croker, H., Packer, J., Ward, J., Stansfield, C., Mytton, O., Bonell, C., & Booy, R. (2020). Impacts of school closures on physical and mental health of children and young people: A systematic review. *The Lancet Child & Adolescent Health*, 4(6), 397-404. [https://doi.org/10.1016/S2352-4642\(20\)30109-7](https://doi.org/10.1016/S2352-4642(20)30109-7)
- Westrupp, E. M., Bennett, C., Berkowitz, T., Youssef, G. J., Toumbourou, J. W., Tucker, R., Andrews, F. J., Evans, S., Teague, S. J., Karantzas, G. C., Melvin, G. M., Olsson, C., Macdonald, J. A., Greenwood, C. J., Mikocka-Walus, A., Hutchinson, D., Fuller-Tyszkiewicz, M., Stokes, M. A., Olive, L., ... Sciberras, E. (2021). Child, parent, and family mental health and functioning in Australia during COVID-19: comparison to pre-pandemic data. *European Child and Adolescent Psychiatry*. <https://doi.org/10.1007/s00787-021-01861-z>
- Yoon, Y., Eisenstadt, M., Leraya, S. T., & Deighton, J. (2023). Gender difference in the change of adolescents' mental health and subjective wellbeing trajectories. *European Child & Adolescent Psychiatry*, 32(9), 1569-1578.

World Health Organization. (n.d.). *Coronavirus: Overview of the virus and its impact*. Retrieved September 10, 2022, from https://www.who.int/health-topics/coronavirus#tab=tab_1

Yeh, M., McCabe, K., Hough, R. L., Dupuis, D., & Hazen, A. (2003). Racial/Ethnic differences in parental endorsement of barriers to mental health services for youth. In *Mental Health Services Research* (Vol. 5, Issue 2). <https://doi.org/10.1023/A:1023286210205>

**Chapter 2: Longitudinal tracking of mental health in kindergarten students throughout the
pandemic**

Tessa Ritchie
Dr. Maria Rogers
Dr. Julia Ogg
Dr. Liz Shelleby
Dr. Alecia Santuzzi
Dr. Jess Whitley

Abstract

Canadian children have been impacted by the restrictions employed to stop the spread of the novel coronavirus (COVID-19). Whilst the impact has been universal, preliminary research suggests that the pandemic's consequences, specifically on mental health, have not been uniform. While many studies have focused on correlational risk factors for mental health problems, the current study tracked mental health symptoms in a cohort of kindergarten students longitudinally across 4 timepoints at 6-month intervals starting in the Fall of 2019, prior to the pandemic. The study monitored parent-reported anxiety and depressive symptoms in 248 students and the role of pre-pandemic academic achievement and concurrent attention difficulties throughout school cancellations and return to in person schooling. Linear growth curve models were used to examine changes in anxiety and depression symptoms from before the pandemic through the initial lockdown, back to school and a second mandatory lockdown. No significant changes over time were observed. A conditional growth curve model, which accounted for initial literacy and numeracy scores along with attention symptoms at all four timepoints found that attention scores predicted anxiety symptoms in the Fall of 2020 and the Spring of 2021. Small associations were also found between academic scores and baseline depression scores, with no long-term effects observed over time. Implications and next steps are discussed.

Keywords: pandemic, mental health, literacy, numeracy, attention-deficit/hyperactivity disorder (ADHD), attention difficulties, early education

Introduction

In March 2020, the SARS-CoV-2 virus, more commonly known as COVID-19, was rapidly spreading, with many unknowns regarding the severity and transmissibility of the virus. Governments promptly closed many public spaces, including schools, to prevent further spread of the virus. The United Nations Educational, Scientific and Cultural Organization (UNESCO) estimated that 1.5 billion students were impacted by the pandemic globally (Gustafsson, 2021). Many parents, teachers, and mental health professionals became concerned about the impact of online learning and other pandemic restrictions on children's wellbeing (Holmes et al., 2020). While many children transitioned to online or distance learning, the effectiveness and feasibility of online learning for younger children were questioned (Foti, 2020; Kruszewska et al., 2022). Despite statistics indicating that young children were less susceptible to severe physical illness as a result of the virus (Ye, 2020), closed daycares, closed schools, social distancing, and intensive collective fear of contracting COVID-19 rendered these children vulnerable to the indirect effects of the pandemic.

For kindergartners in Ontario, Canada, aged 3.5 to 6 years, the goals of the interactive play-based curriculum are to develop skills and aptitude in literacy and mathematics and develop foundational social and learning skills to help support them throughout their education (Ontario Ministry of Education, 2016). When the transition was made to virtual learning, synchronous learning was limited to 180 minutes/ day for the youngest students (Government of Ontario, 2020). Attendance and participation in the limited time with teachers heavily relied on parents' support and involvement, and reports suggest that, subsequently, many children stopped attending altogether (Hristova, 2020; Whitley et al., 2021). As the pandemic's restrictions eased, the effects of the educational disruption were monitored, with some reports suggesting that the fallouts may continue until 2030 (Gustafsson, 2030). Although all students experienced the disruptions, research results indicate that some students were

disproportionately impacted by the school closures (Whitley et al., 2021). Students who were already vulnerable based on their psychosocial situations or who typically required extra support through accommodations or modifications to their curriculum, such as those with learning and attention difficulties, are among those who have been identified as particularly vulnerable to the negative consequences of school closures (Sarid et al., 2023).

Mental health symptoms and general wellbeing outcomes have been well-monitored throughout the pandemic. A meta-analysis conducted by Racine et al. (2021) found that when compared to pre-pandemic estimates, there were nearly two times as many children and youth experiencing clinically significant symptoms of anxiety and depression in the first year of the pandemic. The purpose of the current study is to examine mental health in young children just starting formal education and further examine whether some children may have been at greater risk for mental health problems during the pandemic.

Risk Factors for Poor Mental Health during the Pandemic

Mental health problems as a consequence of the pandemic have been reported in the youngest students (Adegboye et al., 2021; Kurz et al., 2022; Statistics Canada, 2024). As mental health problems in early childhood have been associated with an increased probability for psychopathology later in life (Duchesne et al., 2008), understanding which children were at greater risk for symptoms of depression and anxiety throughout the pandemic can help inform future interventions and the allocation of supports.

Pre-pandemic research provides a wealth of knowledge on the many biopsychosocial factors associated with long-term mental health problems (e.g., Bradley & Corwyn, 2002; Yoshikawa et al., 2012). In a systematic review of 55 studies, children from families with lower income and parents with lower levels of education were found have increased mental health problems (Reiss, 2013).

Discrepancies in mental health as a function of SES often represent further inequities, such as access to

resources and overall opportunities and privilege. A review of research studies found that children from low-to-middle SES families maybe two to three times more likely to develop mental health problems than peers from high SES families (Reiss, 2013). Similarly, a child's racial or ethnic background has been associated with increased mental health problems in childhood and adolescence. A meta-analytic review found that children of racial and ethnic minorities who experience discrimination are at greater risk of internalizing and externalizing symptoms (Benner et al., 2018). Beyond the social and racial inequities, many children who are already prone to challenges at school were further impacted by the pandemic. When further looking at factors which impact mental health, children with lower grades and attentional difficulties have been found to have overall lower levels of wellbeing prior to the pandemic (Tobia et al., 2019). Since the pandemic, the lack of social interaction, academic support from peers and teachers, and the disruption to routine have likely made 'at-risk' children even more vulnerable to the mental health effects of the pandemic (Buchanan et al., 2023).

Attention Difficulties and Mental Health

Attention deficits in children and youth are most often conceptualized through the DSM-5-TR's formal criteria of Attention-Deficit/ Hyperactivity Disorder (ADHD). ADHD is a neurodevelopmental disorder characterized by symptoms of inattention, hyperactivity and impulsivity, with a global prevalence of approximately 5% in children and adolescents (APA, 2022; Drechsler et al., 2020). Recent research argues in favour of understanding the core features of ADHD as dimensional rather than categorical; subthreshold ADHD can still have a meaningful impact on functioning (Balázs & Keresztény, 2014; Drechsler et al., 2020). Considering attentional symptoms on a spectrum allows for the inclusion of children with symptoms who are otherwise too young to receive a formal diagnosis, as well as including other sub-threshold presentations which may still present a risk of other mental health conditions (Norén Selinus et al., 2016). In the current study, attention symptoms will be measured on a

spectrum based on parent reports. This will include both symptoms of inattention, and hyperactivity/impulsivity,

Children with ADHD have difficulty sustaining attention, inhibiting impulses, and ignoring distractions, resulting in a significant impact on their day-to-day functioning (APA, 2022). Beyond the functional impact of attention symptoms, evidence suggests that attention difficulties are further associated with increased mental health symptoms such as depression and anxiety (Becker et al., 2015). Prior to the pandemic, there was a multitude of research suggesting that children with ADHD are at greater risk of comorbid externalizing and internalizing symptoms and disorders (Ibilola & Silva, 2017; Tung et al., 2016). As attention difficulties impact a child's ability to engage in learning activities and peer interactions with long-term impacts on social and academic success (von Salisch et al., 2016), there are likely bidirectional effects that contribute to the high rates of comorbidity (Bubier et al., 2009). However, when Gair and colleagues (2021) examined the comorbid development of ADHD and anxiety symptoms in young children, they found that ADHD symptoms predicted later anxiety symptoms but not vice versa. The impact of the pandemic has been further posited to more significantly impact children with attention difficulties.

One study demonstrated that children with ADHD were adversely impacted by online learning (Becker et al., 2020). Further, a recent narrative review explored how the pandemic impacted the wellbeing of children and adolescents with ADHD and found that those with ADHD had increased behavioural symptoms and decreased overall wellbeing during the pandemic (Davoody et al., 2022). Children with ADHD or attention difficulties often struggle with online school and are more vulnerable to changes in routine and disruption to daily activities (Bobo et al., 2020; Davoody et al., 2022). A meta-analysis completed by Rogers and MacLean (2023) found increased ADHD symptoms during the pandemic. Additionally, children with ADHD were found to have worse anxiety, depression and overall

quality of life when compared to children with no previous mental health diagnosis (Erden & Uzun, 2023).

Learning Difficulties and Mental Health

Across the lifespan, learning disabilities are associated with an increased risk of mental health problems, such as symptoms of anxiety and depression, even when controlling for social factors such as income and education (Wilson et al., 2009). Children who do not have a formal learning disorder but have lower grades academically or have been identified as struggling in school are also at greater risk for future mental health problems, including a higher incidence of symptoms of anxiety and depression (Duncan et al., 2009; Essex et al., 2006).

Notably, there has been evidence of a bidirectional effect between children's mental health and academics, with children struggling with their mental health also exhibiting a decline in academic performance (Agnafors et al., 2021). The relationship between academic difficulties and future mental health problems is more pronounced for those from lower and middle SES families as well as racial and ethnic minorities (Benner et al., 2018; Essex et al., 2006).

Throughout the pandemic, many teachers expressed concern about their students' emotional health, citing isolation and lack of social connections as key factors (Canadian Teachers' Federation, 2020). However, when examining the available research on the impact of school closures on students, much of the current research focuses on the impact on academic performance. Preliminary studies suggest that academic skills (e.g., reading, mathematics) were significantly adversely affected (Molnàr & Hermann, 2023). A report from one school board in Ontario stated that fewer students in grade 1 were meeting grade-level expectations than pre-pandemic students and were struggling even more during the virtual learning stages of the lockdown (Cameron et al., 2021). A meta-analysis that included studies from 15 countries found that the learning deficits that were initially present in the early stages of the

pandemic and did not subside even 2.5 years after the pandemic (Betthäuser et al., 2023). However, the impact of the pandemic extends beyond academic achievement, with evidence that there were increased adverse effects on their mental health during the initial stages of the pandemic for children with pre-existing learning difficulties (Yaylaci & Eyuboglu., 2022).

Students who have learning difficulties were among those who experienced some of the most significant disturbances in schooling during the pandemic (FitzGerald et al., 2023) and were more likely to struggle with home learning (Jackson et al., 2022). For parents of children with learning difficulties, disruptions to special education programming and increased familial stress have been cited as potential factors contributing to the increased emotional symptoms displayed by their children (Catroppa et al., 2023). Additionally, the pandemic forced children with special learning needs to lose access to critical resources that allow them to access the learning necessary for them to succeed in school. Students may have been denied access to many of the specialized professionals who support them on a day-to-day basis and the accompanying explicit teaching support, technology resources and in-person interaction, which school staff typically rely on to assess the emotional and academic needs of their students (FitzGerald et al., 2023; Tremmel et al., 2020). Increases in anxiety and mood-related symptoms, in addition to increased loneliness and externalizing behaviours, have been reported in children with learning difficulties during the pandemic (Catroppa et al., 2023; Kopra et al., 2021). However, relatively less is known about how the youngest children in the formal education system fared throughout the pandemic.

Mental Health in Early Childhood

Depression and anxiety symptoms, often referred to as internalizing symptoms, are associated with some of the most common psychiatric disorders in childhood and adolescence. Internalizing symptoms can cause substantial internal distress, with early symptoms being associated with the

development of significant impairment and psychiatric diagnoses (Ashford et al., 2008; Weeks et al., 2014).

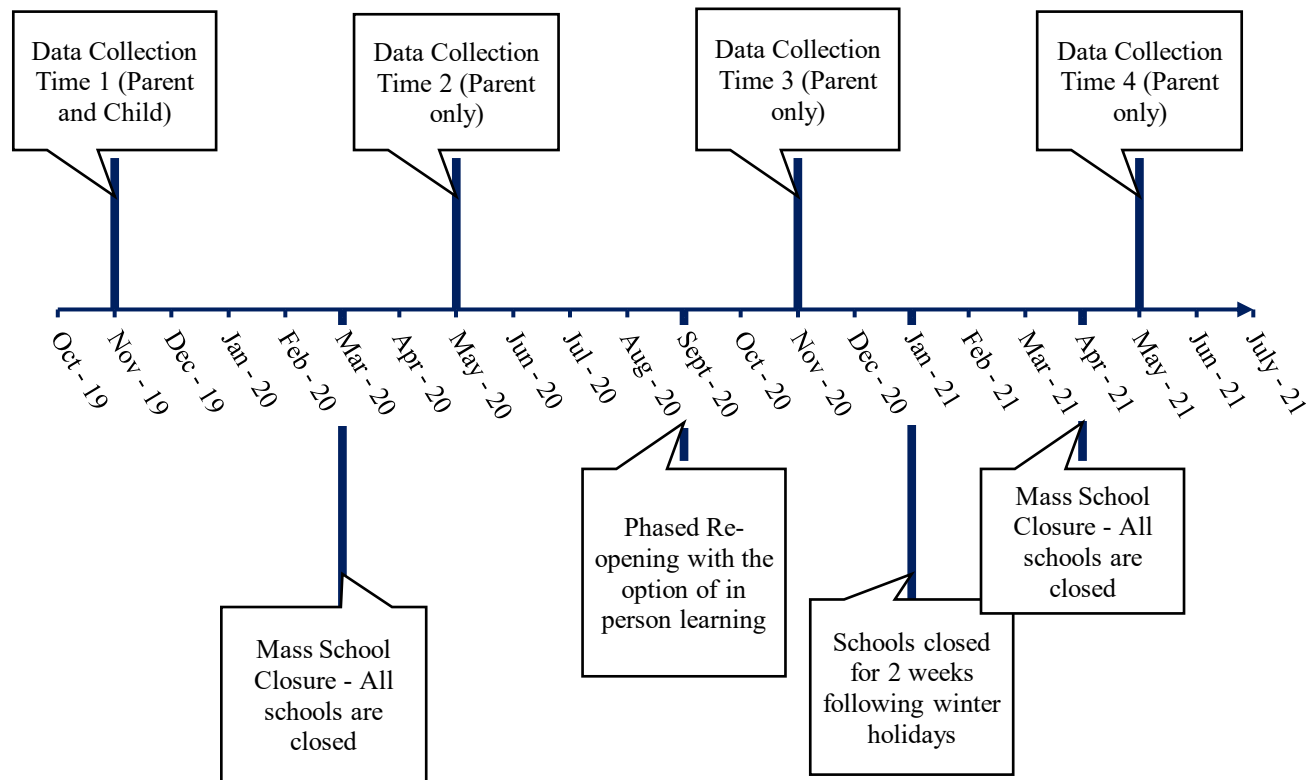
Even in the youngest children, early internalizing symptoms in kindergarten students persist over time, with 65 to 100% presenting symptoms five years later (Essex et al., 2009). Children with subthreshold diagnostic symptoms may encounter functional impairment, which appears associated with an increased risk of adult psychopathology (Hofstra et al., 2002). Understanding the early impact on the youngest students may better predict the level of support needed as the pandemic continues through their school-aged years and potentially beyond.

Thus far, research on the impact of the pandemic on young students is limited. In the United States, a survey conducted during the Spring of 2020 revealed that one-third of parents were concerned about their child's social-emotional wellbeing (Stites et al., 2021). In two meta-analyses, age and grade levels were found to be positively correlated with depressive symptoms: older children experienced a greater prevalence compared to younger children. However, similar results were not found for anxiety-related symptoms, with no significant differences between age and grade levels apparent (Deng et al., 2024; Racine et al., 2021). Despite the findings, large meta-analyses tend to group all elementary-aged children, and few studies have focused on the early education cohort (ages four to six years). One international study found that approximately one-third of parents noted an increase in affective and anxiety problems in the youngest cohort of children (aged 1 to 6 years) in the Spring of 2020 (Schmidt et al., 2021). In the same study, the prevalence of anxiety and depressive symptoms that were clinically significant were 2 to 5 times higher than pre-pandemic rates (Schmidt et al., 2021). Despite evidence suggesting kindergartners were impacted by the first stages of the pandemic, to the author's knowledge, there are no studies investigating kindergartners' mental health across multiple years of the pandemic, accounting for the impact of pre-pandemic attention and academic scores.

The COVID-19 Context

Generally, Ontario students were attending school full-time in person until the province announced a temporary closure of schools starting on March 14, 2020, with in-person school not resuming until the following September. When returning to school in September 2020, parents were able to choose whether their child would be returning to school entirely in person or entirely online. There was no hybrid options offered at this time. In addition, in-person learning was modified with mandatory mask-wearing, physical distancing, and plexiglass barriers implemented to reduce the risk of transmission between students. Students were also divided into classroom and recess cohorts to limit the number of children they had close contact with. As the number of positive COVID-19 cases and hospitalizations rose in the region, those who had selected to learn in person in September 2020 were often required to return to online learning (Government of Canada, August 2021)

Ontario experienced more days of school shutdowns than any other province in Canada, with 23 weeks of mandatory shutdowns between March 2020 and June 2021 (Vallaincourt et al., 2021). The general pattern of school closures followed the “waves” of the pandemic, reflecting the timepoints with the highest COVID-19-linked hospitalizations and deaths. The first wave occurred in Spring 2020, with death rates peaking through early May of that year. Schools remained closed until the end of the school year. The second wave occurred in the Winter of 2020/2021, with death rates peaking at the end of January and a return to school in-person was delayed until after the winter break. The third wave was observed in the Spring of 2021, with relatively lower death rates, but increased hospitalizations and stressed healthcare systems noted through late April and early May. Schools were closed once again from mid-April until the end of the school year. A timeline of closures as well as the study’s data collection periods is presented below in Figure 1.

Figure 1*Timeline of School Closures in Ontario and Data collection***The Current Study**

The current study tracked a cohort of kindergarten students prior to the start of the pandemic's restrictions. Pre-pandemic risk factors helped identify students who are at greater risk of the short and long-term impacts of the pandemic. The current study investigated academic achievement and mental health before and during the pandemic (Fall 2019), during the initial pandemic closures (Spring 2020), the partial return to school (Fall 2020), and the second major school closures (Spring 2021). Based on previous research, we suspected that the parent-reported mental health symptoms (anxiety and depression) would increase over time, with a cumulative effect of the lockdown and pandemic restrictions resulting in higher symptoms over time (Deng et al., 2023; Madigan et al., 2023; Mistry & Benner, 2020). We hypothesized that children who had lower initial academic scores would be more

significantly impacted by the pandemic and at higher risk of symptoms of anxiety and depression throughout the pandemic. We hypothesized that the effect would be cumulative, becoming worse with the time as the disruptions in schooling and routine progress from the COVID-19 pandemic. Similarly, we hypothesized that attention symptoms would significantly predict higher rates of parent-reported anxiety and depression symptoms across the three pandemic time points.

Research Methods

The present study was a part of a larger longitudinal research project seeking to examine the impact of home-school interactions on children's development. The timeline for data collection is highlighted in Figure 1. Note the unique COVID restrictions that were present during each of the periods of data collection as well as the waves of COVID-19 in Canada.

Data Collection

During the first round of data collection, in the Fall of 2019, consent packages were sent home with students, with additional reminder emails sent from principals alerting the parents/caregivers they would be receiving information about a research study. The consent packages included information about the larger longitudinal study regarding home-school engagement, requesting not only parent surveys, but also permission for child academic testing which would be completed during school time, as well as teacher reports. All three components (child testing, parent survey and teacher survey) were scheduled to be completed twice yearly until the students completed the second grade. The consent form listed the exclusionary criteria including a previous diagnosis of an intellectual disability or autism spectrum disorder. While the surveys were only available in English, the consent form noted that translation support was available upon request, helping to increase accessibility and participation. To further support engagement, paper copies and in-person assistance were offered to parents who required help completing the surveys. Researchers also worked closely with school administration to facilitate

recruitment efforts and ensure the study was accessible by all parents. All parents who consented were invited to participate at all time points.

The completion of academic testing involved trained volunteers individually administering the Kaufman Test of Educational Achievement-III (KTEA-3) during classroom hours in the schools. Most of the testing was completed in December 2019, with some students who were absent on the original testing days completing the testing in January 2020. For the completion of parent surveys, participants were given the option of completing surveys online or with a hard (i.e., paper) copy. Parents/caregivers who requested hard copies had surveys sent home with their students and included a stamped, addressed envelope to return surveys to the researchers. The surveys came with written instructions, and school principals called ahead to parents/caregivers to help explain the pre-stamped envelopes and answer any questions. For the online parent surveys, parents/caregivers were sent individualized links through *Qualtrics*; additionally, two reminder emails were sent to all parents/caregivers who had not yet completed the survey.

During the second, third and fourth wave of data collection (Spring 2020, Fall 2020, Spring 2021), COVID restrictions prevented hard copies from being distributed through the schools. All parents/caregivers who had initially requested hard copies were contacted individually asking if they still wanted a hard copy, and if so, to provide their home address and a pre-stamped and addressed envelope would be mailed to them. No parents/caregivers requested hard copies; subsequent surveys were administered online in their entirety. At later time points, while in person and school-based retention efforts were hindered by the pandemic, each parent was contacted individually to help create an individualized approach to participant recruitment. The goal of individually contacting parents was to help identify and mitigate potential barriers to participation and prevent attrition. Two reminder emails were sent to all parents.

Materials

Demographics

The demographic questionnaire (Appendix A) was completed by parents/caregivers of the participants. Questions pertained to family history, income, parental education, ethnicity, languages spoken as well as general information about the child (mental health diagnoses, medications, etc.). Following Time 1, a condensed demographic questionnaire was administered to account for possible changes in demographic information over time (e.g., family income).

Kaufman Test of Educational Achievement

The Kaufman Test of Educational Achievement Third Edition (KTEA-3) is an individually administered battery that assesses key academic skills. The KTEA-3 was individually administered to each child. All tests were completed using the tablet version of the test. Specifically, Math Concepts & Applications (MCA) and Letter & Word Recognition (LWR) subtests were used to evaluate basic numeracy and literacy skills. The MCA and LWR provide standardized scores using age and gender-based norms. Since age-based norms are not available for those under 4 years of age, only grade-based norms were used with these children. Previous research has identified both subtests to have strong reliability. The measure creators report that LWR has a split-half reliability of $r = .98$ and the MCA has a split-half reliability of $r = .91$, for children 4 years of age (Kaufman & Kaufman, 2014). Furthermore, the KTEA-3 was shown in prior research to have strong concurrent validity with other standardized achievement tests including the Weschler Individual Achievement Test – Third Edition (WIAT-III). Correlations between the KTEA-3 and the WIAT-III for the overall domain scores were reported in previous research as $r = .95$. The correlations between similar subtests to the LWR and MCA on the WIAT-III were $r = .79$ (LWR) and $r = .85$ (MCA) (Kaufman & Kaufman, 2014).

ADHD Rating Scale-5

The ADHD Rating Scale–5 for Children and Adolescents, Home Version (ADHD RS-5; DuPaul et al., 2016) was completed by parents/caregivers as a reflection of their child’s ADHD symptoms. Parents/caregivers record the frequency of symptomatic behaviors of ADHD over the previous 6 months using a 4-point Likert scale that ranges from 1 = *never or rarely* to 4 = *very often*. The items were developed using diagnostic criteria from the DSM-5. The scale consists of two subscales: an Inattention subscale (nine items) and a Hyperactivity/Impulsivity subscale (nine items). A total subscale including all items can also be used to evaluate combined type ADHD (18 items). Robust construct validity for the ADHD RS-5 has been demonstrated, in previous research with high correlations (> 0.80) with the Conner’s Parent Rating Scale (DuPaul et al., 2016).

Child and Adolescent Symptom Inventory-Progress Monitor

The Child and Adolescent Symptom Inventory-Progress Monitor-Parent Form (CASI-PM-P) is a 26-28-item rating scale which measures symptom frequency for several child and adolescent disorders. For children ages 3 to 5 years, only 26 items are included (two anxiety questions are removed) and for those 6 years and above there are 28 items. The scale includes 8-items which comprise the ADHD rating scales that were not included in the current study. The items asked parents/caregivers to rate their child’s behavior during the preceding month using Likert scores ranging from 0 = *Never* to 3 = *Very Often*. Items were summed to create the two composite symptom categories: the measure of Global Anxiety (7-9 items) and the measure of Global Depression (4 items). Summed scores are compared to a normative sample and allow for conversion into T-scores. A t-score between 60-69 is considered to reflect moderate severity, while a score of 70 and above reflects high severity.

The test-retest reliability for the CASI-PM-P in a previous research sample of 178 children was considered to be high (≥ 0.7) for ADHD, ODD, CD, and Global Depression, and moderate (0.5 to 0.6)

for GAD, SAD, MDE, Dysthymia, SP, and Global Anxiety (Sprafkin et al., 2010). Regarding construct validity, when compared to chart diagnoses and structured interviews, the sensitivity and specificity of parent screening for externalizing disorders (ADHD, oppositional defiant disorder, conduct disorder) range from fair to excellent and from good to excellent for internalizing disorders (generalized anxiety disorder and major depressive disorder; Lavigne et al., 2009).

Participant Demographics

For the current project, all Kindergarten students from six schools in a large city in Eastern Canada were invited to participate. A total of 238 parents/caregivers consented for their kindergarten students and themselves to participate from 32 classrooms across 6 schools. The consent packages included information about the larger longitudinal study regarding home-school engagement, requesting not only parent surveys, but also permission for child academic testing which would be completed during school time, as well as teacher reports. Ethics approval was granted from the institutional ethics review board and the school district's research committee.

Of the original 238 children, 26 never responded to any of the parent surveys. From the remaining 162 parents/caregivers for which demographic information was completed at Time 1, 140 were female with an average age of 37.94 years ($SD=4.51$). Of the parents/ caregivers, the majority had at minimum a bachelor's degree (80.40%). The average age of the children at Time 1 (Fall 2019) was 4.65 years ($SD=.55$). with 110 in their first year of kindergarten (junior kindergarten) and 128 in their second year (senior kindergarten). With regards to gender, 54.6% were reported as female and 45.4% as male, Two had a reported history of ADHD, and one had a reported diagnosis of Oppositional Defiant Disorder (ODD). At the first time point, the majority of children were identified as white (79.1%), with Arab (8.6%), Chinese (6.1%), Black (6.1%), South Asian (5.5%), Other (4.9%), West Asian (2.6%), Latin American (2.6%), First Nations (1.2%), Filipino (1.2%), South East Asian (1.2%) and under 1% were

Inuit and Japanese (.06%).

Academic testing was completed individually with 192 of the children in December 2019. Children who were not present at the time of class testing were tested individually in January 2020. A total of 224 children completed the academic testing at Time 1. At Time 1, teacher data were not collected due to ongoing strike actions and following the COVID-19 shutdowns, teacher data were no longer allowed to be collected in the schools. No teacher or child data were collected after the first time point due to the COVID restrictions.

At each time point, if any parent who mistakenly completed the survey twice, the most complete survey response was used; if completion of each survey was comparable, only the first response was tallied. A total of 161 (71.8%) parents/caregivers returned the survey in the Fall of 2019 (Time 1; 11 hard copies) and 178 (79.5%) in the Spring of 2020 (Time 2). One hundred and thirty-four (59.8%) were returned in the Fall of 2020 (Time 3) and finally, 175 (78.1%) in the Spring of 2021 (Time 4). Participants were excluded if they indicated they had moved out of the province over the course of the study; however, their data while in the province of Ontario were still included within the analysis. Across all four time points, a total of 211 parents participated in the study and completed a minimum of 20% of the survey at one time point during the study. Of the 211 parents, 202 had children who completed the in person academic testing at Time 1. Some children had parents' consent to participate in the research but were not present on of testing and therefor did not complete the academic testing.

Detailed sample demographics are presented in Table 1. A chi-square test of independence revealed a significant difference in the distribution of household income across the four time points, $\chi^2(15) = 25.56, p = .043$; however, follow-up pairwise comparisons with Bonferroni correction indicated that none of the differences between specific time points reached statistical significance. Variable descriptive statistics are presented in Table 2. Independent samples t-tests found no significant gender differences

(between male and female) across the ADHD-5 rating scale or the global depression and anxiety scales in the fall of 2019 ($p > .05$).

Table 1*Demographics*

<i>Variable Name</i>	<i>Category</i>	<i>Fall 2019</i>	<i>Spring 2020</i>	<i>Fall 2020</i>	<i>Spring 2021</i>
		<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>
Household income	under \$32 999	11 (7.1%)	8 (15.7%)	6 (4.4%)	5 (2.9%)
	\$33 000 to \$65 999	15 (9.5%)	5 (9.8%)	11 (8.1%)	15 (8.8%)
	\$66 000 to \$92 999	9 (6.0%)	6 (11.7%)	19 (14.1%)	16 (9.4%)
	\$93 000 to \$132 999	40 (25.3%)	11 (21.6%)	34 (25.2%)	28 (16.4%)
	\$133 000 to \$264 999	73 (46.2%)	20 (39.2%)	70 (51.9%)	93 (54.4 %)
	\$265 000 and above	10 (6.3%)	3 (5.9%)	5 (3.7%)	14 (8.2 %)
Child gender	Boy	74 (45.4 %)	33 (61.1 %)	66 (47.5%)	94 (53.1 %)
	Girl	89 (54.6 %)	21 (38.9 %)	73 (52.5 %)	83 (46.9%)
Child race (select all that apply)	White/ Caucasian	110 (56.4)	120 (53.3%)	99 (56.6%)	131 (55.5%)
	Aboriginal/ First Nations/ Métis/ Inuit	3 (1.5%)	3 (1.3%)	2 (1.1%)	2 (.8%)
	Asian (combined)	26 (13.3%)	33 (14.7%)	27 (15.4%)	33 (14.0%)
	Black	9 (4.6%)	8 (3.6%)	5 (2.9%)	7 (3.0%)
	Latin American	3 (1.5%)	6 (2.7%)	5 (2.9%)	7 (3.0%)
	Arab	12 (6.2%)	14 (6.2%)	4 (2.3%)	14 (5.9%)
	Other	6 (3.1%)	8 (3.6%)	6 (3.4%)	9 (3.8%)
Mental Health Diagnoses	ADHD	1 (.5%)	2 (.9%)	1 (.5%)	2 (1.0%)
	ODD	1 (.5%)	1 (.5%)	1 (.5 %)	1 (.5%)
	Autism Spectrum Disorder	2 (.9%)	3 (1.4%)	4 (2.0%)	5 (2.5%)
	Anxiety	1 (.5%)	1 (.5%)	1 (.5%)	1 (.5%)

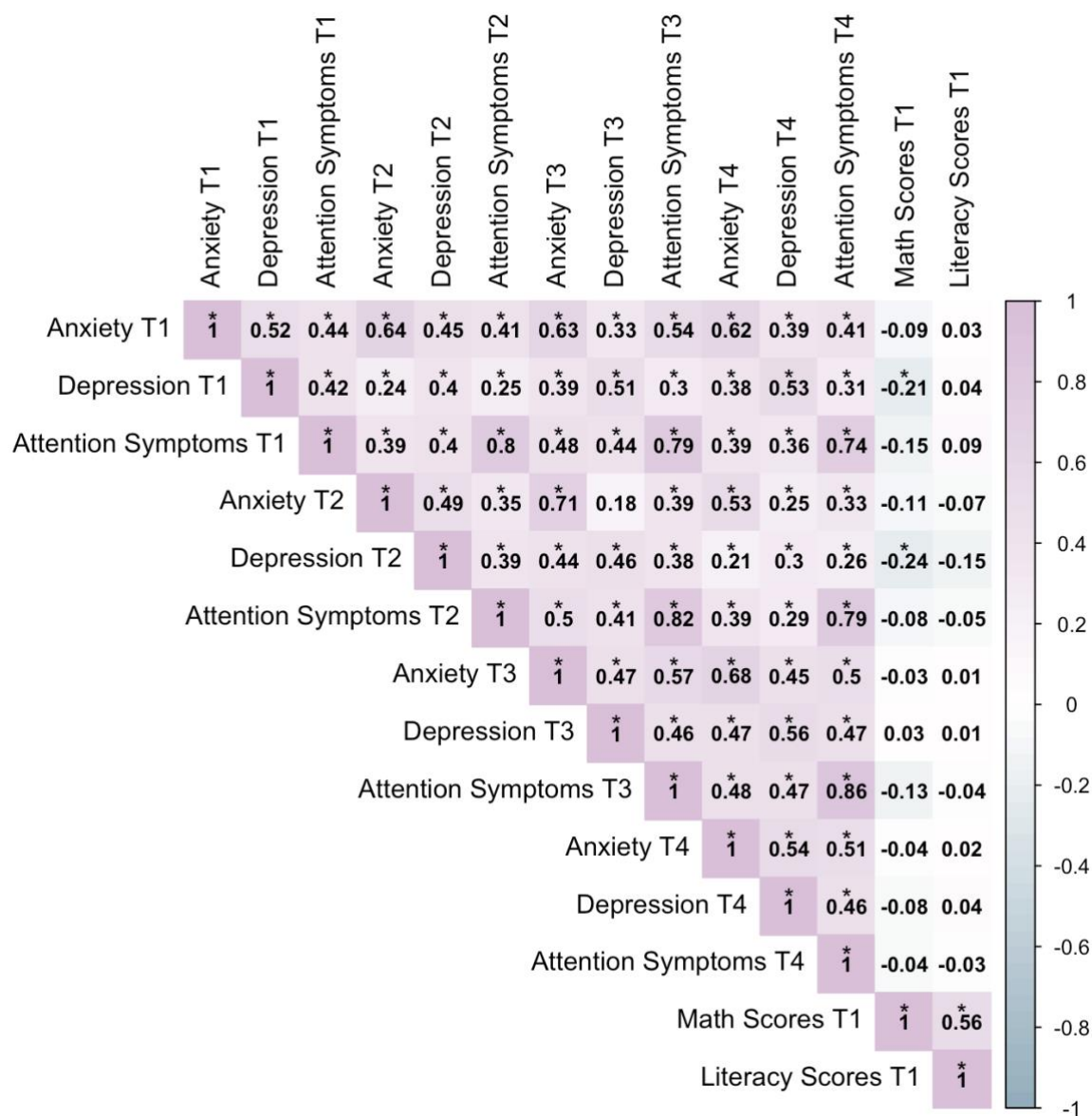
Note: Valid percentages reported. Percentages may not total 100% due to rounding. The "Asian (combined)" category includes South Asian, Chinese, Filipino, Southeast Asian, and West Asian responses.

Table 2*Descriptives of Key Variables*

<i>Variable name</i>	<i>Fall 2019</i>		<i>Spring 2020</i>		<i>Fall 2020</i>		<i>Spring 2021</i>	
	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>
Global Anxiety (mean)	147	.37(.36)	153	.37(.45)	133	.37(.33)	170	.41(.40)
Global Depression (mean)	147	.12(.24)	153	.13(.25)	133	.13(.26)	170	.19(.33)
ADHD-5 Rating Scale (mean)	142	0.64(.53)	157	.74(.53)	126	.73(.54)	171	.79(.55)
KTEA - Literacy (standard score)	201	100.1(14.4)	--	--	--	--	--	--
KTEA - Numeracy (standard score)	202	103.4(15.4)	--	--	--	--	--	--

Results

Bivariate correlations are presented in Figure 2. Anxiety and depression at all time points were positively and significantly associated with all attention and outcome variables except for depression at Time 3 and anxiety at Time 2. Depression at Time 1 and Time 2 had a weak significant negative association with math scores. Associations with mental health outcome varied by Time 1 predictor (value of r ranged from $-.24$ to $.57$). Overall, as expected there are strong correlations between most outcome variables and the measure of attention. Notably, the outcome variables tend to have weaker and mostly non-significant correlations with the academic measures (math and literacy scores).

Figure 2*Bivariate correlations of model variables** Significant ($p < .05$)**Data Analysis**

To track the change in anxiety and depression across the four timepoints, we ran unconditional Linear Growth Curve Models (LGCM). LGCM's are specified as a type of structural regression that represents both fixed and random effects in the trajectories over time. LGCM allows for estimation of

how individuals change over time whilst evaluating rate of change (slope) to identify specific patterns of change (Curran et al., 2010). The unconditional model first assesses intra-individual differences in the growth curve of anxiety or depression symptoms over the four time points (within-person model) of the pandemic lockdown changes without any covariates. This is a basic change model with latent growth factors that represent initial levels or slopes for subsequent change. Next, we specified the conditional LGCMs by adding attention symptoms as a time-variant covariate regressed at each time point, and academic scores (literacy and numeracy) as a time-invariant covariate on the intercept and slope only, as academic scores were only available in the fall of 2019. The conditional model allows us to test whether the covariates explain the variation in the parameters between individuals by adding the variables (academic and attention factors) and determine how they predict growth trajectories.

Given the relatively small sample size, it was important to ensure the LGCMs were possible. While previous research has fitted smaller sample sizes, samples around 100 are typically the standard recommendation (Curran et al., 2010). In the current sample, Full Information Maximum Likelihood (FIML) was used to handle missing data because it allows for the use of all available data, providing unbiased and efficient parameter estimates while minimizing the loss of statistical power, when data are missing at random (Peugh & Enders, 2004).

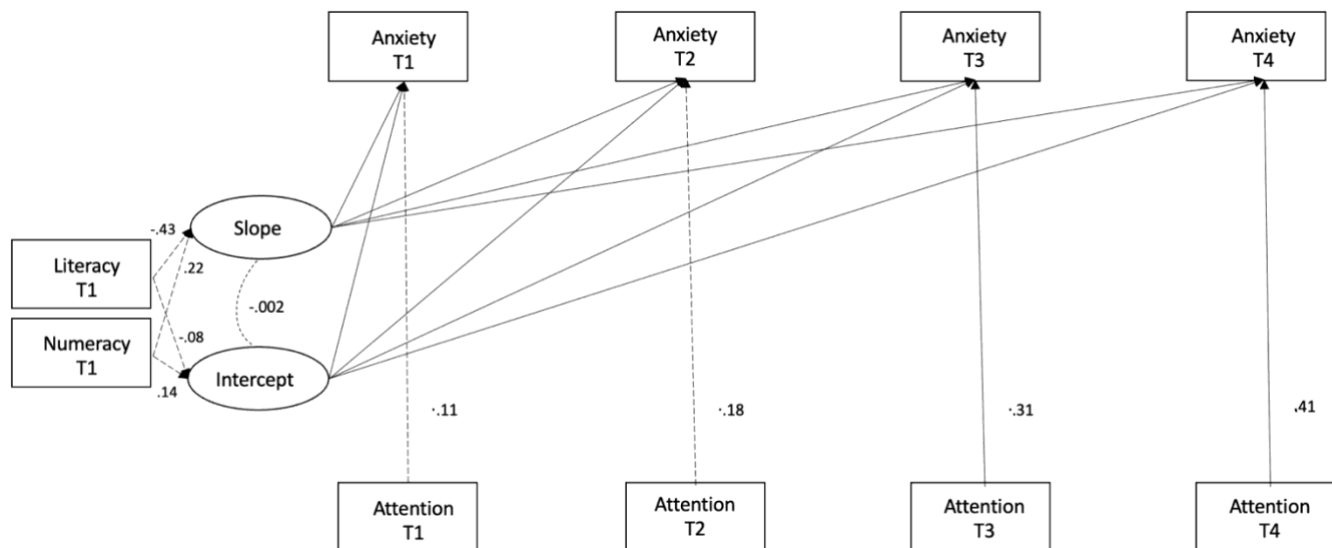
LGCM for Anxiety

The unconditional LGCM for anxiety (no covariates) had a nonsignificant intercept and a nonsignificant slope. This indicates that at Time 1, the participants had similar levels of anxiety and no significant change in anxiety across time. The covariance between the intercept and slope (describing the relationship between the starting point and the rate of change) was insignificant, suggesting that initial levels of anxiety did not influence rate of change in anxiety (Table 3). The conditional LGCM for anxiety which included the attention variables at all time points and the initial academic scores, fit the

data reasonably well. The cutoffs used to evaluate model fit were $CFI \geq 0.95$, $RMSEA \leq 0.06$, and $SRMR \leq 0.08$. (Hu & Bentler, 2019; Table 3, Figure 4). Again, at Time 1 there was a nonsignificant intercept which indicates no significant difference in anxiety and an insignificant slope indicates a nonsignificant change over time. When including the covariates in the model, again there is no identified change in anxiety from before the pandemic, across the first lockdown (Spring 2020), return to school (Fall 2020) and the second major lockdown (Spring 2021). The covariance between the intercept and slope (describing the relationship between the starting point and the rate of change) was insignificant, suggesting that initial levels of anxiety do not influence rate of change in anxiety. Neither baseline scores were significantly associated with the intercept and slope, suggesting that those with higher baseline academic performance did not experience higher or lower initial anxiety, nor steeper or weaker change in anxiety compared to those with lower scores. However, interestingly, both Time 3 and 4 (Fall 2020, Summer 2021), attention symptoms predicted increased anxiety (Time 3: $b = .31$, $p = .03$; Time 4: $b = .41$, $p = .02$).

Figure 3

Conditional latent growth curve model for anxiety measured at four time points (T1–T4)



Note. The model includes one time-variant covariate (attention symptoms) and one time-invariant covariate (baseline academic scores). The estimates are standardised coefficients; solid lines represent significant paths, and dashed lines indicate non-significant paths. Means, variances, and errors are omitted from this figure. Rectangles represent measured variables. Ovals represent latent intercepts and slopes. Factor loadings for slopes were fixed to 0, 1, 2, 3 to represent linear growth.

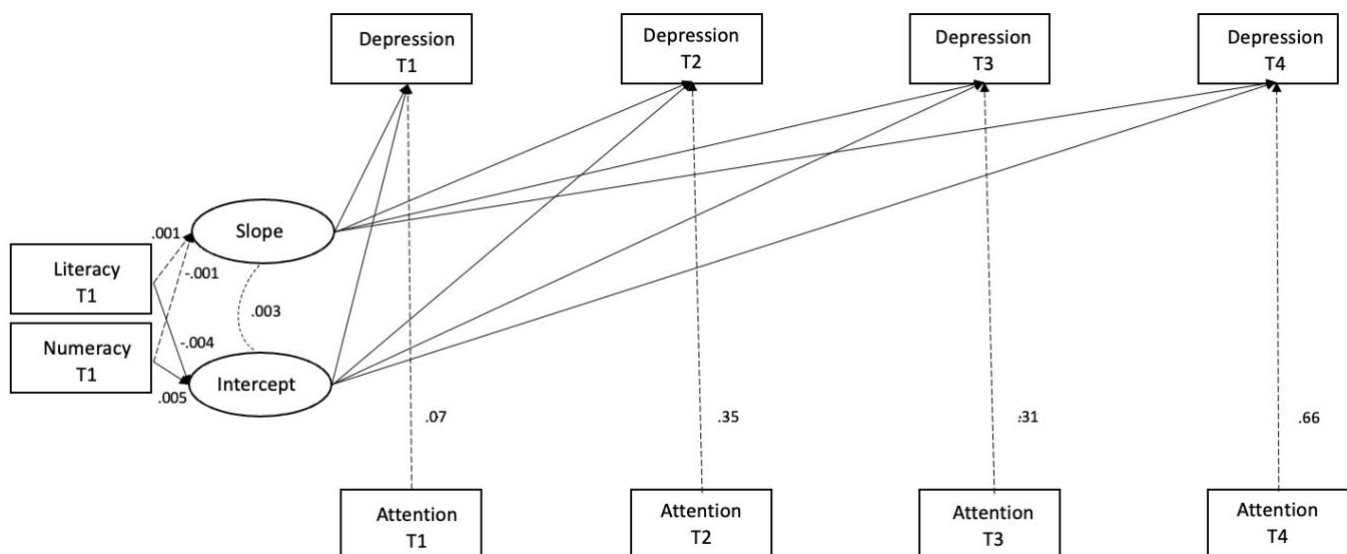
LGCM for Depression

The unconditional LGCM for depression showed that in the Fall of 2019, a significant intercept indicated a significant difference in depression and a significant slope indicated a significant change over time (Table 3). The resulting covariance between the intercept and slope, which describes the relationship between the starting point and the rate of change, was again insignificant, suggesting that initial levels of depression do not influence rate of change in depression. The conditional LGCM for depression fit again fit the data reasonably well based on the commonly accepted cutoffs for Structural Equation Modeling (Hu & Bentler, 2019; Table 4, Figure 4) and showed that at Time 1, a nonsignificant intercept indicated no significant difference in depression and a non significant slope indicates a nonsignificant change over time. The covariance between the intercept and slope (describing the

relationship between the starting point and the rate of change) was insignificant, suggesting that initial levels of depression do not influence rate of change in depression. Baseline numeracy and literacy scores were significantly, but weakly associated with the intercept of depression, though in opposite directions. More specifically, these results indicate that the children who had higher numeracy scores in the Fall of 2019 tended to also have higher baseline depression scores ($b = .005, p = .03$) and those who had higher literacy scores tended to have lower depression scores ($b = -.004, p = .03$). However, the relatively small *beta coefficients*, suggest that the significance is likely near negligible in strength practically suggesting caution on the interpretability of this finding. Neither of the baseline scores were significantly associated with the slope, suggesting that those with higher baseline academic performance did not experience steeper or weaker change in depression compared to those with lower scores. Attention symptoms did not predict depression at any of the four time points.

Figure 4

Conditional latent growth curve model for depression measured at four time points (T1–T4)



Note. The model includes one time-variant covariate (attention symptoms) and one time-invariant covariate (baseline academic scores). The estimates are standardised coefficients; solid lines represent significant paths and dashed lines indicate non-significant paths. Means, variances, and errors are omitted from this figure. Rectangles represent measured variables. Ovals represent latent intercepts and slopes. Factor loadings for slopes were fixed to 0, 1, 2, 3 to represent linear growth.

Table 3

Unconditional latent growth curve model parameters and fit indices of anxiety and depression over four time points.

	Intercept			Slope		Model fit		
	<i>M</i>	<i>Var</i>	<i>R</i> (intercept x slope)	<i>M</i>	<i>Var</i>	CFI	RMSEA	SRMR
Anxiety – T4	.36	.02	.00	.01	.02	.97	.06	.04
Depression – T4	.12	.02	.004	.02	.008	.96	.05	.06

Note. Var = variance; CFI = comparative fix index; RMSEA = root-mean-square error of approximation; SRMR = standardised root-mean-square residual. * $p < .05$.

Table 4

Conditional latent growth curve model parameters and fit indices of anxiety and depression over four time points.

	Intercept			Slope		Model fit		
	<i>M</i>	<i>Var</i>	<i>R</i> (intercept x slope)	<i>M</i>	<i>Var</i>	CFI	RMSEA	SRMR
Anxiety – T4	-.07	.34	-.002	.11	.11	.97	.09	.03
Depression – T4	-.15	.20	.003	-.03	.07	.94	.08	.05

Note. Var = variance; CFI = comparative fix index; RMSEA = root-mean-square error of approximation; SRMR = standardised root-mean-square residual. * $p < .05$.

Discussion

The goal of the current study was to evaluate the change in anxiety and depressive symptoms in a sample of young students starting before the pandemic through the first two years of the pandemic while considering academic and attentional difficulties as potential risk factors for exacerbated internalizing symptoms. Results suggested relatively stable levels of anxiety and depression symptoms across all four time points, with only a slight increase over time. Contrary to the hypothesis, the increase was non-significant for both the anxiety and depression conditional linear growth curve models. These

results suggest that, although the pandemic's restrictions significantly impacted the schooling and daily routine of this young cohort of students, there do not appear to be clinical elevations in symptoms of anxiety and depression. Broad meta-analyses have suggested that younger students may be less vulnerable to the effects of the pandemic (Deng et al., 2022; Racine et al., 2021), as academic demands are fewer and there may be less of an understanding of the implications of the pandemic.

Regarding the identified covariates, pre-pandemic literacy and numeracy levels did not meaningfully contribute to higher rates of anxiety or depression across any of the time points. Contrary to our hypothesis, children who were initially identified as struggling academically did not experience an increased likelihood of mental health symptoms during the pandemic. Attention symptoms, however, were associated with increased anxiety symptoms in the later stages of the pandemic (Fall 2020 and Spring 2021). The changing trajectory of mental health symptoms for children with attention disorders in the later stages of the pandemic builds on existing literature that suggests that the effects of the pandemic may be cumulative. The constant disruption in routine (school closures, disruption of afterschool programming and extracurricular activities) combined with disruptions within the home environment (parents working from home) may render children with attention difficulties more vulnerable to mental health symptoms. However, in typical development outside the pandemic, early child development research has found that externalizing symptoms (commonly associated with attention deficits), tends to decrease in early childhood (ages 2 to 6 years) while internalizing symptoms increase (Gilliom & Shaw, 2004).

Previous research supports the importance of routines for children with formal ADHD diagnoses in helping prevent both internalizing and externalizing symptoms after controlling for age, gender, and parental adjustment (Haris et al., 2014). Previous studies also demonstrate that children with ADHD were more likely to have difficulty with remote learning and were less prepared for the next school year

(Rosenthal., et al., 2022). The current study's results suggest that the later stages of the pandemic (Spring 2021- with return to school, subsequent lockdowns) were when anxiety symptoms were highest, coinciding with online learning and the new school year. However, the difference was non-significant with earlier time points.

Unlike previous studies which examined ADHD from a clinical diagnosis perspective, the current study examined attention symptoms on a spectrum, not excluding children who do not meet diagnostic criteria for the diagnosis. Children with higher attention symptoms that may not meet the criteria for a clinical diagnosis appear to still be at risk of increased attention symptoms throughout the pandemic.

Limitations

While there are many strengths to the current study, including the longitudinal design and relatively high participant retention, there are a few limitations to consider. First, the limited availability of in-person academic testing throughout the pandemic significantly limits the ability to fully understand the relationship between academics and internalizing symptoms during the pandemic. Research suggests that the pandemic substantially impacted learning, resulting in a significant learning deficit (Pietro et al., 2023). However, the specific impacts of the pandemic on students' learning not being measured in the current study, likely limits our understanding of the connection between academic challenges during the pandemic and internalizing symptoms.

The second limitation is the lack of diversity within the current sample. While the study sought a representative sample from schools across multiple regions, the pandemic disrupted many initial strategies to reduce barriers (use of a translator and paper copies). Further, there was much lower uptake from families with lower incomes and less education, limiting the ability to analyze the impact of socioeconomic status within the model. Also, revisions to the survey were limited by pandemic

shutdowns within the school board; there was no ability to ask specific restriction-based questions to the sample (i.e., current level of restrictions, individual school closures).

Finally, while the study sought to incorporate multiple sources of information (teacher, student, and parent reports), the pandemic-related restrictions led to the reliance on parent-only ratings. Having multiple raters across diverse settings (school, home, and self-report) would help improve the validity of the ratings and likely support a more accurate measure of children's anxiety, depression, and attention symptoms.

Future Directions and Next Steps

The following steps for research include continuing to track the longitudinal trajectories of the youngest students in conjunction with their attention symptoms and academic achievement. There appears to be a cumulative effect over time, suggesting that the long-term impacts may be more prominent as time progresses (Benner & Mistry, 2020). Where possible, a representative sample that focuses on understanding the impact on children from various backgrounds and pandemic experiences will help us better understand who is at the highest risk for long-term difficulties.

Clinically, for children with more symptoms of inattention, hyperactivity and impulsivity, there are higher rates of anxiety during the later stages of the pandemic. Moving forward, these children would likely benefit from structured and consistent routines at home and school that provide predictability daily or weekly (McRae et al., 2020). Routines support the child's wellbeing and that of parents and overall family adjustment. As all family members were impacted by the pandemic, supporting the most vulnerable students and their families will be essential.

Conclusions

Overall, this study demonstrated that kindergarten children did not experience significant increases in symptoms of depression or anxiety during the pandemic. However, findings suggest that

children with higher attention symptoms were more likely to experience higher anxiety throughout the later stages of the pandemic. Previous research suggests that children with higher attention difficulties may be more susceptible to anxiety symptoms as a result of the changes in routine and their greater difficulty adapting to online schooling. As these children were the youngest school-aged children to experience the pandemic's disruptions, it is essential that research continue to track their trajectories over time and seek to understand the full effects of the pandemic on their mental wellbeing. Despite the relatively low rates of increase, these children will likely continue to benefit from further emotional and academic support as they continue throughout their academic trajectories.

References

- Adegboye, D., Williams, F., Collishaw, S., Shelton, K., Langley, K., Hobson, C., ... & van Goozen, S. (2021). Understanding why the COVID-19 pandemic-related lockdown increases mental health difficulties in vulnerable young children. *JCPP advances*, 1(1), e12005.
- Agnafors, S., Barnmark, M., & Sydsjö, G. (2021). Mental health and academic performance: a study on selection and causation effects from childhood to early adulthood. *Social psychiatry and psychiatric epidemiology*, 56, 857-866.
- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). American Psychiatric Association Publishing.
- Ashford, J., Smit, F., van Lier, P. A., Cuijpers, P., & Koot, H. M. (2008). Early risk indicators of internalizing problems in late childhood: a 9-year longitudinal study. *Journal of child psychology and psychiatry, and allied disciplines*, 49(7), 774–780. <https://doi.org/10.1111/j.1469-7610.2008.01889.x>
- Aurini, J., & Davies, S. (2021). COVID-19 school closures and educational achievement gaps in Canada: Lessons from Ontario summer learning research. *Canadian Review of Sociology*, 58(2). <https://doi.org/10.1111/cars.12334>
- Balázs, J., & Keresztény, A. (2014). Subthreshold attention deficit hyperactivity in children and adolescents: a systematic review. *European child & adolescent psychiatry*, 23(6), 393–408. <https://doi.org/10.1007/s00787-013-0514-7>
- Becker, S. P., Breaux, R., Cusick, C. N., Dvorsky, M. R., Marsh, N. P., Sciberras, E., & Langberg, J. M. (2020). Remote learning during COVID-19: Examining school practices, service continuation, and difficulties for adolescents with and without attention-deficit/hyperactivity disorder. *Journal of Adolescent Health*, 67(6), 769-777

- Becker, S. P., Langberg, J. M., Evans, S. W., Girio-Herrera, E., & Vaughn, A. J. (2015). Differentiating anxiety and depression in relation to the social functioning of young adolescents with ADHD. *Journal of Clinical Child & Adolescent Psychology*, 44(6), 1015-1029.
- Benner, A. D., Wang, Y., Shen, Y., Boyle, A. E., Polk, R., & Cheng, Y. P. (2018). Racial/ethnic discrimination and well-being during adolescence: A meta-analytic review. *American psychologist*, 73(7), 855.
- Betthäuser, B. A., Bach-Mortensen, A. M., & Engzell, P. (2023). A systematic review and meta-analysis of the evidence on learning during the COVID-19 pandemic. *Nature human behaviour*, 7(3), 375-385.
- Bobo, E., Lin, L., Acquaviva, E., Caci, H., Franc, N., Gamon, L., ... & Purper-Ouakil, D. (2020). How do children and adolescents with Attention Deficit Hyperactivity Disorder (ADHD) experience lockdown during the COVID-19 outbreak?. *L'encephale*, 46(3S), S85-S92
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, 53. <https://doi.org/10.1146/annurev.psych.53.100901.135233>
- Bubier, J. L., & Drabick, D. A. G. (2009). Co-occurring anxiety and disruptive behavior disorders: The roles of anxious symptoms, reactive aggression, and shared risk processes. *Clinical Psychology Review*, 29(7), 658-669. <https://doi.org/10.1016/j.cpr.2009.08.005>
- Buchanan, D., Hargreaves, E., & Quick, L. (2022). Schools closed during the pandemic: revelations about the well-being of 'lower-attaining' primary-school children. *Education 3-13*, 51(7), 1077–1090. <https://doi.org/10.1080/03004279.2022.2043405>
- Canadian Teachers' Federation. (2020). *Mental health*. Canadian Teachers' Federation. <https://www.ctf-fce.ca/tag/mental-health/>

- Catroppa, C., Morrison, E., Ryan, N. P., Khan, N., Botchway-Commey, E. N., Moe, S., ... & Sood, N. T. (2023). Characterising the Educational Experiences and Mental Health of Children with Pre-Existing Learning Difficulty or Specific Learning Disorder (SLD) during the COVID-19 Pandemic. *COVID*, 3(9), 1233-1243.
- Cameron, D., Zheng, S., Archer, B., Chiau, G., Huang, P., & Tam, G. (2021). *Preliminary findings on the impact to learning due to the pandemic*. Toronto District School Board.
- Curran, P. J., Obeidat, K., & Losardo, D. (2010). Twelve Frequently Asked Questions About Growth Curve Modeling. *Journal of cognition and development : official journal of the Cognitive Development Society*, 11(2), 121–136. <https://doi.org/10.1080/15248371003699969>
- Davoody, S., Goeschl, S., Dolatshahi, M., Davari-Ashtiani, R., Saffarpour, R., Sodeifian, F., & Brand, S. (2022). Relation between ADHD and COVID-19: A Narrative Review to Guide Advancing Clinical Research and Therapy. *Iranian journal of psychiatry*, 17(1), 110–117. <https://doi.org/10.18502/ijps.v17i1.8055>
- Deng, J., Zhou, F., Hou, W., Heybati, K., Lohit, S., Abbas, U., ... & Heybati, S. (2023). Prevalence of mental health symptoms in children and adolescents during the COVID-19 pandemic: A meta-analysis. *Annals of the New York Academy of Sciences*, 1520(1), 53-73.
- Drechsler, R., Brem, S., Brandeis, D., Grünblatt, E., Berger, G., & Walitza, S. (2020). ADHD: Current Concepts and Treatments in Children and Adolescents. *Neuropediatrics*, 51(5), 315–335. <https://doi.org/10.1055/s-0040-1701658>
- 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, 1134-1146.

- Duncan, M. J., Patte, K. A., & Leatherdale, S. T. (2021). Mental health associations with academic performance and education behaviors in Canadian secondary school students. *Canadian Journal of School Psychology, 36*(4), 335-357.
- Erden, S., & Uzun, N. (2023). Children with ADHD were affected in terms of mental health and quality of life during the COVID-19 pandemic. *Journal of Medicine and Palliative Care, 4*(1), 1-6.
- Essex, M. J., Kraemer, H. C., Armstrong, J. M., Boyce, W. T., Goldsmith, H. H., Klein, M. H., Woodward, H., & Kupfer, D. J. (2006). Exploring risk factors for the emergence of children's mental health problems. *Archives of general psychiatry, 63*(11), 1246–1256.
<https://doi.org/10.1001/archpsyc.63.11.1246>
- FitzGerald, C., MacCormack, J., & Sider, S. (2023). Perspectives of school leaders on supporting learners with special education needs during the COVID-19 pandemic: an ethic of care analysis. *Journal of School Leadership, 33*(4), 409-427.
- Foti, P. (2020). Research in distance learning in Greek kindergarten schools during the pandemic of COVID-19: Possibilities, dilemmas, limitations. *European Journal of Open Education and E-learning Studies, 5*(1).
- Gair, S. L., Brown, H. R., Kang, S., Grabell, A. S., & Harvey, E. A. (2021). Early Development of Comorbidity Between Symptoms of ADHD and Anxiety. *Research on child and adolescent psychopathology, 49*(3), 311–323. <https://doi.org/10.1007/s10802-020-00724-6>
- Government of Ontario. (2020). Policy/Program Memorandum 164: Requirements for Remote Learning.
<https://www.ontario.ca/document/education-ontario-policy-and-program-direction/policyprogram-memorandum-164>

- Guller, B., Yaylaci, F., & Eyuboglu, D. (2022). Those in the shadow of the pandemic: impacts of the COVID-19 outbreak on the mental health of children with neurodevelopmental disorders and their parents. *International Journal of Developmental Disabilities*, 68(6), 943-955.
- Gustafsson M. (2021). Pandemic-related disruptions to schooling and impacts on learning proficiency indicators: A focus on the early grades. *UNESCO Institute for Statistics*. Retrieved from uis.unesco.org/sites/default/files/documents/covid-19_interruptions_to_learning_-_final.pdf
- Harris, A. N., Stoppelbein, L., Greening, L., Becker, S. P., Luebbe, A., & Fite, P. (2014). Child routines and parental adjustment as correlates of internalizing and externalizing symptoms in children diagnosed with ADHD. *Child Psychiatry & Human Development*, 45, 243-253
- Hofstra, M. B., Van Der Ende, J. A. N., & Verhulst, F. C. (2002). Child and adolescent problems predict DSM-IV disorders in adulthood: a 14-year follow-up of a Dutch epidemiological sample. *Journal of the American Academy of Child & Adolescent Psychiatry*, 41(2), 182-189.
- Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., et al. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *The Lancet Psychiatry*, 7(6), 547–560. <https://www.ctf-fce.ca/all-is-not-well-in-education/>
- Hristova, B. (2020, November 25). HWDSB social worker calls to check on students more than doubled in October. *CBC News*. <https://www.cbc.ca/news/canada/hamilton/hwdsb-social-workers-student-engagement-1.5815922>
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Ibilola O, & Silva D. (2017). The medical and mental health comorbidities of children with adhd in a

sibling control design study. *Journal of Paediatrics and Child Health*, 53.

<https://doi.org/10.1111/jpc.13596> 2

- Jackson, A., Melvin, G. A., Mulraney, M., Becker, S. P., Bellgrove, M. A., Quach, J., ... & Sciberras, E. (2023). Associations between anxiety and home learning difficulties in children and adolescents with ADHD during the COVID-19 pandemic. *Child Psychiatry & Human Development*, 54(5), 1347-1359.
- Korpa, T., Pappa, T., Chouliaras, G., Sfinari, A., Eleftheriades, A., Katsounas, M., Kanaka-Gantenbein, C., & Pervanidou, P. (2021). Daily Behaviors, Worries and Emotions in Children and Adolescents with ADHD and Learning Difficulties during the COVID-19 Pandemic. *Children (Basel, Switzerland)*, 8(11), 995. <https://doi.org/10.3390/children8110995>
- Kruszewska, A., Nazaruk, S., & Szewczyk, K. (2022). Polish teachers of early education in the face of distance learning during the COVID-19 pandemic—the difficulties experienced and suggestions for the future. *Education 3-13*, 50(3), 304-315.
- Kurz, D., Braig, S., Genuneit, J., & Rothenbacher, D. (2022). Lifestyle changes, mental health, and health-related quality of life in children aged 6–7 years before and during the COVID-19 pandemic in South Germany. *Child and adolescent psychiatry and mental health*, 16(1), 20.
- Lavigne, J. V., Cromley, T., Sprafkin, J., & Gadow, K. D. (2009). The Child and Adolescent Symptom Inventory-Progress Monitor: a brief Diagnostic and Statistical Manual of Mental Disorders, -referenced parent-report scale for children and adolescents. *Journal of child and adolescent psychopharmacology*, 19(3), 241-252.
- Molnár, G., & Hermann, Z. (2023). Short-and long-term effects of COVID-related kindergarten and school closures on first-to eighth-grade students' school readiness skills and mathematics, reading and science learning. *Learning and Instruction*, 83, 101706.

Norén Selinus, E., Molero, Y., Lichtenstein, P., Anckarsäter, H., Lundström, S., Bottai, M., & Hellner

Gumpert, C. (2016). Subthreshold and threshold attention deficit hyperactivity disorder symptoms in childhood: psychosocial outcomes in adolescence in boys and girls. *Acta Psychiatrica Scandinavica*, 134(6), 533-545.

Ontario Ministry of Education. (2016). *The kindergarten program*. Queen's Printer for Ontario.

https://files.ontario.ca/books/edu_the_kindergarten_program_english_aoda_web_oct7.pdf

Public Health Agency of Canada. (2021, August 17). *COVID-19 vaccination: The 2021-2022 school year and public health measures*. Government of Canada. [https://www.canada.ca/en/public-](https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/planning-2021-2022-school-year-vaccination.html)

[health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/planning-2021-2022-school-year-vaccination.html](https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/planning-2021-2022-school-year-vaccination.html)

Peugh, J. L., & Enders, C. K. (2004). Missing Data in Educational Research: A Review of Reporting Practices and Suggestions for Improvement. *Review of Educational Research*, 74(4), 525-556.

<https://doi.org/10.3102/00346543074004525>

Racine, N., McArthur, B. A., Cooke, J. E., Eirich, R., Zhu, J., & Madigan, S. (2021). Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: a meta-analysis. *JAMA pediatrics*, 175(11), 1142-1150.

Reiss, F. (2013). Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. In *Social Science and Medicine* (Vol. 90).

<https://doi.org/10.1016/j.socscimed.2013.04.026>

Rogers, M. A., & MacLean, J. (2023). ADHD symptoms increased during the Covid-19 pandemic: a Meta-analysis. *Journal of attention disorders*, 27(8), 800-811.

- Sarid, M., & Lipka, O. (2023). Students with learning disabilities/attention-deficit/hyperactivity disorder in higher education dealing with remote learning: lessons learned from COVID-19 era. *Frontiers in Psychology, 14*, 1172771.
- Sjöwall, D., Backman, A., & Thorell, L. B. (2015). Neuropsychological heterogeneity in preschool ADHD: Investigating the interplay between cognitive, affective and motivation-based forms of regulation. *Journal of abnormal child psychology, 43*, 669-680.
- Schmidt, S. J., Barblan, L. P., Lory, I., & Landolt, M. A. (2021). Age-related effects of the COVID-19 pandemic on mental health of children and adolescents. *European Journal of Psychotraumatology, 12*(1). <https://doi.org/10.1080/20008198.2021.1901407>
- Stites, M. L., Sonneschein, S., & Galczyk, S. H. (2021). Preschool parents' views of distance learning during COVID-19. *Early Education and Development, 32*(7), 923-939
- Tobia, V., Greco, A., Steca, P., & Marzocchi, G. M. (2019). Children's wellbeing at school: A multi-dimensional and multi-informant approach. *Journal of Happiness Studies, 20*, 841-861
- Tremmel, P., Myers, R., Brunow, D. A., & Hott, B. L. (2020). Educating students with disabilities during the COVID-19 pandemic: Lessons learned from Commerce Independent School District. *Rural Special Education Quarterly, 39*(4), 201-210.
- Tung, I., Li, J. J., Meza, J. I., Jezior, K. L., Kianmahd, J. S. V., Hentschel, P. G., O'Neil, P. M., & Lee, S. S. (2016). Patterns of comorbidity among girls with ADHD: A meta-analysis. *Pediatrics, 4*. <https://doi.org/10.1542/peds.2016-0430>
- Vaillancourt, T., McDougall, P., Comeau, J., & Finn, C. (2021). COVID-19 school closures and social isolation in children and youth: Prioritizing relationships in education. *Facets, 6*(1), 1795-1813.

- von Salisch, M., Denham, S. A., & Koch, T. (2017). Emotion knowledge and attention problems in young children: A cross-lagged panel study on the direction of effects. *Journal of Abnormal Child Psychology*, 45(1), 45–56. <https://doi.org/10.1007/s10802-016-0157-5>
- 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.
- Whitley, J., Beauchamp, M. H., & Brown, C. (2021). The impact of COVID-19 on the learning and achievement of vulnerable Canadian children and youth. *Facets*, 6(1), 1693-1713.
- Wilson, A. M., Deri Armstrong, C., Furrie, A., & Walcot, E. (2009). The mental health of Canadians with self-reported learning disabilities. *Journal of Learning Disabilities*, 42(1), 24-40.
- Ye, J. (2020). Pediatric mental and behavioral health in the period of quarantine and social distancing with COVID-19. *JMIR pediatrics and parenting*, 3(2), e19867.
- 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. *American psychologist*, 67(4), 272.

Appendix A

Parent Information

1. What is your relationship to child?

Biological Mother	Biological Father	Step-mother	Step-father	Adoptive Mother
Adoptive Father	Foster Mother	Foster Father	Parent's Partner (living in household)	Other Adult (Please Specify)

2. Are you an Aboriginal person, that is, First Nations, Métis or Inuit? Note: First Nations (status and non-status). If “Yes”, mark the circle(s) that best describe(s) yourself now?

No, not an Aboriginal person	Yes, First Nations	Yes, Métis	Yes, Inuit
------------------------------	--------------------	------------	------------

3. Are you: (select as many as possible)

Caucasian/White	Chinese
South Asian (e.g., East Indian, Pakistani, Sri Lankan etc.)	
Black	Filipino
Latin American	Southeast Asian (e.g., Vietnamese, Cambodian, Laotian, Thai, etc.)
Arab	Korean
West Asian (e.g., Iranian, Afghan, etc.)	Other (please specify): _____
Japanese	Multi-racial: (please specify): _____

4. What is your age? _____

5. What is your gender?

Male	Female	Other (please specify)
------	--------	------------------------

6. What is your level of education? (please check the highest completed):

☐ Less than high school
 ☐ High school or GED

- ☐ Some college, 2-year college or vocational
- ☐ Bachelor's degree
- ☐ Some graduate work
- ☐ Master's degree
- ☐ Doctoral degree

7. On average, how many hours per week do you work?

- ☐ 0-5
- ☐ 6-20
- ☐ 21-40
- ☐ 40 or more

8. Number of adults in the home who care for children (including you): _____

9. What is your marital status?

- ☐ Single, never married
- ☐ Separated
- ☐ Divorced
- ☐ Married
- ☐ Living together as if married
- ☐ Widowed

9. Spouse/Partner's relationship to child:

- | | | | | |
|-------------------|-------------------|---------------|--|------------------------------|
| Biological Mother | Biological Father | Step-mother | Step-father | Adoptive Mother |
| Adoptive Father | Foster Mother | Foster Father | Parent's Partner (living in household) | Other Adult (Please Specify) |

9. Your spouse/partner's level of education (please check the highest completed):

- ☐ Less than high school
- ☐ High school or GED
- ☐ Some college, 2-year college or vocational
- ☐ Bachelor's degree
- ☐ Some graduate work
- ☐ Master's degree
- ☐ Doctoral degree

10. On average, how many hours per week does your spouse/partner work?

- ☐ 0-5
- ☐ 6-20
- ☐ 21-40
- ☐ 40 or more

11. What is your primary language spoken in your home?

- ☐ English
- ☐ Spanish
- ☐ French
- ☐ Vietnamese
- ☐ Chinese
- ☐ Korean
- ☐ Russian
- ☐ Other (please specify): _____

12. Family income per year (check one):

\$6,999 or less
 \$7,000 to \$12,999
 \$13,000 to \$19,999
 \$20,000 to \$26,999
 \$27,000 to \$32,999
 \$33,000 to \$39,999
 \$40,000 to \$52,999
 \$53,000 to \$65,999
 \$66,000 to \$79,999
 \$80,000 to \$92,999
 \$93,000 to \$105,999
 \$106,000 to \$118,999
 \$119,000 to \$132,999
 \$133,000 to \$145,999
 \$146,000 to \$198,999
 \$199,000 to \$264,999
 \$265,000 to \$332,999
 \$331,000 to \$399,999
 Greater than \$400,000

Child Information

13. What is your participating child's name? (i.e., your child in Junior or Senior Kindergarten)
Please include first and last name.

14. What is your participating child's gender?

☐ Male

☐ Female

☐ You don't have an option that applies to my child. My child identifies as:

15. What is your participating child's Date of Birth?: _____ (month / day / year)

16. What is your participating child's age? _____

17. What is your participating child's grade level? _____

18. What is the name of your participating child's school? _____

19. Is your participating child an Aboriginal person, that is, First Nations, Métis or Inuit?

No, not an
Aboriginal
person

Yes, First
Nations

Yes, Métis

Yes, Inuit

20. Is your participating child (select as many as possible)

Caucasian/White

South Asian (e.g., East Indian, Pakistani, Sri Chinese

Lankan etc.)

Black

Filipino

Latin American

Southeast Asian (e.g., Vietnamese, Cambodian, Laotian, Thai, etc.)

Arab

Korean

West Asian (e.g., Iranian, Afghan, etc.)

Other (please specify): _____

Japanese

Multi-racial: (please specify): _____

21. Has your child been diagnosed with a behaviour or mental disorder? (e.g., ADHD, anxiety)? If yes, please specify which disorder(s).

Yes (please specify) No

22. Is your participating child taking any medications for a behaviour or mental disorder?

Yes (please specify) No

**Chapter 3: Vulnerability to internalizing symptoms among Canadian children across the
pandemic era: A life course perspective**

Tessa Ritchie
Dr. Maria Rogers
Dr. Yuanyuan Jiang
Dr. Emma A. Climie
Dr. Janet W.T. Mah
Dr. Penny Corkum
Amanda Krause

Abstract

To manage the spread of the COVID-19 virus, all levels of the Canadian government implemented restrictions in order to protect the physical health of children and their families; however, research suggests that many children consequently experienced increased symptoms of anxiety and depression. The current study used the Life Course Framework to identify and analyze risk factors that may have increased children's and adolescents' vulnerability to mental health problems during and after the pandemic. Parents across Canada completed surveys in the Spring of 2021 ($N=394$) and Fall/Winter of 2022 ($N=163$). Data were analyzed using multiple linear regressions to predict changes in anxiety and depression in separate models. Next, measures of relative importance were used to evaluate the proportion of total effect of risk factor to the overall rates of anxiety and depression in the children and youth. The risk factors in the Spring of 2021 predicted almost 40% of the variance in anxiety over a year later. The same model predicted just under one-third of the variance of the variance in depression at the second time point. Higher baseline mental health symptoms, worse learning behaviours, lower parental income, and higher parental COVID-19 stress were the risk factors that had the highest relative importance within the two models. Implications for future research and interventions are discussed.

Keywords: Pandemic, mental health, risk factors, internalizing symptoms, life course framework

Introduction

In March 2020, the World Health Organization declared a global pandemic due to the highly contagious respiratory disease caused by the SARS-CoV-2 virus, more commonly known as COVID-19 (World Health Organization, 2020). This declaration would mark the beginning of a series of restrictions for children that would impact their day-to-day lives for weeks, months, and ultimately years to come (Cabot & Bushnik, 2022). The restrictions, coupled with increased familial stress from the health and economic effects of the pandemic, prompted many to raise alarms about both the immediate and long-term impacts of COVID-19 on child mental health (Holmes et al., 2020). The most recent research suggests that many children and youth across the world experienced elevated levels of anxiety and depression in comparison to pre-pandemic ratings (Samji et al., 2022; Statistics Canada, 2024; Viner et al., 2022). While the pandemic impacted all children in Canada, not all experienced the increased mental health symptoms described above. The current study sought to explore which specific risk factors may have rendered children and adolescents in Canada more vulnerable to symptoms of anxiety and depression as they transitioned out of the pandemic's restrictions in the Spring of 2021 and back to their “new normal” in the Spring of 2022.

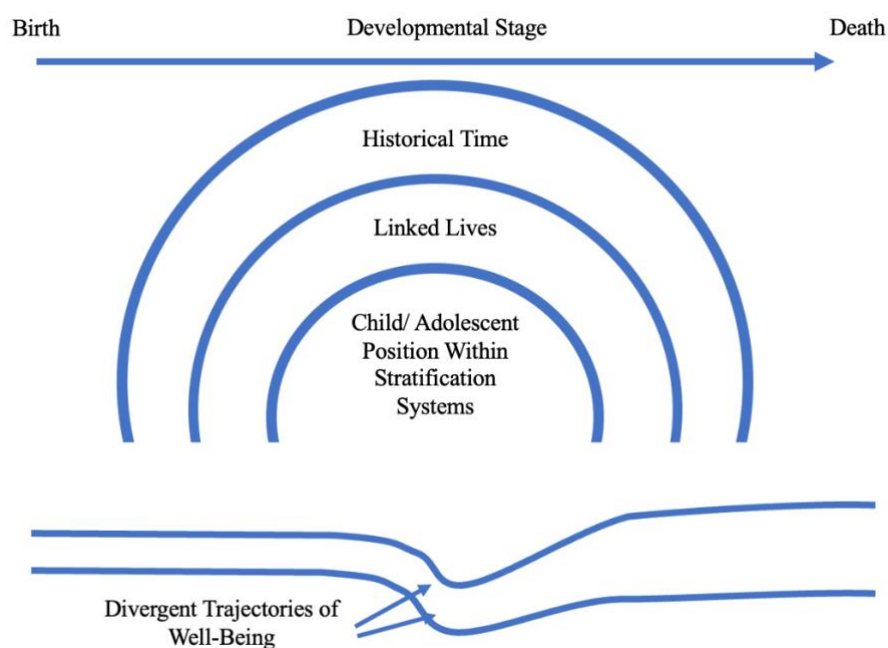
Life Course Framework

The current study drew upon the Life Course Framework to identify and understand risk factors that may have altered the mental health trajectories of children and youth during the COVID-19 pandemic. The Life Course framework outlines how significant, sociohistorical events, such as the COVID-19 pandemic and its subsequent public health restrictions, serve as a transition point which can alter a child's developmental trajectory (Almeida et al., 2009; Benner & Mistry, 2020). Benner and Mistry (Benner & Mistry, 2020) proposed the Life Course framework as a valuable approach for identifying risk factors arising from the pandemic that could significantly impact an individual's overall

wellbeing and life trajectory. The model suggests that to understand the effects on children's development, research must attend to the child's current stage of development. Next, the model accounts for the broader historical context. Within the current study, the broader historical context would encompass the nature of the COVID-19 pandemic environment the child is living in (e.g., the restrictions and the risk of physical illness). Next, the model examines the impact of the children's key interpersonal relationships or linked lives (e.g., parents and teachers). Finally, the model incorporates the child's pre-existing position within the social and economic stratification systems that may contribute to their long-term wellbeing (e.g., academic abilities and race). See Figure 1 for the model.

Figure 1

Categories of Risk Factors for Internalizing Symptoms as Identified Through the Life Course Theory Framework, adapted from Benner and Mistry (2020). Originally Adapted from Elder and Giele (2009).



Benner and Mistry (2020) suggested considering all risk factors within the framework individually and cumulatively to identify children who may be vulnerable over the long-term to mental health problems due to the pandemic. Notably, the Life Course Framework suggests that in addition to short-

term alterations of an individual's wellbeing, there is a cascading effect whereby the short-term consequences affect subsequent transitions, which can further alter a person's wellbeing many years later (Elder, 1998). The long-term effects of childhood mental health problems are currently well understood, with mental health problems in early life related to significant long-term consequences, such as chronic physical health issues, unemployment, and future mental health problems (Daly et al., 2013; Goodwin et al., 2009; Roza et al., 2003). We will employ the Life Course framework to identify and classify the risk factors within the current sample to explore their effect on the mental health trajectories of children and youth.

Developmental Stage

The Life Course framework emphasizes the individual's developmental stage (Benner et al., 2020; Elder, 1998), as seen at the top of Figure 1. For some children, the age and developmental stage they experienced during the pandemic may serve as a protective or a risk factor for the effects of the pandemic. During the “Great Recession” of 2008, researchers examined the trajectories of academics of elementary and middle school students in the United States (Shores et al., 2019). Three years after the recession, academic achievement was significantly lower for older children (upper elementary/middle school) than early elementary students as measured by their academic scores. Results suggested that the subsequent budget cuts greatly impacted the more senior students' academic achievement than the youngest students' (Shores et al., 2019). Many preliminary review studies suggest that adolescents generally may be more vulnerable to the effects of the pandemic compared to younger children, with adolescents experiencing more mental health problems during the pandemic than their younger counterparts (Georgiadia et al., 2022; Ludwig-Walz et al., 2022; Theberath et al., 2022). Further, evidence suggests that girls were disproportionally impacted by the pandemic, with a greater increase in emotional and behavioural difficulties when compared to boys, with more pronounced differences when

compared to prepandemic statistics (Mendolia et al., 2022).

The Sociohistorical Context: The COVID-19 Pandemic

The broadest level of risk identified within the Life Course framework is the unique historical context (see the first arch of Figure 1). The federal government of Canada first advised communities to brace for strict public health measures, including closing schools and workplaces to limit the spread of COVID-19 in February 2020 (Prime Minister of Canada, 2020). Subsequently, schools were closed, and children were either not attending school altogether or attending virtual classes. Access to daycares and afterschool programs were reduced, and children and youth were restricted from in-person interactions with their peers or individuals outside their household (Public Health Agency of Canada, 2021). The pandemic impacted nearly every aspect of children's daily routine in Canada. For the next two years, restrictions waxed and waned with the resurgence of the COVID-19 virus, and children had to adapt rapidly to new circumstances for learning and socializing.

The municipal, provincial, and federal governments created and enforced public health rules. Generally, Canadians were regarded as very compliant with the regulations (Cabot & Bushnik, 2022). However, studies suggest that the level of compliance was also dependent on parents and families (Brankston et al., 2021). The general pattern of closures of schools and public spaces followed the waves of the pandemic, with closures occurring when there were the most significant increases in COVID-19 cases, hospitalizations, and deaths. Notably, Canadian provinces and regions experienced vastly different rates of COVID-19 in their communities and resorted to varying public health restrictions. The available evidence suggests that, while the public health restrictions resulted in few children in Canada becoming severely sick with the virus, school closures, social isolation, and other secondary consequences were associated with significant increases in mental health problems in children and adolescents (Meherali et al., 2021; Robillard et al., 2021).

International research has also found similar relationships between mental health symptoms and public health restrictions. A systematic review of 36 studies across 11 countries examined the impact of the first wave's restrictions on child and adolescent mental health (age 0 to 19 years) and found significant mental health problems associated with school closures and strict social restrictions (Viner et al., 2022). Another meta-analysis found that depression symptoms were higher in over 800,000 individuals when pandemic restrictions were more stringent or when there were school closures (Ludwig-Walz et al., 2022). When identifying risk factors for mental health problems that fit within the broader historical context, that is, within the pandemic, it is crucial to collect information on individuals' experiences with the restrictions and evaluate how public health measures impact wellbeing.

Linked Lives

In the next level of the Life Course Framework (Figure 1), we have linked lives. For children and adolescents, parents and teachers are critical persons in the linked lives domains of the framework. Teachers interacted with students during the pandemic through modified teaching methods, including virtual or distance learning. Magson et al. (2021) found an association between difficulties with online learning and increased anxiety and depressive symptoms. One study which examined the impacts of distance learning on children and parents found that distance learning negatively impacted the psychological wellbeing of both parties (Maggio et al., 2021). In line with these results, as parents' mental health deteriorates, there is often a commensurate impact on children. A systematic review of 18 studies found that parents' mental health can negatively impact child and adolescent psychopathology (Sweeney & Wilson, 2023), a relationship which is likely bidirectional.

Social and Economic Stratification Systems

Finally, the Life Course framework proposes that the individual's position within pre-existing social and economic stratification systems is also an additional risk factor (see Figure 1). According to

the framework, children in advantageous economic and social positions would likely experience less disruption due to the pandemic (Elder, 1998). Benner and Mistry (Benner & Mistry, 2020) highlighted that in the context of the pandemic, social stratification systems could be broadly conceptualized as children and youth who were already marginalized and who faced significant stressors in their pre-pandemic lives. The pandemic exposed and magnified social inequality across multiple domains (Ismail et al., 2021). Researchers found increased illness rates and symptom severity of the COVID-19 virus in racialized individuals as well as those from lower education, literacy level, and socioeconomic status (SES; Ismail et al., 2021); however, further research is needed to fully understand the relationship among these systems and children's mental health during the pandemic.

The most often studied social and economic stratification system is SES, a measure of an individual or family's social standing, often based on family education and income. Previous research has found SES negatively correlated with children's mental health problems (Bøe et al., 2014; Starfield et al., 2002). To date, research suggests that children from a lower SES background, such as lower household income and lower parental education, experienced increased psychological difficulties (Geweniger et al., 2022; Li et al., 2021; Moulin et al., 2023; Scrimin et al., 2022; Yuan et al., 2023) during the pandemic. However, another longitudinal study which tracked mental health during the pandemic also posited that the relationship between mental health problems and social and economic status would likely intensify post-pandemic as the predicted financial recession disproportionately impacts those from a lower income background (Pierce et al., 2020).

Beyond SES, each child has individual factors which impact their position in social stratification. The presence of mental health problems at the individual level, of course, is an important factor to consider within the broader context of a child's life. For instance, one cannot consider the risk of future mental health symptoms without considering pre-existing mental health conditions. Previous research

has found that pre-existing mental health disorders are associated with a greater risk of adverse outcomes when exposed to significant trauma (Hapke et al., 2006). Further, during the pandemic, one study found that nearly half of the children with a pre-existing mental health diagnosis had deteriorations in overall mental health or worsening of psychiatric symptoms (Stevanovic et al., 2022). While pre-existing internalizing symptoms have been related to long-term internalizing symptoms during the pandemic, this relationship is further impacted by peer and familial context (Vacaru et al., 2022). While pre-existing symptoms tended to be a risk factor for future mental health problems during the pandemic, a long-term meta-analysis report provides evidence of stabilization and even recovery of mental health symptoms (Deng et al., 2023). Despite this, the high prevalence of clinically elevated symptoms continues, and there remains a need to identify who may be at risk of long-term mental health consequences. Considering pre-existing conditions when examining risk is vital to understanding the overall factors as they contribute to any changes in internalizing symptoms throughout the pandemic.

Attention symptoms (symptoms of inattention, hyperactivity and impulsivity), which are often associated with attention-deficit/hyperactivity disorder (ADHD), are one of the pre-existing conditions commonly being examined as a risk factor for mental health problems during the pandemic. Difficulties with inattention and executive functions (e.g., task initiation, planning and time management) were associated with increased difficulty with online learning (He et al., 2021). Prior to the pandemic, children and adolescents with ADHD were already at greater risk of other psychiatric disorders, such as anxiety and depression, (Blackman et al., 2005; Steinberg et al., 2015). They are also more likely to have poor social and academic functioning in addition to their primary symptoms (Steinberg et al., 2015).

Preliminary studies on the impact of the pandemic on children with attention difficulties suggest that these children were likely to be affected that their neurotypical counterparts. A meta-analysis

revealed increased ADHD symptoms during the COVID-19 pandemic (Rogers & Maclean, 2023).

During the pandemic, children with ADHD also had more difficulty with online learning than their peers (Becker et al., 2020; Tessarollo et al., 2022). Additionally, Breaux et al. (2021) found that a diagnosis of ADHD puts children at greater risk of mental health problems during the pandemic. However, the researchers also noted that the increases in mental health symptoms overall were not sustained after the initial lifting of restrictions in the summer of 2020. Further research is still needed to understand the longer-term impact on children with attention difficulties and other pre-existing mental health diagnoses.

Finally, learning disabilities and more broadly, difficulty learning and succeeding in academic contexts, can also be considered among the umbrella of pre-existing risk factors among children. Academic achievement has a complex reciprocal relationship internalizing and externalizing mental health symptoms, and the pandemic likely intensified this relationship through the universal disruption to children's education. In an Australian study, children who had more difficulty learning from home were found to have increased anxiety symptoms (Jackson et al., 2022). Further research has found symptoms of anxiety and depression to be associated with poor attendance, which further contributes to worse educational outcomes (Aurini et al., 2021). Further, children with mental health problems were found to attend online school less frequently compared to their peers (Hertz et al., 2022). Learning behaviours, are the identified behaviours that are relevant to effective learning and have been attributed to higher academic success when compared to students with more passive behaviours (Swagiary, 2023). Learning behaviours broadly include a child's creativity and engagement in school activities and their attentiveness, persistence, self-regulation in the classroom.

Child Mental Health during the Pandemic

There is limited previous research on risk factors for mental health problems during the pandemic, and the majority of extant studies are cross-sectional and fail to track the risk factors as the

pandemic develops. For example, one study identified indirect and direct associations cross-sectionally between geographic regions, grades, gender, online learning, and child mental health problems (Chen et al., 2020). Additionally, a non-systematic review study from early in the pandemic found that some groups of children and adolescents, such as those from low SES backgrounds or those with pre-existing chronic illness, appear to be more vulnerable to mental health problems during the pandemic (Marques de Miranda et al., 2020). With many studies cross-sectionally identifying risk factors for mental health problems in children and youth (Bosch et al., 2022; Moya-Vergara et al., 2023; Sicouri et al., 2021), researchers must continue to longitudinally assess risk factors using a solid theoretical framework as a lens through which to identify and conceptualize risk during this unique historical timepoint. Further, understanding the impact specifically within the Canadian context is critical, as each country experienced unique COVID-19 prevalence rates and subsequent government imposed restrictions.

Current Study

The current study aimed to investigate risk factors associated with increased child anxiety and depressive symptoms in Canadian children aged 3-18 years. Specifically, we endeavored to examine individual risk factors aligned with the Life Course Framework and how they predicted increased child anxiety and depressive symptoms during (Spring of 2021) and towards the end (Fall of 2022) of the pandemic. Figure 2 presents the complete list of risk factors examined within the framework. Two regression models were used to predict post-pandemic changes in anxiety and depression based on the identified risk factors. The regression analyses allowed us to evaluate any predictive relationship that was apparent. We employed relative importance analyses for effect sizes to examine each risk factor's individual contribution.

In line with previous research, we hypothesized that internalizing symptoms of anxiety and depression will increase with each risk factor. Even after controlling for symptoms in the Spring of

2021, we hypothesized that there will be an overall cumulative effect in the Fall of 2022 (after the pandemic). Given that most published research to date has focused on risk factors studied in isolation, no further hypotheses are outlined for the individual analyses.

Figure 2

List of Individual Risk Factors to be Assessed Individually during Part 1 of the Analysis

Developmental Stage	Child Age
Historical Context	COVID Restrictions
	COVID impact - child
Linked Lives	Parental COVID Stress
	School modality
Social Stratification System	Household Income/ Education
	Number of Mental Health Diagnoses
	Attention symptoms
	Learning Behaviours

Research Methods

Procedure

The researchers' institutional ethics boards approved the methods used in this study. Recruitment for a broad heterogeneous sample was done through participant pools from the researchers' labs across Canada, as well as advertising through ADHD resource organizations (e.g., Canadian ADHD Resource Alliance, Center for ADHD Awareness Canada).

We collected data in the Spring of 2021 (Time 1) and again in the Fall of 2022 (Time 2) via online surveys administered to parents/caregivers. This research was part of a larger, longitudinal project that included two additional time points not included in the current study. The consent form at the beginning of the survey listed the inclusionary criteria, which required parents to confirm they resided in Canada with their child and attended either elementary or secondary school (kindergarten to grade 12). Parents had to be sufficiently proficient in English to complete the survey. Parents/ caregivers who completed the survey received a \$20 online gift card for their participation. Consent could be withdrawn at any time.

Measures

Demographics. The demographic questionnaire (Appendix A) included questions about the person responding to the questionnaire (e.g., parent or caregiver), the participating child, and general sociodemographic data (e.g., household income, parental education). The demographic questionnaire also included specific questions about the family's recent experience of COVID-19 restrictions, including mode of schooling (virtual versus in-person). The variables of interest include household income and highest household education, child age, gender, previous mental health diagnoses, and the child's race/ethnicity.

Child and Adolescent Symptom Inventory-Progress Monitor. The Child and Adolescent Symptom Inventory-Progress Monitor-Parent Form (CASI-PM-P) is a 28-item rating scale which measures symptom frequency for several child and adolescent mental health disorders. This instrument requires that parents/caregivers rate the frequency of 28 discrete children's behaviours from 0 = *Never* to 3 = *Very often during the last month*. Based on the scoring criteria, items are summed to create several symptom severity scores (Gadow & Sprafkin, 2002).

The current study uses three composite symptom categories: Global Anxiety, Global Depression and ADHD-Combined. Summed scores are compared to an American normative sample and allow for conversion into T-scores, with moderate severity being a T-score between 60-69 and high symptom severity being a T-score of 70 and above (Lavigne et al., 2009).

In a previous study, test-retest reliability for the CASI-PM-P was moderate to high (0.5 to 0.7) for all symptom severity and composite scores. The CASI-PM-P exhibited a moderate level of concurrent validity, as evidenced by the alignment between the factors evaluated by the CASI-PM-P and the corresponding factors measured by the Child Behavior Checklist (Achenbach, 1999).

The Learning Behaviours Scale. The Learning Behaviours Scale (LBS) is typically a teacher-rated scale used to measure the differential learning behaviours of school-aged children. It is standardized for children aged 5-17 in the US and Canada (Canivez & Beran, 2011). For the current study, parents/caregivers completed the scale, rather than teachers, as many children participated in school from home. The full scale contains 29 items, each rated on a 3-point Likert Scale ranging from 0 = *Does not apply* to 2 = *most often applies* asking parents to indicate how frequently their child displays a specific behaviour (e.g., very hesitant about giving and answer, accepts new tasks without fear or resistance). The internal consistency of the scale (when completed by teachers) was $\alpha = .75$ to $.85$ (McDermott, 1999). The scale also demonstrated acceptable concurrent validity with academic

achievement and intellectual functioning (Gresham et al., 2011). The Cronbach's Alpha coefficient for the current sample was .82, indicating good internal consistency.

COVID Stress Scales. Taylor and colleagues (2020) created and validated this 36-item scale and identified a stable 5-factor solution corresponding to scales assessing COVID-19-related distress caused by danger and contamination fears, fears about economic consequences, xenophobia, compulsive checking, reassurance-seeking, and traumatic stress symptoms. The full scale had strong reliability, with Cronbach's alpha coefficients ranging from .83 to .94 in a Canadian sample. The convergent validity with previous measures of health anxiety and obsessive-compulsive contamination symptoms was moderate to large (Taylor et al., 2020). Waite and colleagues adapted the COVID Stress Scale to create a 12-item measure to efficiently assess stress levels related to the pandemic and its restrictions (Waite, 2020). Parents rated all items on a 5-point Likert scale from 0 = *not at all* to 4 = *extremely*, indicating the level of distress caused by COVID-19-related stressors. The current sample also demonstrated good internal reliability with a Cronbach's alpha of .90 with the shorter scale form.

The Impact of COVID-19 on Children and Adolescents. To assess the level of disruption in the children's routine day-to-day lives, parents completed a modified version of the *Co-SPACE COVID-19 Impact Scale* (Waite et al., 2020). We used these items in the current study to evaluate changes in the child's routine due to the COVID-19 pandemic. Parents selected ratings on a scale from 1 = *not at all* to 4 = *completely*. The eight questions asked parents to report changes their child may have experienced due to COVID-19 (e.g., increased screen time). There is currently no published information on the reliability and validity of this scale; however, we assessed the measure's internal consistency and again found it acceptable, with a Cronbach's alpha of .79.

Data Description

The project initially yielded 1177 responses in the Spring of 2021. Additional screening criteria ensured all completed surveys met study inclusion criteria and were not falsified or were duplicate responses. First, the parent participants did not indicate that the child they were responding about was between the ages of 3 and 18, they were removed (N=206). Second, if the parent participants completed the survey in under 10 minutes, they were removed (N=270); the average duration for the remaining participants was 45 minutes. Participants who completed the survey outside Canada were also removed (N=310). Third, if a participant had two or more of the following criteria, we removed their responses to account for falsified data (N=23): these included email duplicates, IP duplicates, an age-grade match difference of greater than two years, and not answering a follow-up email. Fourth, as the current data collection was able to review responses at more than one time point, if an email bounced at Time 2 (i.e., could not be delivered), we removed the participant unless the listed Time 2 email and ADHD diagnostic status matched (N=182).

At Time 1 (Spring 2021), 473 responses met the above inclusion for the current analysis. We followed up at Time 2 with all respondents who met the inclusion criteria at Time 1. At the follow-up, respondents were matched based on email address. The responses were also matched based on the child's sex at birth and age or grade (accounting for change over time) to match previous responses to ensure parents were answering the survey about the same child. The final data for Time 2 included 93 respondents. Table 1 contains the demographic information at Time 1 and Time 2. At Time 1, most children (n=394) were elementary school-aged, with a range of 5-10 years. At the initial time point, the mean age was 9.7 years ($SD=2.9$; *Minimum* age of 3.7 years; *maximum* age of 17.2 years). Similarly, at 18-month follow-up (N=150), there was a mean age of 11.6 years ($SD=2.9$; *Minimum* age of 4.14 years; *maximum* age of 17.7 years).

Table 1*Participant Demographics*

<i>Variables</i>	Category	<i>Time 1 – Spring 2021</i> (<i>n</i> =471)		<i>Time 2 – Fall 2022</i> (<i>n</i> =163)	
		<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Province of residence	Northern Territories	16	3.4%	4	2.5%
	Atlantic Provinces	39	8.3%	6	3.7%
	Central Provinces	232	49.3%	83	50.9%
	Prairie Provinces	103	21.9%	35	21.5%
	West Coast	78	16.6%	35	21.5%
Parent gender	Man	181	38.4%	57	35.0%
	Woman	291	61.8%	105	64.4%
Household income	\$7 000 to \$32 999	9	1.9%	9	5.5%
	\$33 000 to \$65 999	76	16.1%	66	40.5%
	\$66 000 to \$92 999	144	30.6%	52	31.9%
	\$93 000 to \$132 999	116	24.6%	14	8.6%
	\$133 000 to \$264 999	57	12.1%	12	7.4%
	\$265 000 and above	12	2.5%	6	3.7%
	Prefer not to answer	9	1.9%	2	1.2%
Highest household education	Less than Highschool	2	0.4%	0	0.0%
	Highschool or GED	25	5.3%	3	1.8%
	Some college	45	9.6%	18	11.0%
	College Diploma	90	19.1%	33	20.2%
	Bachelor's Degree	291	61.8%	74	45.4%
	Some graduate work	36	7.6%	6	3.7%
	Master's Degree	57	12.1%	25	15.3%
	Doctoral Degree	17	3.6%	3	1.8%
Child gender	Boy	272	57.7%	84	51.5%
	Girl	201	42.7%	79	48.5%
Child ethnicity	White/ Caucasian	303	64.3%	131	80.4%
	Aboriginal/ First Nations/ Métis/ Inuit	80	17.0%	22	13.5%
	Asian	4	0.8%	1	0.6%
	Black	20	4.2%	6	3.7%
	Latin American	16	3.4%	0	0.0%
	Multiracial	4	0.8%	2	1.2%
	Prefer not to answer	22	4.7%	1	0.6%
	Other	1	0.2%	0	0.0%
Number of previous mental health diagnoses (child)	No Diagnosis	164	34.8%	62	38.0%
	1	107	22.7%	56	34.4%
	2	123	26.1%	27	16.6%
	3	46	9.8%	15	9.2%
	4	27	5.7%	2	1.2%
	5 +	6	1.2%	3	1.8%

Overall, the sample had clinically high reports of Global Anxiety at Time 1 ($M=11.3$, $SD=5.4$) and Global Depression ($M=4.8$, $SD=2.8$) and at Time 2 Global Anxiety ($M=11.7$, $SD=4.5$) and Global Depression ($M=5.0$, $SD=2.7$). With the CASI-PM-P, a T-score of 60 to 70 is in the moderate severity range, and a T-score above 70 is considered high severity range (Zablotsky et al., 2022). T-scores are calculated based on the sex and age of the child. In the Spring of 2021, 78.7% ($N=310$) of the sample were in the moderate range or above (T-score above 60 or raw score above 5-7 depending on age) for Global Anxiety, and 75.9% ($N=299$) were in the moderate range or above for Global Depression (raw score above 2-3 depending on age). In the Fall of 2022, 86.6% ($N=141$) were in the moderate range or above on the measure of Global Anxiety, and similarly 80.4% ($N=131$) were outside the normal range on the measure of Global Depression. See Table 2 for further descriptive statistics. In brief, most of the sample was reported by parents to experience anxiety and depressive symptoms of moderate severity or above across the course of the study.

Table 2

Descriptive Statistics of the measures of Global Anxiety and Global Depression in the Spring of 2021 and Fall of 2022

<i>Outcome measure</i>		<i>Spring 2021</i>				<i>Fall 2022</i>			
		<i>N</i>	<i>M</i>	<i>SD</i>	<i>% in clinical range</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>% in clinical range</i>
Global Anxiety	Boys	228	11.2	5.6	76.3%	84	11.1	5.0	78.6%
	Girls	166	11.3	5.0	81.9%	79	12.3	3.7	95.0%
Global Depression	Boys	228	4.7	2.8	73.2%	84	4.7	2.9	69.0%
	Girls	166	4.9	2.8	79.5%	79	5.5	2.3	92.4%

Statistical Analyses

The primary objective of this study was to identify risk factors that rendered children and adolescents more susceptible to heightened symptoms of anxiety and depression during the advanced

stages of the pandemic (Time 2 = Fall 2022). Beyond cumulative risk, the study examined the risk factors' relative contribution, longitudinally.

Data were analyzed using R (version 4.2). Multiple linear regressions were used to predict change in anxiety and depression in two separate models. For effect sizes, we relied on measures of relative importance using the Lindeman, Merenda and Gold (lmg) method in Grömping's (2006) *relaimpo* package in R. Relative importance is a decomposition of the total R^2 for each variable such that coefficients sum to R^2 ; in other words, relative importance is the proportion of the total R^2 contributed by each risk factor. The analyses take the average the R^2 across all possible entry points into the regression model as uses that as proportion of R^2 reported below (Grömping, 2006).

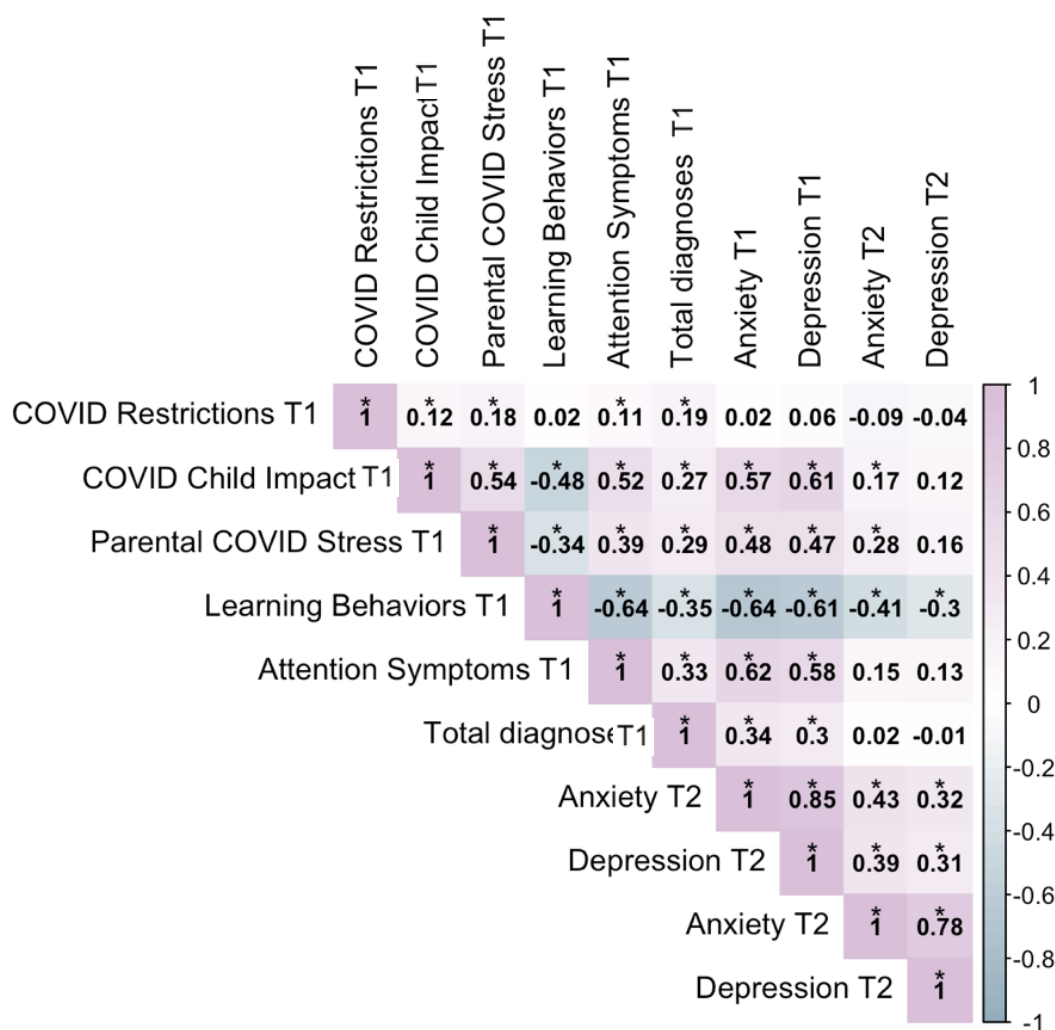
First, all continuous risk factors were analyzed using bivariate correlations to assess for multicollinearity. Bivariate correlations are presented in Figure 3. Both outcomes measures of child anxiety and depression at Time 1 were significantly associated with all Time 1 variables except COVID restrictions. Similarly, both outcome measures at Time 2 were significantly associated with all Time 1 variables except for COVID restrictions, number of previous diagnoses and attention symptoms. Additionally, Depression at Time 2 was also not significantly associated with COVID child impact or parental COVID stress scores. Associations with internalizing outcomes varied by the Time 1 predictor (value of r ranged from $-.34$ to $-.61$). Generally, the predictor variables were moderately correlated, as expected. However, none of the correlations were strong enough to raise concerns over multicollinearity (i.e., had simple bivariate correlations less than 0.70 , other than baseline levels of the same variable). Therefore, each factor made unique contributions in explaining variations in mental health outcomes.

Time 1 COVID restrictions were weakly positively correlated with ratings from the COVID child impact scale, the parental COVID stress scales and attention symptoms. COVID child impact was strongly and positively correlated with parental COVID stress, attention symptoms and child depression

and anxiety at baseline but negatively and strongly linked to learning behaviour scale scores. COVID child impact was weakly positively correlated with Time 2 child anxiety. COVID parental stress scores were moderately negatively correlated to learning behaviour scale scores and strongly positively linked to child depression and anxiety at Time 1 while moderately positively linked to attention symptoms and child anxiety at Time 2. Learning behaviour scale scores were moderately to strongly positively linked to lower levels of anxiety and depression at Time 1 and Time 2 and higher rates of attention symptoms. Overall, covariates displayed stronger correlations with outcomes measures (anxiety and depression) at Time 1 compared to Time 2.

Figure 3

Bivariate correlations for all continuous variables with child anxiety and depression at Time 2



Primary Data Analysis: Regression Models

Model 1. Multiple Regression Predicting Change in Anxiety. Our first regression model was built to predict Time 2 anxiety (controlling for Time 1 anxiety) based on 13 independent variables (Table 3). Child Age was categorized into (under 5 years; N=14, 5-10 years; N=253, 11-15 years; N=187, and 16+ years; N=20). Household education, income, and child gender were also included as categorical variables in the model (see demographics table). Child race/ethnicity was dichotomized, with

children from non-majority racial backgrounds grouped together. School modality was combined in the relative importance analysis to differentiate between alternating, in-person and virtual schooling. We used relative importance (ri) to identify which variables predicted the most change in anxiety.

Collectively, the 13 variables predicted nearly 40% of the variance ($R^2 = .39$), mainly due to the relative importance of 6 variables ($R^2 = .33$): baseline anxiety (ri = .09), learning behaviour scale (ri = .09), school modality (*alternating or virtual; ri = .05), COVID parental stress scale (ri = .05), household income (ri = .03), and COVID restrictions (ri = .02). Significance ($p < .05$) was present for baseline anxiety, virtual school modality, parental COVID stress and the learning behaviours scale.

Model 2. Multiple Regression Predicting Change in Depression. Our second regression model was built to predict Time 2 depression based on the same 13 independent variables (Table 4). We used relative importance (ri) to identify which variables predicted the most change in depression. Collectively, the 13 variables predicted just under one-third of the variance ($R^2 = .29$), mainly due to the relative importance of 4 variables ($R^2 = .21$): household income (ri = .09), baseline depression (ri = .06), learning behaviour scale (ri = .04), and COVID parental stress scale (ri = .02).

A comparison of relative importance between the two models predicting change in child and youth anxiety and depression is presented in Table 5, showing that both measures of mental health share many of the same top predictors (i.e., baseline levels of that mental health variable, household income, learning behaviour scale, and COVID stress). Of note, these predictors accounted for less variance in change in depression than in anxiety. School modality and COVID restrictions were top predictors of change in anxiety, but not depression.

Table 3*Multiple regression model predicting change in anxiety*

<i>Coefficient</i>	<i>B</i>	<i>β</i>	<i>95 CI B</i>	<i>95 CI β</i>	<i>p</i>	<i>Relative importance</i>
Intercept	1.83	-0.13	0.75 – 2.90	-0.32 – 0.06	0.001	--
Baseline Anxiety	0.26	0.25	0.04 – 0.47	0.04 – 0.47	0.019	.09
Household Education	-0.03	-0.07	-0.09 – 0.04	-0.24 – 0.10	0.414	.01
Household Income	-0.02	-0.06	-0.09 – 0.04	-0.25 – 0.12	0.485	.03
Child's Gender	0.01	0.01	-0.13 – 0.15	-0.14 – 0.16	0.893	.01
Child's Age	0.01	0.01	-0.11 – 0.13	-0.16 – 0.18	0.903	.01
School Modality	0.08	0.17	-0.10 – 0.26	-0.22 – 0.56	0.393	.05
Child's Race/Ethnicity	0.23	0.50	0.04 – 0.42	0.09 – 0.91	0.017	*
COVID Restrictions	-0.02	-0.11	-0.06 – 0.01	-0.28 – 0.07	0.228	.01
COVID Child Impact	-0.00	-0.11	-0.01 – 0.00	-0.27 – 0.04	0.143	.02
Parental COVID Stress	-0.01	-0.09	-0.03 – 0.01	-0.29 – 0.10	0.341	.01
Learning Behavior Scale	0.02	0.20	0.00 – 0.03	0.04 – 0.37	0.016	.05
Attention Symptoms	-0.03	-0.33	-0.04 – -0.01	-0.56 – -0.10	0.005	.09
Total Diagnoses	-0.01	-0.12	-0.04 – 0.01	-0.31 – 0.08	0.247	.01
<i>R</i> ²	-0.03	-0.07	-0.10 – 0.05	-0.24 – 0.11	0.451	.01

Note. B = unstandardized coefficient. β = standardized coefficient. In 95 confidence intervals for B.

* Relative importance was not calculated for dichotomous variables.

Table 4*Multiple regression model predicting change in depression*

<i>Coefficient</i>	<i>B</i>	<i>β</i>	<i>95 CI B</i>	<i>95 CI β</i>	<i>p</i>	<i>Relative importance</i>
Intercept	1.54	-0.05	0.13 – 2.95	-0.25 – 0.16	0.033	--
Baseline Depression	0.26	0.25	0.04 – 0.47	0.04 – 0.46	0.018	.06
Household Education	-0.01	-0.03	-0.10 – 0.07	-0.21 – 0.15	0.737	.01
Household Income	-0.13	-0.29	-0.22 – -0.04	-0.49 – -0.10	0.004	.09
Child's Gender	0.02	0.02	-0.17 – 0.20	-0.15 – 0.18	0.839	.005
Child's Age	0.08	0.09	-0.09 – 0.24	-0.10 – 0.27	0.355	.01
School Modality	0.06	0.11	-0.18 – 0.30	-0.31 – 0.53	0.609	.01
Child's Race/Ethnicity	0.07	0.13	-0.18 – 0.33	-0.31 – 0.57	0.569	*
COVID Restrictions	-0.01	-0.05	-0.06 – 0.03	-0.24 – 0.14	0.588	.02
COVID Child Impact	-0.00	-0.08	-0.01 – 0.00	-0.24 – 0.09	0.355	.01
Parental COVID Stress	-0.01	-0.08	-0.04 – 0.02	-0.29 – 0.13	0.441	.01
Learning Behavior Scale	0.01	0.14	-0.00 – 0.03	-0.03 – 0.32	0.104	.02
Attention symptoms	-0.01	-0.11	-0.03 – 0.01	-0.35 – 0.14	0.389	.04
Total Diagnoses	-0.01	-0.08	-0.05 – 0.02	-0.29 – 0.13	0.462	.01
<i>R</i> ²	-0.04	-0.07	-0.13 – 0.06	-0.25 – 0.12	0.465	.01

Note. B = unstandardized coefficient. β = standardized coefficient. In 95 confidence intervals for B.

* Relative importance was not calculated for dichotomous variables.

Table 5*Comparison of relative importance of independent variables predicting change in mental health*

Variable	Anxiety	Depression
Learning Behavior Scale	.09	.04
Baseline Mental Health	.09	.06
School Modality	.05	.01
Parental COVID Stress	.04	.02
Income	.03	.09
Covid Restrictions	.02	.01
Child Race	.01	.02
Education	.01	.01
Attention Symptoms	.01	.01
COVID Child Impact	.01	.01
Total Diagnoses	.01	.01
Child Gender	.01	.01
Child Age	.01	.01
R^2	.39	.29

Note. Variables are presented in order of size of relative importance value for anxiety.

Discussion

The goal of the current study was to evaluate which risk factors contributed to higher rates of depression and anxiety during the pandemic. Overall, across the sample, there were very high rates of internalizing symptoms reported, with three-quarters of the sample having rates within the moderate severity range or higher on the measures of anxiety and depression in the Spring of 2021 and again in the Fall of 2022. These results parallel findings in a 2023 meta-analysis that provided evidence of an increase in anxiety symptoms during the COVID-19 pandemic (Deng et al., 2023; Madigan et al., 2023), though the current sample's rates are substantially higher than reported in previous studies.

The high rates of internalizing symptoms may be a result of the sample being a mostly clinical sample with previous diagnoses of mental health disorders, as nearly two thirds of the sample had a previous psychiatric diagnosis. However, quantity of previous diagnoses did not

significantly contribute to the overall model for anxiety or depression suggesting alternative factors impacting the sample. Self-selection bias may have impacted the generalizability of the sample, with parents who were concerned about their child's mental health being more likely to participate in the study. Nonetheless, the overall high rates of anxiety and depression suggest the need for universal interventions in school, across communities and within families that provide emotion regulation and coping strategies to all children, not just a small number of at-risk children (Cefai et al., 2022; Przybylko et al., 2021).

Results from the current study used 13 predictor variables – risk factors that were identified using the Life Course Framework in the Spring of 2021, to predict outcomes in anxiety and depression as children exited the pandemic. Both models accounted for substantial variance in child anxiety and depression in the Fall of 2022. In the relative importance analysis, baseline symptoms, SES, learning behaviours, and parental pandemic-related stress were relatively the most important predictors across symptoms of depression and anxiety. Additionally, school modality (virtual schooling in particular) and COVID restrictions were top predictors of change in anxiety, but not depression. Above all, in line with previous Life Course research, the current study provides evidence for a cumulative impact of risk, with children who have more than one risk factor being at a greater risk of mental health problems during the pandemic. Risk factors from child-level factors (worse learning skills, more baseline symptoms of anxiety and depression) in combination with contextual factors (parental stress, familial SES) both contributed to higher rates of mental health problems later in the pandemic.

Interpreted through the lens of the Life Course Framework, there are several interesting interpretations of the current study's results. First, baseline anxiety and depression symptoms, as well as learning behaviours, were significant risk factors for increased depression and anxiety

symptoms at the second time point in the Fall of 2022. These child-level factors appear to be among the most significant predictors of long-term mental health difficulties. The stability of anxiety and depression symptoms are well established (e.g., Roza et al., 2003) and call for early assessment and intervention for both emotional and behavioural difficulties in children. Results would suggest that early identification of children who are struggling can be done through brief assessments of core learning behaviours, academics or anxiety and depression symptoms, and the contribution of such assessments appears to be above and beyond that of children with attention difficulties or previous mental health diagnoses.

Interestingly, long-term anxiety symptoms appear to be more closely related to covid disruptions, as the model revealed greater relative importance of school modality (specifically not being in person full-time), parental pandemic stress, and total COVID restrictions. This suggests that child anxiety, may be more impacted by the historical context (the pandemic's restrictions) and linked lives (parents, teachers) within the framework, emphasizing the impact of environment on children's anxiety symptoms. In particular, it warrants further investigations into the impacts of closed schools, and other restrictions that directly impacted children, youth and families.

Overall, the significant cumulative effects, continue to provide evidence that risk cannot be studied in isolation. In fact, it is cumulative effect of multiple risk factors that best explains the elevated rates of anxiety and depression symptoms. Likely, as children and adolescents emerge from the pandemic, there are many complex relationships among risk variables. It is essential to support children as they return to "normal" and provide access to adequate resources for mental health support. Children who experienced symptoms of anxiety and depression,

difficulty learning, and experienced familial-related disruption are at the greatest risk of persistent internalizing symptoms.

Ongoing evaluation of at-risk children is necessary, as children initially identified as high needs when first returned to school may not necessarily be those experiencing the most significant internalizing symptoms. Ongoing identification, intervention and broad system-level support for schools, families and communities can help mitigate the effects of the pandemic on children's long-term mental health (Duan et al., 2020). Interestingly, contrary to expectations, the child's age or stage of development did not demonstrate a significant relationship to mental health symptoms. While no age effects were found in the current study, the Life Course perspective would suggest that it is important to continue with long-term monitoring, as consequences may not yet be apparent (Benner & Mistry, 2020), previous research suggesting that differences in trajectories of wellbeing may become more apparent as time progresses (Shores & Steinberg, 2019).

Limitations

The current study has limitations that are important to consider. First, we used parent reports completed online. Online research renders it challenging to confirm the identity and legitimacy of each individual despite the significant caution taken during our rigorous data filtering process. Additionally, some of measures used in the study were modified to fit the constraints of the methodology of the study and have limited usage outside the pandemic context. The study also relied on parental report for internalizing symptoms. Specifically for older children, it may be ideal to have self-report included to ensure an accurate account of internalizing symptoms as they are not always clearly observable by parents. This study had two data collection points, and there was a significant attrition over time. There was likely a retention

bias indicating that the long-term results should be interpreted cautiously. There is potential that families or children who were struggling most, were less likely to complete the surveys due to the demanding length of the questionnaire. Moving forward, research should continue to examine children and youth's mental health trajectories longitudinally while accounting for identifiable risk factors. Finally, this sample was primarily a clinical sample with approximately two-thirds of the sample having pre-existing mental health diagnoses. Generalization of results to the overall Canadian population should be made with caution.

Conclusions

Overall, this study demonstrated that multiple risk factors during the pandemic resulted in high reports of internalizing symptoms among children and youth after the pandemic. Informed by the Life Course Framework, the identified risk factors in this study explained significant variance in children's internalizing symptoms, both individually and cumulatively, over time. The findings suggest that pre-existing mental health, lower frequency of positive learning behaviours as well as parental COVID-related stress and low familial income may have a more prominent contribution to children's wellbeing post-pandemic as the myriad social effects from COVID-19 continue to impact families. The pandemic's restrictions appear to have most directly impacted children's anxiety above children's depression with virtual schooling, parental pandemic stress and quantity of restrictions accounting for a substantial portion of the overall variance in the model. Research must continue to examine factors that made children more vulnerable to long-term mental health impacts because of the pandemic, in the years to come. Each child's wellbeing develops along a trajectory, and a single large historical event, such as the COVID-19 pandemic, has the capacity to significantly alter this path (Benner & Mistry, 2020).

References

- Achenbach, T. M. (1999). The Child Behavior Checklist and related instruments. In M. E. Maruish (Ed.), *The use of psychological testing for treatment planning and outcomes assessment* (pp. 429–466). Lawrence Erlbaum Associates Publishers.
- Almeida, D. M. , & Wong, J. D. (2009). Life transitions and daily stress processes In Elder G. H. & Giele J. Z. (Eds.), *The craft of life course research* (pp. 141–162). New York, NY: Guilford. [[Google Scholar](#)]
- Anderson, E. R., & Mayes, L. C. (2010). Race/ethnicity and internalizing disorders in youth: A review. In *Clinical Psychology Review* (Vol. 30, Issue 3).
<https://doi.org/10.1016/j.cpr.2009.12.008>
- Aurini, J., & Davies, S. (2021). COVID-19 school closures and educational achievement gaps in Canada: Lessons from Ontario summer learning research. *Canadian Review of Sociology*, 58(2). <https://doi.org/10.1111/cars.12334>
- Barendse, M. E. A., Flannery, J., Cavanagh, C., Aristizabal, M., Becker, S. P., Berger, E., Breaux, R., Campione-Barr, N., Church, J. A., Crone, E. A., Dahl, R. E., Dennis-Tiway, T. A., Dvorsky, M. R., Dziura, S. L., van de Groep, S., Ho, T. C., Killoren, S. E., Langberg, J. M., Larguinho, T. L., ... Pfeifer, J. H. (2023). Longitudinal Change in Adolescent Depression and Anxiety Symptoms from before to during the COVID-19 Pandemic. *Journal of Research on Adolescence*, 33(1). <https://doi.org/10.1111/jora.12781>
- Becker, S. P., Breaux, R., Cusick, C. N., Dvorsky, M. R., Marsh, N. P., Sciberras, E., & Langberg, J. M. (2020). Remote Learning During COVID-19: Examining School Practices, Service Continuation, and Difficulties for Adolescents With and Without Attention-Deficit/Hyperactivity Disorder. *The Journal of adolescent health : official publication of the*

Society for Adolescent Medicine, 67(6), 769–777.

<https://doi.org/10.1016/j.jadohealth.2020.09.002>

Benner, A. D., & Mistry, R. S. (2020). Child Development During the COVID-19 Pandemic Through a Life Course Theory Lens. *Child Development Perspectives*, 14(4).

<https://doi.org/10.1111/cdep.12387>

Blackman, G. L., Ostrander, R., & Herman, K. C. (2005). Children with ADHD and Depression: A Multisource, Multimethod Assessment of Clinical, Social, and Academic Functioning. *Journal of Attention Disorders*, 8(4), 195-207. <https://doi.org/10.1177/1087054705278777>

Bøe, T., Sivertsen, B., Heiervang, E., Goodman, R., Lundervold, A. J., & Hysing, M. (2014). Socioeconomic status and child mental health: The role of parental emotional wellbeing and parenting practices. *Journal of Abnormal Child Psychology*, 42(5).

<https://doi.org/10.1007/s10802-013-9818-9>

Bosch, R., Pagerols, M., Prat, R., Español-Martín, G., Rivas, C., Dolz, M., Haro, J. M., Ramos-Quiroga, J. A., Ribasés, M., & Casas, M. (2022). Changes in the Mental Health of Children and Adolescents during the COVID-19 Lockdown: Associated Factors and Life Conditions. *International Journal of Environmental Research and Public Health*, 19(7).

<https://doi.org/10.3390/ijerph19074120>

Brankston, G., Merkley, E., Fisman, D. N., Tuite, A. R., Poljak, Z., Loewen, P. J., & Greer, A. L. (2021). Socio-demographic disparities in knowledge, practices, and ability to comply with COVID-19 public health measures in Canada. *Canadian Journal of Public Health*, 112(3).

<https://doi.org/10.17269/s41997-021-00501-y>

Breaux, R., Dvorsky, M. R., Marsh, N. P., Green, C. D., Cash, A. R., Shroff, D. M., Buchen, N., Langberg, J. M., & Becker, S. P. (2021). Prospective impact of COVID-19 on mental health

- functioning in adolescents with and without ADHD: protective role of emotion regulation abilities. *Journal of child psychology and psychiatry, and allied disciplines*, 62(9), 1132–1139. <https://doi.org/10.1111/jcpp.13382>
- Cabot, J., & Bushnik, T. (2022). Compliance with precautions to reduce the spread of COVID-19 in Canada. *Health Reports, Statistics Canada*, 82-003-X. <https://doi.org/https://www.doi.org/10.25318/82-003-x202200900001-eng>
- Canada Revenue Agency. (2023, June 27). *Government of Canada*. How to make a repayment: Repay COVID-19 benefits - Canada.ca. <https://www.canada.ca/en/revenue-agency/services/payments-cra/individual-payments/repay-covid-benefits/how-make-payment.html>
- Canivez, G. L., & Beran, T. N. (2011). Learning behaviors scale and Canadian youths: Factorial validity generalization and comparisons to the U.S. standardization sample. *Canadian Journal of School Psychology*, 26(3). <https://doi.org/10.1177/0829573511416440>
- Cefai, C., Camilleri, L., Bartolo, P., Grazzani, I., Cavioni, V., Conte, E., ... & Colomeischi, A. A. (2022). The effectiveness of a school-based, universal mental health programme in six European countries. *Frontiers in Psychology*, 13, 925614.
- Chen, J. H., Li, Y., Wu, A. M. S., & Tong, K. K. (2020). The overlooked minority: Mental health of International students worldwide under the COVID-19 pandemic and beyond. In *Asian Journal of Psychiatry* (Vol. 54). <https://doi.org/10.1016/j.ajp.2020.102333>
- Chung, G., Lanier, P., & Wong, P. Y. J. (2022). Mediating effects of parental stress on harsh parenting and parent-child relationship during coronavirus (COVID-19) pandemic in Singapore. *Journal of family violence*, 37(5), 801-812.

Connor, D. F., Edwards, G., Fletcher, K. E., Baird, J., Barkley, R. A., & Steingard, R. J. (2003).

Correlates of comorbid psychopathology in children with ADHD. *Journal of the American Academy of Child and Adolescent Psychiatry*, 42(2). <https://doi.org/10.1097/00004583-200302000-00013>

Daly, M., & Delaney, L. (2013). The scarring effect of unemployment throughout adulthood on psychological distress at age 50: Estimates controlling for early adulthood distress and childhood psychological factors. *Social Science and Medicine*, 80.

<https://doi.org/10.1016/j.socscimed.2012.12.008>

Deng, J., Zhou, F., Hou, W., Heybati, K., Lohit, S., Abbas, U., ... & Heybati, S. (2023).

Prevalence of mental health symptoms in children and adolescents during the COVID-19 pandemic: A meta-analysis. *Annals of the New York Academy of Sciences*, 1520(1), 53-73.

Duan, L., Shao, X., Wang, Y., Huang, Y., Miao, J., Yang, X., & Zhu, G. (2020). An

investigation of mental health status of children and adolescents in china during the outbreak of COVID-19. *Journal of Affective Disorders*, 275. <https://doi.org/10.1016/j.jad.2020.06.029>

Elder, G. H. (1998). The Life Course as Developmental Theory. *Child Development*, 69(1).

<https://doi.org/10.1111/j.1467-8624.1998.tb06128.x>

Elder, G. H., & Giele, J. Z. (2009). Life course studies: An evolving field. In *The Craft of Life*

Course Research.

Gadow, K. D., & Sprafkin, J. (2002). Child Symptom Inventory 4: Screening and Norms

Manual. *Tony Brook, NY: Checkmate Plus*.

Georgiadis, C., Bose, D., Wolenski, R., Javadi, N., Cox, S., Pettit, J. W., & Comer, J. S. (2022).

How Flexible are Treatments for Youth Internalizing Disorders? Examining Modification

- Guidelines Included across Supported Treatments. *Journal of Clinical Child and Adolescent Psychology*, 51(5). <https://doi.org/10.1080/15374416.2022.2109649>
- Geweniger, A., Barth, M., Haddad, A. D., Högl, H., Insan, S., Mund, A., & Langer, T. (2022). Impact of the COVID-19 Pandemic on Mental Health Outcomes of Healthy Children, Children With Special Health Care Needs and Their Caregivers—Results of a Cross-Sectional Study. *Frontiers in Pediatrics*, 10. <https://doi.org/10.3389/fped.2022.759066>
- Grömping, U. (2006). *Relative importance for linear regression in R: The package relaimpo*. *Journal of Statistical Software*, 17(1), 1-27. <https://doi.org/10.18637/jss.v017.i01>
- Goodwin, R. D., Sourander, A., Duarte, C. S., Niemelä, S., Multimäki, P., Nikolakaros, G., Helenius, H., Piha, J., Kumpulainen, K., Moilanen, I., Tamminen, T., & Almqvist, F. (2009). Do mental health problems in childhood predict chronic physical conditions among males in early adulthood? Evidence from a community-based prospective study. *Psychological Medicine*, 39(2). <https://doi.org/10.1017/S0033291708003504>
- Gresham, F. M., Elliott, S. N., Vance, M. J., & Cook, C. R. (2011). Comparability of the Social Skills Rating System to the Social Skills Improvement System: Content and Psychometric Comparisons Across Elementary and Secondary Age Levels. *School Psychology Quarterly*, 26(1). <https://doi.org/10.1037/a0022662>
- Groemping, U. (2006). Relative Importance for Linear Regression in R: The Package relaimpo. *Journal of Statistical Software*, 17(1), 1–27. <https://doi.org/10.18637/jss.v017.i01>
- Hapke, U., Schumann, A., Rumpf, H. J., John, U., & Meyer, C. (2006). Post-traumatic stress disorder: The role of trauma, pre-existing psychiatric disorders, and gender. *European Archives of Psychiatry and Clinical Neuroscience*, 256(5). <https://doi.org/10.1007/s00406-006-0654-6>

He, S., Shuai, L., Wang, Z., Qiu, M., Wilson, A., Xia, W., Cao, X., Lu, L., & Zhang, J. (2021).

Online Learning Performances of Children and Adolescents With Attention Deficit

Hyperactivity Disorder During the COVID-19 Pandemic. *Inquiry : a journal of medical care organization, provision and financing*, 58, 469580211049065.

<https://doi.org/10.1177/00469580211049065>

Hertz, M. F., Kilmer, G., Verlenden, J., Liddon, N., Rasberry, C. N., Barrios, L. C., & Ethier, K.

A. (2022). Adolescent Mental Health, Connectedness, and Mode of School Instruction

During COVID-19. *Journal of Adolescent Health*, 70(1).

<https://doi.org/10.1016/j.jadohealth.2021.10.021>

Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard,

C., Christensen, H., Cohen Silver, R., Everall, I., Ford, T., John, A., Kabir, T., King, K.,

Madan, I., Michie, S., Przybylski, A. K., Shafran, R., Sweeney, A., ... Bullmore, E. (2020).

Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. In *The Lancet Psychiatry* (Vol. 7, Issue 6).

[https://doi.org/10.1016/S2215-0366\(20\)30168-1](https://doi.org/10.1016/S2215-0366(20)30168-1)

Ismail, S. J., Tunis, M. C., Zhao, L., & Quach, C. (2021). Navigating inequities: A roadmap out

of the pandemic. *BMJ Global Health*, 6(1). <https://doi.org/10.1136/bmjgh-2020-004087>

Jackson, A., Melvin, G. A., Mulraney, M., Becker, S. P., Bellgrove, M. A., Quach, J.,

Hutchinson, D., Westrupp, E. M., Montgomery, A., & Sciberras, E. (2022). Associations

Between Anxiety and Home Learning Difficulties in Children and Adolescents with ADHD

During the COVID-19 Pandemic. *Child Psychiatry and Human Development*.

<https://doi.org/10.1007/s10578-022-01338-3>

- Lavigne, J. V., Cromley, T., Sprafkin, J., & Gadow, K. D. (2009). The Child and Adolescent Symptom Inventory-Progress Monitor: a brief Diagnostic and Statistical Manual of Mental Disorders, 4th edition-referenced parent-report scale for children and adolescents. *Journal of child and adolescent psychopharmacology*, 19(3), 241–252.
<https://doi.org/10.1089/cap.2008.052>
- Li, W., Wang, Z., Wang, G., Ip, P., Sun, X., Jiang, Y., & Jiang, F. (2021). Socioeconomic inequality in child mental health during the COVID-19 pandemic: First evidence from China. *Journal of Affective Disorders*, 287. <https://doi.org/10.1016/j.jad.2021.03.009>
- Ludwig-Walz, H., Dannheim, I., Pfadenhauer, L. M., Fegert, J. M., & Bujard, M. (2022). Increase of depression among children and adolescents after the onset of the COVID-19 pandemic in Europe: a systematic review and meta-analysis. In *Child and Adolescent Psychiatry and Mental Health* (Vol. 16, Issue 1). <https://doi.org/10.1186/s13034-022-00546-y>
- Madigan, S., Racine, N., Vaillancourt, T., Korczak, D. J., Hewitt, J. M., Pador, P., ... & Neville, R. D. (2023). Changes in depression and anxiety among children and adolescents from before to during the COVID-19 pandemic: a systematic review and meta-analysis. *JAMA pediatrics*.
- Maggio, M. G., Stagnitti, M. C., Calatozzo, P., Cannavò, A., Bruschetta, D., Cuzzola, M. F., Manuli, A., Pioggia, G., & Calabrò, R. S. (2021). What about the consequences of the use of distance learning during the COVID-19 pandemic? A survey on the psychological effects in both children and parents. *International Journal of Environmental Research and Public Health*, 18(23). <https://doi.org/10.3390/ijerph182312641>

- Magson, N. R., Freeman, J. Y. A., Rapee, R. M., Richardson, C. E., Oar, E. L., & Fardouly, J. (2021). Risk and Protective Factors for Prospective Changes in Adolescent Mental Health during the COVID-19 Pandemic. *Journal of Youth and Adolescence*, 50(1).
<https://doi.org/10.1007/s10964-020-01332-9>
- Marques de Miranda, D., da Silva Athanasio, B., Sena Oliveira, A. C., & Simoes-e-Silva, A. C. (2020). How is covid-19 pandemic impacting mental health of children and adolescents? *International Journal of Disaster Risk Reduction*, 51, 101845.
<https://doi.org/10.1016/j.ijdr.2020.101845>
- McDermott, P. A. (1999). National scales of differential learning behaviors among American children and adolescents. *School Psychology Review*, 28(2).
<https://doi.org/10.1080/02796015.1999.12085965>
- Meherali, S., Punjani, N., Louie-Poon, S., Rahim, K. A., Das, J. K., Salam, R. A., & Lassi, Z. S. (2021). Mental health of children and adolescents amidst covid-19 and past pandemics: A rapid systematic review. In *International Journal of Environmental Research and Public Health* (Vol. 18, Issue 7). <https://doi.org/10.3390/ijerph18073432>
- Mendolia, S., Suziedelyte, A., & Zhu, A. (2022). Have girls been left behind during the COVID-19 pandemic? Gender differences in pandemic effects on children's mental wellbeing. *Economics letters*, 214, 110458. <https://doi.org/10.1016/j.econlet.2022.110458>
- Moulin, F., Bailhache, M., Monnier, M., Thierry, X., Vandentorren, S., Côté, S. M., Falissard, B., Simeon, T., Geay, B., Marchand, L., Dufourg, M. N., Ancel, P. Y., Charles, M. A., Rouquette, A., Melchior, M., & Galéra, C. (2023). Longitudinal impact of psychosocial status on children's mental health in the context of COVID-19 pandemic restrictions.

European Child and Adolescent Psychiatry, 32(6). <https://doi.org/10.1007/s00787-022-02010-w>

- Moya-Vergara, R., Portilla-Saavedra, D., Castillo-Morales, K., Espinoza-Tapia, R., & Sandoval Pastén, S. (2023). Prevalence and Risk Factors Associated with Mental Health in Adolescents from Northern Chile in the Context of the COVID-19 Pandemic. *Journal of Clinical Medicine*, 12(1). <https://doi.org/10.3390/jcm12010269>
- Operto, F. F., Coppola, G., Vivenzio, V., Scuoppo, C., Padovano, C., de Simone, V., ... & Pastorino, G. M. G. (2022). Impact of COVID-19 pandemic on children and adolescents with neuropsychiatric disorders: emotional/behavioral symptoms and parental stress. *International Journal of Environmental Research and Public Health*, 19(7), 3795.
- Pierce, M., Hope, H., Ford, T., Hatch, S., Hotopf, M., John, A., Kontopantelis, E., Webb, R., Wessely, S., McManus, S., & Abel, K. M. (2020). Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. *The Lancet Psychiatry*, 7(10). [https://doi.org/10.1016/S2215-0366\(20\)30308-4](https://doi.org/10.1016/S2215-0366(20)30308-4)
- Prime Minister announces new actions under Canada's COVID-19 response. (2020). Prime Minister of Canada. <https://www.pm.gc.ca/en/news/news-releases/2020/03/16/prime-minister-announces-new-actions-under-canadas-covid-19-response>
- Przybylko, G., Morton, D. P., & Renfrew, M. E. (2021). Addressing the COVID-19 mental health crisis: a perspective on using interdisciplinary universal interventions. *Frontiers in Psychology*, 12, 644337.
- Public Health Agency of Canada. (2021, August 17). *COVID-19 vaccination: The 2021-2022 school year and public health measures*. Government of Canada.

<https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/planning-2021-2022-school-year-vaccination.html>

- Reiss, F. (2013). Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. In *Social Science and Medicine* (Vol. 90).
<https://doi.org/10.1016/j.socscimed.2013.04.026>
- Robillard, R., Daros, A. R., Phillips, J. L., Porteous, M., Saad, M., Pennestri, M. H., Kendzerska, T., Edwards, J. D., Solomonova, E., Bhatla, R., Godbout, R., Kaminsky, Z., Boafu, A., & Quilty, L. C. (2021). Emerging new psychiatric symptoms and the worsening of pre-existing mental disorders during the COVID-19 pandemic: A Canadian multisite study. *Canadian Journal of Psychiatry*, 66(9).
- Rogers, M. A., & MacLean, J. (2023). ADHD Symptoms Increased During the Covid-19 Pandemic: A Meta-Analysis. *Journal of attention disorders*, 27(8), 800–811.
<https://doi.org/10.1177/10870547231158750>
- Roza, S. J., Hofstra, M. B., van der Ende, J., & Verhulst, F. C. (2003). Stable prediction of mood and anxiety disorders based on behavioral and emotional problems in childhood: A 14-year follow-up during childhood, adolescence, and young adulthood. *American Journal of Psychiatry*, 160(12). <https://doi.org/10.1176/appi.ajp.160.12.2116>
- Samji, H., Wu, J., Ladak, A., Vossen, C., Stewart, E., Dove, N., Long, D., & Snell, G. (2022). Review: Mental health impacts of the COVID-19 pandemic on children and youth – a systematic review. In *Child and Adolescent Mental Health* (Vol. 27, Issue 2).
<https://doi.org/10.1111/camh.12501>
- Scrimin, S., Mastromatteo, L. Y., Hovnanyan, A., Zagni, B., Rubaltelli, E., & Pozzoli, T. (2022). Effects of Socioeconomic Status, Parental Stress, and Family Support on Children's

- Physical and Emotional Health During the COVID-19 Pandemic. *Journal of Child and Family Studies*, 31(8). <https://doi.org/10.1007/s10826-022-02339-5>
- Shores, K., & Steinberg, M. P. (2019). Schooling During the Great Recession: Patterns of School Spending and Student Achievement Using Population Data. *AERA Open*, 5(3). <https://doi.org/10.1177/2332858419877431>
- Sicouri, G., March, S., Pellicano, L., De Young, A., Donovan, C., Cobham, V., Rowe, A., Brett, S., Russell, J., Uhlmann, L., & Hudson, J. (2021). *Mental Health Symptoms in Children and Adolescents during COVID-19 in Australia*. <https://doi.org/10.31234/osf.io/369ey>
- Starfield, B., Riley, A. W., Witt, W. P., & Robertson, J. (2002). Social class gradients in health during adolescence. *Journal of Epidemiology and Community Health*, 56(5). <https://doi.org/10.1136/jech.56.5.354>
- Statistics Canada. (2024). *Canadian Health Survey on Children and Youth: Changes in the mental health of respondents from the 2019 survey*. Statistics Canada. Retrieved from <https://www150.statcan.gc.ca/n1/en/daily-quotidien/240910/dq240910a-eng.pdf?st=1Wqw4DkL>
- Steinberg, E. A., & Drabick, D. A. (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>
- Stevanovic, D., Kabukcu Basay, B., Basay, O., Leskauskas, D., Nussbaum, L., & Zirakashvili, M. (2022). COVID-19 pandemic-related aspects and predictors of emotional and behavioural symptoms in youth with pre-existing mental health conditions: results from Georgia, Lithuania, Romania, Serbia, and Turkey. *Nordic Journal of Psychiatry*, 76(7). <https://doi.org/10.1080/08039488.2021.2013531>

Stinson, E. A., Sullivan, R. M., Peteet, B. J., Tapert, S. F., Baker, F. C., Breslin, F. J., Dick, A.

S., Gonzalez, M. R., Guillaume, M., Marshall, A. T., McCabe, C. J., Pelham, W. E., van

Rinsveld, A., Sheth, C. S., Sowell, E. R., Wade, N. E., Wallace, A. L., & Lisdahl, K. M.

(2021). Longitudinal Impact of Childhood Adversity on Early Adolescent Mental Health

During the COVID-19 Pandemic in the ABCD Study Cohort: Does Race or Ethnicity

Moderate Findings? *Biological Psychiatry Global Open Science*, 1(4).

<https://doi.org/10.1016/j.bpsgos.2021.08.007>

Sweeney, S., & Wilson, C. (2023). Parental anxiety and offspring development: A systematic review. In *Journal of Affective Disorders* (Vol. 327).

<https://doi.org/10.1016/j.jad.2023.01.128>

Taylor, S., Landry, C. A., Paluszek, M. M., Fergus, T. A., McKay, D., & Asmundson, G. J. G.

(2020). Development and initial validation of the COVID Stress Scales. *Journal of Anxiety*

Disorders, 72. <https://doi.org/10.1016/j.janxdis.2020.102232>

Tessarollo, V., Scarpellini, F., Costantino, I., Cartabia, M., Canevini, M. P., & Bonati, M.

(2022). Distance Learning in Children with and without ADHD: A Case-control Study

during the COVID-19 Pandemic. *Journal of attention disorders*, 26(6), 902–914.

<https://doi.org/10.1177/10870547211027640>

Theberath, M., Bauer, D., Chen, W., Salinas, M., Mohabbat, A. B., Yang, J., Chon, T. Y., Bauer,

B. A., & Wahner-Roedler, D. L. (2022). Effects of COVID-19 pandemic on mental health of

children and adolescents: A systematic review of survey studies. In *SAGE Open Medicine*

(Vol. 10). <https://doi.org/10.1177/20503121221086712>

Tonidandel, S., & LeBreton, J. M. (2011). Relative importance analysis: A useful supplement to regression analysis. *Journal of Business and Psychology*, 26, 1-9

- Vacaru, S. V., Beijers, R., & de Weerth, C. (2022). Internalizing symptoms and family functioning predict adolescent depressive symptoms during COVID-19: A longitudinal study in a community sample. *PloS one*, 17(3), e0264962.
- Viner, R., Russell, S., Saule, R., Croker, H., Stansfield, C., Packer, J., Nicholls, D., Goddings, A. L., Bonell, C., Hudson, L., Hope, S., Ward, J., Schwalbe, N., Morgan, A., & Minozzi, S. (2022). School Closures during Social Lockdown and Mental Health, Health Behaviors, and Well-being among Children and Adolescents during the First COVID-19 Wave: A Systematic Review. In *JAMA Pediatrics* (Vol. 176, Issue 4).
<https://doi.org/10.1001/jamapediatrics.2021.5840>
- Waite, P., & Creswell, C. (2020). *COVID-19: Supporting Parents, Adolescents and Children during Epidemics*. 1(1), 1–15.
- World Health Organization (2020, March 11). *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*. [Www.who.int](http://www.who.int). Retrieved January 30, 2021, from <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
- Yuan, Y., Zhou, A., & Kang, M. (2023). Family Socioeconomic Status and Adolescent Mental Health Problems during the COVID-19 Pandemic: The Mediating Roles of Trait Mindfulness and Perceived Stress. *International Journal of Environmental Research and Public Health*, 20(2). <https://doi.org/10.3390/ijerph20021625>
- Zablotsky, B., Black, L. I., Terlizzi, E. P., Vahratian, A., & Blumberg, S. J. (2022). Anxiety and depression symptoms among children before and during the COVID-19 pandemic. *Annals of Epidemiology*, 75. <https://doi.org/10.1016/j.annepidem.2022.09.003>

Appendix A

Demographic Questionnaire

What province or territory do you live in?

Alberta
 British Columbia
 Manitoba
 Saskatchewan
 Ontario
 Quebec
 Prince Edward Island
 Nova Scotia
 New Brunswick
 Newfoundland and Labrador
 Nunavut
 Northwest territories
 Yukon

Do you have a child who is diagnosed with ADHD currently enrolled in school (between kindergarten and grade 12)?

Yes

No

Parent Information

What is your relationship to the child?:

Biological Mother	Biological Father	Step-mother	Step-father	Adoptive Mother
Adoptive Father	Foster Mother	Foster Father	Parent's Partner (living in household)	Other Adult (Please Specify)

What is your age? _____

What is your sex?

☐ Male

☐ Female

☐ You don't have an option that applies to me. I am:

What is your gender identity?

☐ Man

☐ Woman

☐ You don't have an option that applies to me. I identify as:

Please select the highest level of education in your household:

Less than high school	High school or GED
Some college, 2-year college or vocational	Bachelor's degree
Some graduate work	Master's degree
Doctoral degree	

On average, how many hours per week do you work?

0-5	6-20	21-40	40 or more
-----	------	-------	------------

How many adults in the home who care for children (including you): _____**What is your marital status?**

Single, never married	Separated
Divorced	Married
Living together as if married	Widowed

What is your annual family income per year (check one):

\$6,999 or less
\$7,000 to \$12,999
\$13,000 to \$19,999
\$20,000 to \$26,999
\$27,000 to \$32,999
\$33,000 to \$39,999
\$40,000 to \$52,999
\$53,000 to \$65,999
\$66,000 to \$79,999
\$80,000 to \$92,999
\$93,000 to \$105,999
\$106,000 to \$118,999
\$119,000 to \$132,999
\$133,000 to \$145,999
\$146,000 to \$198,999
\$199,000 to \$264,999
\$265,000 to \$332,999
\$331,000 to \$399,999
Greater than \$400,000
Prefer not to answer

What is the primary language spoken in your home?

English	Spanish
French	Vietnamese
Chinese	Korean
Russian	Other (please specify): _____

Child Information**What is your child's sex?**☐ Male☐ Female☐ You don't have an option that applies to my child. My child is:

What is your child's gender identity?☐ Boy☐ Girl☐ You don't have an option that applies to my child. My child identifies as:

What is your child's Date of Birth: _____ (month / day / year)**What is your child's grade level?**

Kindergarten

Grade 1

Grade 2

Grade 3

Grade 4

Grade 5

Grade 6

Grade 7

Grade 8

Grade 9

Grade 10

Grade 11

Grade 12

Is your child currently in a French immersion program?

All French

Early entry French

Late entry French

All English program

How is your child CURRENTLY attending school?

In person classes

Typically, in person, but online due to government orders

Typically, in person, but online due to contact tracing

Typically in person, but online due to positive/suspected COVID test or awaiting results

Alternating in person and virtual learning (please specify % in person and % online)
 All virtual learning
 Homeschooling (pre-covid decision)
 Other (please specify)

What percentage are they online in a typical week (total sum must be 100%)

Online
 In person

Does your child have an Individual Education Plan (IEP) or an Individual Program Plan (IPP)?

Yes
 No

What is your child's Race/Ethnicity?

Aboriginal	Caucasian/White
South Asian (e.g., East Indian, Pakistani, Sri Lankan etc.)	
Black	Filipino
Latin American	Southeast Asian (e.g., Vietnamese, Cambodian, Laotian, Thai, etc.)
Arab	Korean
West Asian (e.g., Iranian, Afghan, etc.)	Other (please specify): _____
Japanese	Multi-racial: (please specify): _____

Has your participating child been diagnosed with any of the following behaviour or mental health disorders? Select all that apply.

None
 Attachment Disorder
 Adjustment Disorder
 Communication Disorder
 Depression
 *Anxiety Disorder (please specify)
 Obsessive Compulsive Disorder
 Bipolar disorder
 Tourette Syndrome
 Conduct Disorder
 Oppositional Defiant Disorder
 Autism Spectrum Disorder
 Other (please specify)

Is your participating child taking any medications for a behaviour or mental disorder?

Yes (please specify) No

Currently, what restrictions are in place? (Check all that apply)

Working from home mostly

Schooling at home/schools have closed

Restaurants and other public spaces are closed (e.g., no indoor dining, gyms, museums, and libraries)

Only allowed outside home for essential provisions (e.g., groceries)

Limits on indoor socialization

Limits on outdoor gatherings

Someone in my household has shown possible symptoms of COVID-19

Someone in my household has tested positive for COVID-19

We are financially supporting other family members who do not live with us

Extended family members have moved in with us

We do not have internet access at home

We do not have enough devices (e.g., laptops, tablets) for everyone to use at the same time

I have lost my job because of COVID-19

Having my children at home during COVID-19 has affected my career negatively

Chapter 4: General Discussion

The goal of this dissertation was to investigate the ongoing impact of the pandemic on the mental health of children and adolescents in Canada. Further, I sought to investigate how specific risk factors, identified using the *Life Course Framework*, rendered children and adolescents more vulnerable to internalizing symptoms throughout the pandemic. In chapter 1, I introduced the two studies and reviewed the available literature on the *Life Course Framework* to conceptualize how children's mental health has fared during the COVID-19 pandemic and what may have rendered children at risk of adverse outcomes. In Chapters 2 and 3, I reviewed the two studies that sought to apply the available literature and track mental health symptoms in two samples of Canadian children.

Study 1 (Chapter 2) focused on a younger cohort of students who were in kindergarten at the beginning of the pandemic. In study 1, parent ratings of anxiety and depression were tracked throughout multiple phases of the pandemic while examining the effects of academic and attention-related risk factors. Study 2 (Chapter 3) focused on a broader sample of Canadian students aged 4 to 18 years and used relative importance analyses to track the impact of contextual and individual risk factors on internalizing symptoms later in the pandemic. Finally, in Chapter 4 I will review the dissertation's findings within the broader framework and the practical and research implications of the research findings.

The Life Course Framework

The *Life Course Framework* suggests that while all children in Canada experienced disruption throughout the pandemic, some children will experience lasting effects, as the historic event will have altered their trajectory of wellbeing (Benner & Mistry, 2020). Further, to identify and understand what made children vulnerable, research needs to examine risk from the perspective of multiple domains (i.e., home and school), multiple levels (micro to macro) and

multiple directions (i.e., interdependence and independent levels of risk; Spini et al., 2017).

In the current dissertation wellbeing, or lack of, was assessed as the experiencing of symptoms of anxiety and depression longitudinally. Anxiety and depression symptoms in childhood and adolescence have previously been associated with long-term psychiatric illness (Beesdo-Baum et al., 2012; Merikangas et al., 2010), as well as lower income and relational outcomes throughout development (Vergunst et al., 2023). Using this theoretical framework as a guide, in conjunction with previous pandemic and mental health research, specific risk factors were identified and analyzed as potential covariates to children's mental health. Risk factors were categorized based on the theoretical model, with developmental factors (age), factors from the historical context (pandemic's restrictions and impact), factors associated with linked lives (parents, teachers) and factors from pre-existing social stratification systems (pre-existing mental health, attention, academic difficulties and familial social-economic status; see Chapter 3, Figure 1 for more details). The current work applies the model to two unique samples and tests the theory in the context of the pandemic. It further builds on the existing literature to distinguish risk factors and evaluate why certain children were at greater risk of poor mental health outcomes. As the restrictions from the pandemic lasted years, the current samples are longitudinally evaluating the mental status across one-to-two-year periods. Practically, understanding which children were at most significant risk of mental health problems, as well as whether some children may have been less vulnerable to the harmful effects of the pandemic, helps inform parents, teachers, clinicians and governments regarding how best to support children and youth as they progress out of the pandemic.

Main Findings

Study 1

Parents of a cohort of kindergarten students were asked to rate their child's anxiety and depression symptoms starting before the pandemic (Fall 2019) throughout the Spring 2020 lockdown (no in-person learning), Fall 2020 (optional in-person learning) or Spring 2021 (lockdown with no in-person learning). Linear Growth Curve Models were used to assess intra-individual differences in the growth of anxiety and depression across the four-time points of the pandemic lockdown. Attention was included as a time-variant covariate and academic abilities (basic numeracy and literacy testing) were included as a time-invariant covariate to assess how they may have impacted the wellbeing trajectories of the students across the pandemic.

Contrary to the hypotheses, there was only a slight, non-significant increase in anxiety and depression across the two years. Pre-pandemic academic scores did not contribute to a steeper or weaker change in depression or anxiety symptoms over time. However, interestingly, attention symptoms predicted increased anxiety at the two later stages of the pandemic (Fall 2020 and Spring 2021).

Study 2

Study two examined anxiety and depression symptoms in a Canada-wide sample of parents of children aged 3 to 18 years in the Spring of 2021 and again in the Fall of 2022. Many of the parents (N=473) had children with previous mental health diagnoses. Overall, the sample reported high rates of anxiety and depression across the pandemic, with more than 75% of parents rating their children as having symptoms outside the current range at all time points. Contextual and individual risk factors identified using the life course framework in the Spring of 2021 were used to predict anxiety and depression symptoms in the Fall of 2022.

Overall, the model predicted approximately one-third of the final symptoms of anxiety and depression in the Fall/ Winter of 2022 (while controlling for Spring 2021 levels of anxiety and depression). In line with previous research, children who had higher pre-existing symptoms of anxiety and depression were most vulnerable to higher symptoms during the pandemic. Being a part of virtual schooling, having parents who reported higher COVID-related stress and having lower positive academic behaviours were also significant predictors of anxiety at the second time point. Household income was the only other significant predictor for depression at the second time point aside from initial depression levels.

Analyses of relative importance examined the relative contribution of the risk factors which made children and adolescents more vulnerable to negative mental health symptoms throughout the pandemic. Baseline anxiety and depression symptoms, learning behaviours, familial income, school modality and parental covid stress were identified as having the highest relative contribution to the regression models predicting anxiety and depression.

Risk Factors and Protective Factors for Higher Mental Health Symptoms

This research has the potential to inform our public health and education systems about the impact of the pandemic, including the impact of subsequent school and societal restrictions on children's mental health and wellbeing. By understanding those who were most vulnerable and impacted, we can begin to implement support and interventions to mitigate the potentially significant long-term mental health consequences of the pandemic.

Despite the differences in the results from the two studies, both highlighted that while all children experienced the pandemic, the negative effects were not universal. In the first study, results suggest that the young cohort of children who had just started formal schooling at the beginning of the pandemic may have been insulated from the adverse effects of the pandemic.

Despite multiple increases and changes to schooling modality and pandemic restrictions, there was not the expected cumulative effect, with significantly increasing symptoms of anxiety and depression over time. Potential reasons the young cohort (aged 4-6 years) did not experience the negative mental health effects of the pandemic include that academic demands are not as intense at the youngest ages, and further, the youngest cohort may not fully understand or be exposed to the stressors of the pandemic (Ardington et al., 2021; Deng et al., 2023). Further, younger students may not be aware of the changes to schooling as the majority of their schooling experience was during the pandemic.

However, the second study, which analyzed whether child age was associated with differences in anxiety and depression symptoms, did not find any significant contribution to the overall model. However, the second study had a predominantly clinical sample and, overall, had very high rates of anxiety and depression symptoms falling outside the normal range. Whether age was a protective factor during the pandemic remains unclear. It may be best to employ other risk factors to assess who was most significantly impacted by the pandemic to ensure those at greatest risk receive the necessary support.

At the broadest level, the pandemic and the surrounding historical context disrupted routine and typical daily life for children and adolescents. The disruption included school closures, government restrictions on social interactions, and cancellation of extracurricular activities. For children, this meant disruption to their daily routine, changes to their modality of schooling, and often having parents who were experiencing increased stress due to the pandemic.

In the second study, results showed that higher rates of anxiety and depression were associated with online schooling, more severe restrictions in the region, and parents who were more stressed by the pandemic. Further, children from lower-income families were at greater risk

of increased symptoms of anxiety and depression. Theoretically, these findings support the Life Course Framework, which suggests that disruption to wellbeing can result from contextual factors and not only individual child-related factors. These findings suggest that since disruption occurs at both individual and systemic levels, support should be provided not only to individuals but also through broader structural interventions. Future research and interventions should continue to focus on the impact of environment and the critical people in the lives of children and adolescents. As seen in the current studies, the stress experienced by parents and families had an impact on the mental health symptoms of children. Supporting parents and families, both with the pandemic's stress and adverse restrictions and economic implications, also helps support child mental health (Brown et al., 2020; Johnson et al., 2022).

In both studies, children with pre-existing challenges with either attention or learning were found to have increased internalizing symptoms during the pandemic. Parents' ratings of their child's ability to regulate their attention and manage symptoms of inattention, hyperactivity and impulsivity were associated with lower rates of anxiety symptoms in the Fall of 2020 and Spring of 2021 in the first study. In the second study, learning behaviours, which are adaptive child behaviours that support positive learning, was the risk factor with the highest relative importance aside from initial mental health symptoms, as measured in the Fall of 2022. However, attention symptoms were not related to long-term mental health symptoms in the second study, despite attention symptoms and learning behaviours being closely related in typical and clinical samples in previous research (Colomer et al., 2017). Both attention symptoms and learning behaviours predict future academic achievement (Escalón & Greenfield, 2009).

During the pandemic, constant school closures and disruptions, as well as transitions to online learning, likely contributed to the increased mental health symptoms observed in children

who have lower frequency of positive learning behaviours and regulating attention. Remote learning has already been identified as more difficult for children with attention difficulties (Rosenthal et al., 2022). Supporting these higher-risk children is essential moving forward, as even in the first two years of the pandemic, there is evidence of associated mental health consequences.

Identifying children who are struggling with the return to in-person schooling due to their approach to learning (learning behaviours) or attention difficulties is essential. Many children with learning difficulties did not receive the appropriate (and arguably necessary) support during the closures (Chen et al., 2022). As current and past evidence suggests, these children are at higher risk of academic failure, school dropout and increased mental health problems; early identification and intervention are recommended (Rosenthal et al., 2022).

In-school services that support these higher-risk children as they transition to the post-pandemic will be essential not only for academic success but also for preventing further mental health problems (Rosenthal et al., 2022). Classroom support can be targeted towards directly teaching positive learning behaviours through modelling or directed instruction (McDermott et al., 2016). For children who struggle to engage positively in learning, building their engagement and motivation can be done through modelling, scaffolding and positive reinforcement. This involves demonstrating the academic skill while providing opportunities for the child to observe and imitate the behavior, and then offering support that gradually encourages independent mastery and providing positive reinforcement when for their effort towards the learning skill (Rosenthal et al., 2022). For children with attention difficulties, supporting them with in-person schooling whereby their attention can be appropriately monitored is vital, in addition to providing helpful routines and organization (Tessarollo et al., 2022). For the youngest cohort of

children, who typically rely on an in-person play-based curriculum (Ontario Ministry of Education, 2016) to develop the foundational skills of learning and emotional and behavioural regulation, it is recommended that explicit opportunities be provided in the early years of elementary school (grades 1-3) to compensate for the missed exposure during kindergarten.

Interestingly, emotional knowledge and skills may be particularly critical for children with attention difficulties, who are already at risk of more significant impairment in emotional knowledge, which can impact their academic achievements and social relationships (Sjöwall et al., 2015; von Salisch et al., 2017).

Coupled with the contextual impact of the pandemic, high-risk children would likely benefit from support through parents or schools that facilitate learning appropriate emotional regulation skills and emotional processing skills. Advancing children's knowledge of emotions may be a crucial intervention point to help mitigate the effects of the pandemic. Children struggling to cope with the residual anxiety and depressive symptoms may require explicit teaching to develop the skills to understand, identify, verbalize and regulate their emotions (von Salisch et al., 2017). Specific evidence-based interventions that promote growth, as well as effective coping strategies, should be offered to high-risk children. The current studies identified students with attention or learning difficulties, those who experience greater restrictions, online school and family stress and those from lower-income backgrounds as being at higher-risk for experiencing greater symptoms of depression and anxiety and the pandemic progressed.

Strengths and Limitations

The results from the two current studies add to the growing body of COVID research in several unique ways. First, testing the *Life Course Framework* translates theoretical and past trauma-focused research to the current pandemic. It provides a structure for how to identify high-

risk children for long-term mental health consequences of the pandemic. The two unique studies are the first to the author's knowledge to apply robust and advanced statistical analyses to test risk factors for internalizing symptoms in a Canadian sample. The longitudinal nature of the research provides long-term evidence of changes over time and focuses on the mental consequences as the pandemic persisted and moved towards returning to normal. While initial increased symptoms were expected in the general population, the persisting and worsening mental health symptoms are what provide evidence to the most significantly impacted children who will likely require intervention and future support (Benner & Mistry, 2020).

The current studies have some important limitations. All questionnaires were completed online with convenience sampling, and neither sample was accurately representative of the Canadian population. Future research should seek to replicate the findings in a representative sample to further examine how to examine risk factors within the general population.

Next, both studies relied on parent reports for anxiety and depression symptoms. Multiple raters (self-report, teacher report) would be the best practice for testing the hypotheses. Having adolescents rate their symptoms of anxiety and depression is of particular importance, as parents generally under-report mental health symptoms (De Los Reyes et al., 2005). If multiple raters could be used through in-person or school-based testing, it would also remove any questions of reliability that occur when using online surveys. While schools have immense responsibilities as children transition back after the pandemic, having ongoing high-quality research in schools is likely the optimal methodology for evaluating child wellbeing longitudinally. For children and adolescents, schools are the most likely point of identification and intervention for children who are struggling after the pandemic (Hertz & Barrios, 2021).

The current studies are a start to longitudinally tracking children's and youth's mental

health during the pandemic. However, the timeline of the studies is limited to the pandemic era. To properly test the Life Course Framework, children's mental health should be tracked for years and decades to come.

Conclusion

The goal of the current dissertation was to examine what made children at risk of more anxiety and depression symptoms across the pandemic. Using the Life Course Framework as a guide, two studies employed Canadian samples and tracked internalizing symptoms across the later stages of the pandemic. The results support that many children experienced increased symptoms due to the pandemic, with younger children potentially being less susceptible to these negative effects. Overall, there is evidence of lasting effects for a substantial portion of Canadian students and evidence that the Life Course Framework can be used to understand better how significant historical events impact children's trajectories of wellbeing and why some children are at greater risk of negative outcomes. The current studies found evidence that a child's age (developmental stage), the experience of the pandemic (historical context), interactions with parents and teachers (linked lives) as well as pre-existing position within stratification systems (attention and learning difficulties) contributed to overall higher rates of anxiety and depression. Conversely, contrary to the hypotheses, a child's pre-pandemic academic abilities, pre-existing diagnoses, and routine disruptions did not uniquely contribute to the models.

Results demonstrate that risk can be identified at multiple levels, from the broader environment to an individual's behaviours. These studies provided evidence to support previous stipulations that the pandemic disproportionately impacted vulnerable children and youth. Further, as children in the pandemic did not encounter isolated instances of adverse circumstances, we see further evidence for the cumulative contribution of several risk factors by

applying the Life Course Framework (Evans et al., 2013).

Research should continue to track the cohorts of children in the long-term to understand how individual risk factors contribute to altered trajectories of wellbeing (Benner & Mistry, 2020). Children who are struggling the most should receive support to mitigate the immediate impact of a pandemic, while preventing the long-term consequences of clinically significant symptoms of anxiety and depression in childhood. Finally, while there is hope that there will never be another pandemic in the lifetime of today's children. It is recommended that serious consideration be taken when implementing social distancing restrictions for children. While the school and social disruptions of the pandemic were intended to be temporary, the long-term increases in rates of clinical depression and anxiety and impairing consequences have endured long after the public health restrictions eased (Park et al., 2024).

References

- Ardington, C., Wills, G., & Kotze, J. (2021). COVID-19 learning losses: Early grade reading in South Africa. *International Journal of Educational Development*, 86, 102480
- Beesdo-Baum, K., & Knappe, S. (2012). Developmental epidemiology of anxiety disorders. *Child and Adolescent Psychiatric Clinics*, 21(3), 457-478.
- Benner, A. D., & Mistry, R. S. (2020). Child development during the COVID-19 pandemic through a life course theory lens. *Child development perspectives*, 14(4), 236-243.
- 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*, 48(12), 1174-1183
- Brown, S. M., Doom, J. R., Lechuga-Peña, S., Watamura, S. E., & Koppels, T. (2020). Stress and parenting during the global COVID-19 pandemic. *Child abuse & neglect*, 110(Pt 2), 104699. <https://doi.org/10.1016/j.chiabu.2020.104699>
- Chen, B., Rasmussen, P., Legg, M., Alexander, N., Vedmurthy, P., Asiedu, A., Bay, M., Belcher, H., Burton, V. J., Conlon, C., Fine, A., Gill, R., Lance, E. I., Lipkin, P., Wong, J., Wilms Floet, A. M., Doerrer, S. C., Glattfelder, J., Kordek, A., Pertman, J., ... Leppert, M. L. (2022). Reduction in school individualized education program (IEP) services during the COVID-19 pandemic. *Frontiers in rehabilitation sciences*, 3, 962893. <https://doi.org/10.3389/fresc.2022.962893>
- Colomer, C., Berenguer, C., Roselló, B., Baixauli, I., & Miranda, A. (2017). The impact of inattention, hyperactivity/impulsivity symptoms, and executive functions on learning behaviors of children with ADHD. *Frontiers in psychology*, 8, 540.
- 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.
- Deng, J., Zhou, F., Hou, W., Heybati, K., Lohit, S., Abbas, U., ... & Heybati, S. (2023). Prevalence of mental health symptoms in children and adolescents during the COVID-19 pandemic: A meta-analysis. *Annals of the New York Academy of Sciences*, 1520(1), 53-73.
- Dillmann, J., Sensoy, Ö., & Schwarzer, G. (2022). Parental perceived stress and its consequences on early social-emotional child development during COVID-19 pandemic. *Journal of Early Childhood Research*, 20(4), 524-538.
- Elder, G. H. (1998). The Life Course as Developmental Theory. *Child Development*, 69(1). <https://doi.org/10.1111/j.1467-8624.1998.tb06128.x>
- Escalón, X. D., & Greenfield, D. (2009). Learning behaviors mediating the effects of behavior problems on academic outcomes. *NHSA dialog*, 12(1), 1-17.
- Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin*, 139(6). <https://doi.org/10.1037/a0031808>
- Gómez, G., Basagoitia, A., Burrone, M. S., Rivas, M., Solís-Soto, M. T., Dy Juanco, S., & Alley, H. (2021). Child-focused mental health interventions for disasters recovery: a rapid review of experiences to inform return-to-school strategies after COVID-19. *Frontiers in psychiatry*, 12, 713407.
- Hertz, M. F., & Barrios, L. C. (2021). Adolescent mental health, COVID-19, and the value of school-community partnerships. *Injury Prevention*, 27(1), 85-86.
- Johnson, M. S., Skjerdingsstad, N., Ebrahimi, O. V., Hoffart, A., & Johnson, S. U. (2022). Parenting in a Pandemic: Parental stress, anxiety and depression among parents during

- the government-initiated physical distancing measures following the first wave of COVID-19. *Stress and Health*, 38(4), 637-652.
- Johnstone, K. M., Kemp, E., & Chen, J. (2018). A meta-analysis of universal school-based prevention programs for anxiety and depression in children. *Clinical child and family psychology review*, 21, 466-481.
- Kohlboeck, G., Wenter, A., Sevecke, K., & Exenberger, S. (2023). Differences in perceived threat and trauma in children during the COVID-19 pandemic. *Child and Adolescent Psychiatry and Mental Health*, 17(1), 83.
- McDermott, P. A., Rikoon, S. H., Waterman, C., & Fantuzzo, J. W. (2012). The preschool learning behaviors scale: Dimensionality and external validity in head start. *School Psychology Review*, 41(1), 66-81.
- Merikangas, K. R., He, J. P., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., ... & Swendsen, J. (2010). Lifetime prevalence of mental disorders in US adolescents: results from the National Comorbidity Survey Replication–Adolescent Supplement (NCS-A). *Journal of the American Academy of Child & Adolescent Psychiatry*, 49(10), 980-989.
- Ontario Ministry of Education. (2016). *The kindergarten program*. Queen's Printer for Ontario. https://files.ontario.ca/books/edu_the_kindergarten_program_english_aoda_web_oct7.pdf
- Owens, M., Stevenson, J., Hadwin, J. A., & Norgate, R. (2012). Anxiety and depression in academic performance: An exploration of the mediating factors of worry and working memory. *School psychology international*, 33(4), 433-449
- Park, J. L., McArthur, B. A., Plamondon, A., Hewitt, J. M., Racine, N., McDonald, S., ... & Madigan, S. (2024). The course of children's mental health symptoms during and beyond

- the COVID-19 pandemic. *Psychological Medicine*, 1-12.
- Rosenthal, E., Franklin-Gillette, S., Jung, H. J., Nelson, A., Evans, S. W., Power, T. J., ... & DuPaul, G. J. (2022). Impact of COVID-19 on youth with ADHD: predictors and moderators of response to pandemic restrictions on daily life. *Journal of Attention Disorders*, 26(9), 1223-1234.
- Sjöwall, D., Backman, A., & Thorell, L. B. (2015). Neuropsychological heterogeneity in preschool ADHD: Investigating the interplay between cognitive, affective and motivation-based forms of regulation. *Journal of abnormal child psychology*, 43, 669-680.
- Spini, D., Bernardi, L., & Oris, M. (2017). Toward a life course framework for studying vulnerability. *Research in Human Development*, 14(1), 5-25.
- Tessarollo, V., Scarpellini, F., Costantino, I., Cartabia, M., Canevini, M. P., & Bonati, M. (2022). Distance Learning in Children with and without ADHD: A Case-control Study during the COVID-19 Pandemic. *Journal of attention disorders*, 26(6), 902-914.
- Vergunst, F., Comisso, M., Geoffroy, M. C., Temcheff, C., Poirier, M., Park, J., ... & Orri, M. (2023). Association of childhood externalizing, internalizing, and comorbid symptoms with long-term economic and social outcomes. *JAMA Network Open*, 6(1), e2249568-e2249568.
- von Salisch, M., Denham, S. A., & Koch, T. (2017). Emotion knowledge and attention problems in young children: A cross-lagged panel study on the direction of effects. *Journal of Abnormal Child Psychology*, 45(1), 45–56. <https://doi.org/10.1007/s10802-016-0157-5>
- Wenter, A., Schickl, M., Sevecke, K., Juen, B., & Exenberger, S. (2022). Children's mental health during the first two years of the COVID-19 pandemic: burden, risk factors and

posttraumatic growth—a mixed-methods parents’ perspective. *Frontiers in psychology*, 13, 901205.