

**Academic Functioning, Mental Health, and Peer Processes: Links to the Secondary School
Educational Transition**

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Abstract

Most students in formal education experience school transitions, marked by changes in the environment, reconfiguration of peer groups, and increases in academic expectations and autonomy. The transition from elementary to secondary school is compounded by biological changes associated with adolescence, which force students to adapt to multiple changes simultaneously. The intersection of a significant life event and a developmental process is called a transition-linked turning point, which can impact immediate and long-term psychosocial functioning. To examine the role of the secondary school transition as a turning point in adolescent development, three studies were conducted examining the development and interactions among academic functioning, internalizing symptoms, and bullying victimization. Studies were conducted using data from the McMaster Teen Study, a population-based Canadian cohort followed annually through elementary school (Grades 5 to 8) and secondary school (Grades 9 to 12), and into early adulthood ($N = 701$; girls = 53%; $M_{\text{ageT1}} = 10.91$, $SD = 0.36$). In Study 1, six distinct joint trajectories of academic achievement and school absences were documented. Most students demonstrated paths of continuity, with gradually increasing absences and stable grades, but others showed declines in grades paired with increasing absences. In Study 2, six co-occurring trajectories of anxiety and depression symptoms were found. Many students demonstrated stable symptoms, some worsened, but others improved. In Study 3, the longitudinal associations among absences, grades, internalizing symptoms, and bullying victimization were examined. Increased internalizing symptoms and increased bullying victimization scores were tightly coupled in all phases of schooling, with higher Grade 8 internalizing symptoms leading to higher abuse in Grade 9. In secondary school, high internalizing symptoms led to lower grades and, in turn, higher absences. Findings from these studies highlight heterogeneity in developmental pathways, with the transition to secondary school marking positive developmental changes for some and negative changes for others. Prevention and intervention programs can take advantage of this developmentally sensitive time to derail problematic pathways and implement integrated programs to support students' interpersonal, academic, and emotional functioning, particularly during this period.

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Preface

Approvals

Data used in this dissertation were from the McMaster Teen Study. The study was approved by the McMaster University Research Ethics Board (Time 1 to 4) and the University of Ottawa, Social Sciences and Humanities Research Ethics Board (Time 5 to 16).

Academic Contributions

The student, Heather Brittain, was the research coordinator of the McMaster Teen Study (Time 1 to 16). She assisted with ethics and funding applications (Time 2 and beyond), managed participant recruitment, managed data collection, cleaning, and compiling of the dataset. For each study contained in this dissertation, she conceptualized the manuscript, analyzed the data, wrote original drafts, and edited manuscripts, in consultation with Dr. Vaillancourt.

The supervisor, Dr. Tracy Vaillancourt, is the Principal Investigator of the McMaster Teen Study (Time 1 to 16). She conceptualized the study and complete methodology including development of research protocols and measures selection, wrote ethics applications, funding acquisition, oversaw study administration, and oversaw data management. For each study contained in the dissertation, Dr. Vaillancourt provided expertise and feedback throughout the manuscript development. She was involved in consulting on conceptualization and analyses as well as complete review and editing of manuscripts. She reviewed and provided final approval of each paper for submission for peer review.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During manuscript preparation, the authors used ChatGPT, Anara, and/or Grammarly to improve some of the writing clarity and verify references. All intellectual work, interpretations, and conclusions are the authors' own. The authors verify that they take full responsibility for the final content.

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Publications

The three manuscripts within this dissertation have either been published or are under review for publication in peer-reviewed journals. The content and scope of each paper have been formatted in accordance with journal specifications.

Paper 1: The included manuscript has been published.

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Paper 2: The included manuscript is under peer review.

Paper 3: The included manuscript has been accepted for publication.

Brittain, H., & Vaillancourt, T. (2026). Temporal Associations Between Bullying Victimization, Mental Health, Academic Achievement, and School Absences Across Elementary and Secondary School. *Scientific Reports*. Manuscript accepted for publication March 23, 2026. DOI: 10.1038/s41598-026-45784-8

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*To my son, Myles, and daughter, Andie,
and my late parents, Joanne and Randy*

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Chapter 1 – General Introduction

Globally, students in formal education experience multiple transitions throughout their academic careers. In Canada and similar educational systems, children typically enter elementary school at age 4 or 5, some move to middle school around Grade 6 or 7, and most undergo a significant transition to secondary school at approximately Grade 8, 9, or 10, where they spend three to five years before earning a secondary diploma (OECD, 2023). Although there may be differences in timing and structure across locations, these transitions share common features including shifts in the organizational and instructional structure of schooling, reconfiguration of peer groups and social hierarchies, and changes in academic expectations and developmental demands (Benner, 2011; Eccles et al., 1991; Evans et al., 2018; Spernes, 2022). The co-occurring environmental and psychosocial changes associated with the secondary school transition layered on top of biological changes associated with adolescence force students to adapt to multiple changes concurrently (Eccles et al., 1993; Simmons, 1987), making this transition a key context for understanding developmental change (Cicchetti & Rogosch, 2002).

Extensive research has documented the short-term changes in academic achievement, school engagement, internalizing symptoms, and peer relationships during school transitions; however, much of this work does not account for long periods of functioning before or after the school transition and cannot discern whether transitions represent continuity, temporary disruptions or turning points in development (Bagnall et al., 2023; Benner, 2011; Evans et al., 2018; Jindal-Snape et al., 2020). Although progress has been made in understanding how developmental pathways of academic, psychological, and relational domains can change as a function of school transitions (e.g., Benner & Wang, 2014; Nelemans et al., 2018; Vaillancourt et al., 2023), empirical gaps remain. Students develop differently across elementary school, having different prior experiences and supports as they approach the school transition, and as such, not all will respond the same way. For some, the school transition may exacerbate vulnerabilities, leading to maladaptation (Cicchetti & Rogosch, 2002). It is therefore important to identify the individual factors and contextual conditions that lead some students to have successful experiences and others to struggle.

Researchers also conceptualize school transitions as sensitive periods that may influence how changes in one domain impact functioning in other areas. For example, transition-related

peer group reorganization may change a student's peer victimization experiences, which may be closely tied to post-transition mental health or academic achievement (Bowes et al., 2013). Worsening depressive symptoms may also put students at risk for increasing post-transition bullying victimization (Krygsman & Vaillancourt, 2017). Such associations across sensitive periods may trigger developmental cascades, the process through which changes in one domain influence functioning in another over time, producing effects that may accumulate across development (Masten & Cicchetti, 2010). Despite this, only a few studies have documented how multiple domains of functioning interact over several years during adolescence and have yet to account for how school transition may influence such relations between domains across the full span of adolescence.

To address these gaps, I examined how academic functioning, internalizing symptoms, and bullying victimization develop and interact across adolescence with a focus on how the transition to secondary school reorganizes these systems. This aim was accomplished through three connected studies using data from The McMaster Teen Study, a multi-informant, multi-method, population-based cohort assessed annually from Grade 5 to Grade 12 and into early adulthood. The rigorous design enabled the examination of heterogeneity in academic and mental health functioning, detection of transition-linked turning points, evaluation of concurrent correlates and long-term outcomes, and testing of cross-domain temporal dynamics across adolescence, including two periods of schooling.

School Transitions as Developmental Turning Points

In elementary school, students are typically provided with consistent structure and support, in contrast to the secondary school environment, which is often larger and more complex with departmentalized instruction. When students enter secondary school, they are met with increased academic demands, greater autonomy, shifting peer group dynamics, and reduced adult guidance and oversight (Benner, 2011; Eccles et al., 1991; Evans et al., 2018; Spernes, 2022). These changes can leave students feeling uncertain, worried, and concerned (Beatson et al., 2023; Rice et al., 2021; Spernes, 2022). Such transitions can disrupt normative developmental processes; the underlying mechanisms can be understood through the frameworks of developmental psychopathology (for review, see Ng-Knight, 2015) and transition-linked turning points. Rather than promoting a single theory to explain developmental phenomena, developmental psychopathology is an integrative macro-paradigm that draws on scientific

evidence from several domains (Cicchetti & Rogosch, 2002). Specifically, developmental psychopathology is “the study of the origins and course of individual patterns of behavioural maladaptation, whatever the age of onset, whatever the causes, whatever the transformations in behavioral manifestation, and however complex the course of the developmental pattern may be” (Sroufe & Rutter, 1984, p. 18).

The secondary school transition can be a particularly vulnerable time for students, as it also coincides with profound developmental changes in cognition, and social-emotional and biological development (Best & Ban, 2021). As a result, school transitions have long been conceptualized as potential turning points in development (Benner, 2011). The overlap of this significant life event (i.e., the transition into secondary school) with a developmental process (i.e., adolescence) is referred to as a *transition-linked turning point*, which can lead to substantial changes in psychosocial functioning in the immediate and long-term (Graber & Brooks-Gunn, 1996).

Students with differing prior experiences may therefore respond to such transitional events in varying ways: the emergence of new behaviour, discontinuation of existing behaviour, or changes in behavioural patterns (Graber & Brooks-Gunn, 1996). These behavioural changes are displayed in different ways. In the developmental psychopathology framework, continuity is a logical pattern of typical or atypical behaviour over development, yet it can be shown in different ways. Homotypic continuity occurs when an underlying process has the same behavioural manifestation across different developmental stages, and heterotypic continuity occurs when a single underlying process is manifested in different ways. In contrast, discontinuity refers to shifts in developmental patterns, display of new behavioural patterns, stopping established patterns, or the alteration of direction, signalling possible turning points (Cicchetti & Rogosch, 2002). Continuity and discontinuity in development depend on exposure to risk factors, whether biological, psychological, or environmental, that increase the likelihood of maladaptive outcomes. It also hinges on resilience, the capacity to adapt to adversity, which is shaped by experiences and supportive elements (Cicchetti & Rogosch, 2002). However, adolescence is also a time when students rely more heavily on peer relationships (Brown & Larson, 2009); the capacity for resilience may hinge on adult and peer support at developmentally appropriate times (Benner et al., 2017).

With different experiences, risks, and supports, individuals will each have different levels of capacity for resilience when facing transition-linked turning points and respond in different ways. Indeed, the literature identifies both risks and opportunities associated with school transitions (Anfara & Schmid, 2007): Some students may show declines in grades, increases in absences, heightened stress, and worsening mental health, whereas others experience improved school fit, expanded peer networks, or enhanced motivation as they enter a new learning environment (Bagnall et al., 2023; Benner, 2011; Evans et al., 2018; Jindal-Snape et al., 2020), which may support continuation of adaptive behaviour.

Transition-linked-turning points, such as school transition can influence multiple domains of functioning at once or initiate a sequence of changes across time. Within the developmental psychopathology framework, such a sequence is referred to as a developmental cascade, which can lead to maladaptive or adaptive outcomes (Masten & Cicchetti, 2010). For example, students may experience being bullied, causing symptoms of depression, leading to learning difficulties, and withdrawal (see Laith & Vaillancourt, 2022). These cascades can lead individuals starting from a common level of functioning in one domain to diverge into different outcomes as their development progresses (i.e., multifinality), or individuals with diverse initial functioning to converge on similar outcomes (i.e., equifinality; Cicchetti & Rogosch, 1996; Masten & Cicchetti, 2010). School transitions can significantly impact a student's development for better or worse and are critical times to assess continuity and discontinuity in both adaptive and maladaptive behaviour (Cicchetti & Rogosch, 2002, 1996).

Longitudinal research designs that assess developmental pathways before, during, and after transitions are needed to detect heterogeneity in behavioural adaptation. Designs that assess multiple domains of development are particularly well-suited to examine developmental cascades (Masten & Cicchetti, 2010). Assessment of various pre-transition functioning and support structures is needed to examine mechanisms of risk and resilience that influence developmental trajectories. Given these complexities, long-term, multi-domain longitudinal data are essential for identifying distinct pathways and the factors that distinguish students who thrive after transitions from those who struggle.

Academic Functioning Across Adolescence

Academic achievement is a broad construct capturing how well students perform and participate in school, encompassing both their academic skills and behavioural engagement, and

is commonly assessed using school-based indicators such as course grades, cumulative grade point averages (GPA), examinations, and standardized tests (OECD, 2023a; Steinmayr et al., 2014). A range of terms is used to describe school absences, but school attendance generally denotes a student's physical presence during instructional time, while absenteeism includes excused (e.g., health-related) and unexcused (e.g., truancy) absences from school (Kearney, 2008; Kearney et al., 2019). The term chronic absenteeism is used when students miss 10% or more of a school year (Attendance Works, 2025; Henderson & Fantuzzo, 2023). Although academic achievement and school absences are correlated, these measures of academic functioning are conceptually distinct and may follow different developmental trajectories.

Academic Trajectories and Secondary School Transition

Longitudinal studies have documented trends in academic achievement and absences. Several studies demonstrate moderate stability in academic achievement, with heterogeneity in individual pathways. Many students maintain high achievement across adolescence, whereas others show declines or increases (Alhadabi & Li, 2020; Fu et al., 2016). The same is shown in attendance: most students maintain low absences, but others demonstrate continuity in elevated absences, or increasing absenteeism to varying degrees (Benner & Wang, 2014; Dräger et al., 2024). Longitudinal studies indicate that grades and attendance often worsen immediately following the transition to secondary school (Benner & Graham, 2009; Benner & Wang, 2014; Lee, 2010; Reyes et al., 2000; Vasquez-Salgado & Chavira, 2014). Notwithstanding these insightful findings, limitations remain. Few studies span the full developmental period of adolescence, covering multiple academic periods, and fewer still integrate GPA and absences into a single study to examine if, and how, these domains fluctuate together over time. Further, poor academic functioning (i.e., lower grades and increased absences) is associated with increased bullying victimization (Laith & Vaillancourt, 2022; Nakamoto & Schwartz, 2010) and internalizing symptoms (Finning et al., 2019a; Finning et al., 2019b; Gubbels et al., 2019; Högberg et al., 2025), psychosocial risk factors that may destabilize academic achievement and attendance pathways, and increase risk for some students, leading them on maladaptive paths (Masten & Cicchetti, 2010).

Study 1

In Study 1 (Chapter 2), the long-term, co-occurring patterns of absences and GPA across eight annual waves from Grades 5 to 12, were examined. I used a piecewise multi-trajectory

modelling approach to identify distinct subgroups of students who followed different academic pathways, capturing heterogeneity obscured when indicators are analyzed separately. I also included tests of whether the transition to secondary school acted as a developmental turning point, indicated by shifts in trajectories. Contextual and individual-level factors, including gender, socioeconomic status, bullying victimization, and internalizing symptoms, were examined to identify risk factors of problematic pathways or maladaptation after the transition. The study advances the understanding of how academic achievement and absenteeism develop jointly across adolescence and how the transition to secondary school shapes these developmental pathways and explores possible risk factors. Beyond disruptions in academic functioning, school transitions are associated with changes in mental health. Complementing Study 1, Study 2 includes an exploration of school transition as a transition-linked turning point in depression and anxiety symptoms.

Internalizing Symptoms Across Adolescence

The most common mental disorders in late adolescence are depression and anxiety (Kieling et al., 2024), with 7.53% and 14.85% of Canadian youth aged 12 to 17 having experienced major depressive disorder or any anxiety disorder, respectively, within the past six months (Georgiades et al., 2019). In children and adolescents, depression is characterized by sustained depressed mood or irritability that disrupts daily functioning, such as motivation, energy, concentration, sleeping, and appetite (American Psychiatric Association, 2022). Anxiety disorders involve fear and/or anxiety that is developmentally non-normative or prolonged and are associated with behavioural disturbances, often beginning in childhood (American Psychiatric Association, 2022). The prevalence of depression and anxiety increases markedly from childhood to early and late adolescence through early adulthood (Kieling et al., 2024), especially for girls and women, who experience higher rates than boys and men (Keyes & Platt, 2024). Depression and anxiety often occur together, particularly in childhood and adolescence (Angold & Costello, 1993; Costello et al., 2003; Melton et al., 2016). It is important to understand how co-development unfolds across adolescence and whether salient events, such as school transition, are associated with continuity and discontinuity in symptoms.

Internalizing Trajectories and Secondary School Transition

Long-term studies show diverse trajectories of internalizing symptoms. Many adolescents show low or moderate-stable symptoms, while others exhibit increasing, decreasing, or chronic

patterns (De La Torre-Luque et al., 2020; Krygsman & Vaillancourt, 2022; Shore et al., 2018; Xu et al., 2021). Although some authors have examined co-occurring symptoms of depression and anxiety (Lallukka et al., 2019; Liang et al., 2023; Olino et al., 2010, 2014), they have included girls only (Olinio et al., 2014), omitting boys, or examined only early (Liang et al., 2023) or late adolescence into adulthood (Lallukka et al., 2019; Olino et al., 2010), failing to capture the full span of adolescence when internalizing symptoms often begin to increase and become entrenched (American Psychiatric Association, 2022).

Short-term studies indicate that anxiety and depressive symptoms may increase in the immediate time following school transitions (Bagnall et al., 2023), yet few have accounted for long term functioning before and after school transitions. Those who have used longer term methods have found that, on average, the secondary school transition marked a disruption in improving anxiety symptoms, halting declines, as well as marked an upward deflection in low stable levels of loneliness (Benner & Graham, 2009). A few others have identified heterogeneity in emotional responses to middle or secondary school transition, finding that many students have stable paths, some experience increases, and others experience decreases in anxiety or depression symptoms (Nelemans et al., 2014; Olivier et al., 2023; Wang et al., 2018). Despite the large body of work on adolescent internalizing problems, gaps remain. Depression and anxiety are often analyzed separately despite high comorbidity and shared risk factors. The high comorbidity, however, does not mean identical developmental course and different co-occurring patterns may have differing risk profiles. Few studies span the full period from late childhood to late adolescence, and even fewer test transition-linked shifts across multiple school contexts, which may mark a key turning point in symptoms of either disorder or co-occurring shifts. It is also rare for differential adolescent trajectories to be used to predict clinically assessed adult mental health and functional outcomes.

Study 2

In Study 2 (Chapter 3), the co-development of depression and anxiety symptoms from Grades 5 to 12 was examined with respect to the secondary school transition. In this study, I documented how subsets of students follow different co-developmental pathways across eight years while also examining possible risks associated with gender and socioeconomic status, as well as bullying victimization, school climate, and peer relationships, to understand which adolescents are most likely to follow high-risk pathways. The long-term consequences of

adolescent symptom trajectories were examined by linking them to early adulthood mental health disorders as well as to functional indicators like postsecondary education involvement and employment. By providing a nuanced picture of how depression and anxiety develop together across adolescence and forecasting adult functioning, Study 2 contributes to theoretical, clinical, and educational understanding of internalizing risk across major school transitions.

Bullying Victimization and Academic and Mental Health Pathways

Bullying occurs when an individual is repeatedly and intentionally abused by a peer, or multiple peers, who hold more power (Olweus, 1996). Approximately one-third of Canadian youth and youth worldwide experience bullying victimization (Biswas et al., 2020; UNESCO, 2019). This form of peer abuse typically declines across adolescence with notable differences in experiences at the transition to secondary school (Vaillancourt et al., 2023). Although most students experience low levels of bullying victimization with gradual declines, some experience a reprieve, and others experience chronic or newly emerging abuse by peers (Bowes et al., 2013; Vaillancourt et al., 2023). Bullying victimization is associated with maladaptive functioning across several domains, including elevated depression, anxiety, substance use, suicidal ideation, and academic difficulties such as lower GPA, heightened school disengagement, and increased absences (Halliday et al., 2021; Laith & Vaillancourt, 2022; Moore et al., 2017). It is also associated with long-term risks for psychiatric disorders, suicidality, and economic challenges (Arseneault, 2017; Brimblecombe et al., 2018). Since the secondary school transition is associated with changes in bullying victimization, academic achievement, school attendance, and internalizing problems, it behooves researchers to examine the associations between domains across different phases of schooling, documenting how the transition moderates these associations and how associations unfold across development.

Study 3

Building on Study 1 and Study 2, where average bullying victimization in elementary school and secondary school were tested as correlates of co-occurring trajectories, in Study 3 (Chapter 4), the temporal ordering of bullying victimization, internalizing symptoms, GPA, and school absences across Grades 5 to 12 were examined using an advanced longitudinal model designed to disaggregate within-person fluctuations from stable between-person differences (Curran et al., 2014; Hamaker et al., 2015). This study provided a rigorous test of whether short-term deviations from a student's typical level in one domain (e.g., increases in bullying

victimization) predicted subsequent deviations in another (e.g., increased depression or decreased GPA), and how associations differed before, during, and after the secondary school transition. It also evaluated whether bullying victimization functioned as an antecedent, consequence, or reciprocal correlate of academic and emotional difficulties, a question that has been difficult to resolve in prior research using traditional longitudinal models.

Summary

Through three interrelated studies, my dissertation advances the understanding of adolescent development by identifying vulnerable and resilient subgroups of students, illustrating how developmental processes unfold across adolescence, including a major educational transition, and describing the interrelations among academic, mental health, and peer domains. I integrate person-centered trajectory modelling that highlights heterogeneity with rigorous variable-centered longitudinal approaches that examine unique temporal associations. Specifically, Study 1 details heterogeneous co-occurring trajectories in academic achievement and school absences across late elementary school and secondary school, highlighting the role of the school transition. Study 2 includes details of co-occurring trajectories of anxiety and depression symptoms across this same period, which are used to predict early adulthood functioning. Study 3 examines within-person temporal dynamics among bullying victimization, internalizing symptoms, and academic functioning, clarifying how these domains interact before, during, and after the school transition. In the final chapter (Chapter 5), the central findings and themes across the studies are presented, along with their implications and directions for future research.

Chapter 2 – Paper 1: School Attendance Matters: Co-occurring Trajectories of School Attendance and Academic Achievement from Elementary to Secondary School in a Canadian Context

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Abstract

Introduction: School attendance and academic achievement are central indicators of student engagement and success, and relations between constructs are typically framed as predictors and outcomes, not as co-developing intertwined trajectories across multiple years of schooling. In Canada, where national attendance data are scarce, little is known about how absences and grades co-evolve through critical educational transitions. We examined heterogeneous joint trajectories of school absences and grade point averages (GPAs) from mid-elementary through secondary school (Grade 5 to Grade 12) and examined the transition to secondary school (Grade 8 to Grade 9) as a developmental turning point. We also assessed correlates of academic functioning classes including demographic factors, elementary school type (K-8 vs. middle school), bullying victimization, and depression and anxiety symptoms.

Methods: Data were drawn from 701 students (53% girls; $M_{\text{age}} = 10.9$ years) participating in an eight-year longitudinal study spanning Grades 5–12 in southern Ontario, Canada. Official school-record data on annual absences and GPAs were analyzed using parallel-process piecewise latent growth curve modelling and multi-trajectory (latent class) analysis to identify distinct patterns of co-development and discontinuities at the secondary school transition.

Results: On average, absences increased, and GPAs remained relatively stable across Grade 5 to Grade 12, with a significant increase of 2.76% percent days absent at the secondary school transition. Six joint trajectories were identified: three stable groups showed minimal, developmentally appropriate absences with high, moderate, and mid-range GPA and three risk groups showed increasing or chronic absences paired with declining grades (high increasing absences with moderate declining GPA; low-elementary high-secondary absences with low mid-range declining GPA; chronic absences with mid-range declining GPA). Lower socioeconomic status, male gender, and higher depressive symptoms characterized at-risk trajectories.

Discussion: Findings indicate that school attendance and achievement are dynamically linked, and for some, change sharply during the secondary school transition. Results underscore the need for early, targeted monitoring of both domains and for additional research to guide intervention and policy in the Canadian education context.

1 Introduction

Positive academic functioning is a cornerstone of prosperous development. School attendance and academic achievement (grades, exams, and standardized test scores) are two aspects of academic functioning that are consistently associated [e.g., (1–5)]. Difficulties in either area signal risk for poorer educational outcomes: students with frequent school absences or low academic achievement are less likely to graduate on time (5, 6), more likely to drop out of high school (7), and less likely to pursue or complete higher education (3, 8, 9). These academic challenges also forecast a range of later adverse outcomes [see (10, 11)], including teen pregnancy (12), adult depression (13), substance use (14–16), incarceration (17), and suicidality (18–20). Given the lifelong implications of problematic academic functioning, understanding how school attendance and academic achievement evolve across development is essential for identifying when and for whom support is most needed.

Although several terms are used to characterize school absences, school attendance typically refers to students' physical presence in compulsory schooling, and absenteeism includes excusable and inexcusable absences from compulsory schooling (10, 11). Student absences at or above 10% of instructional days is commonly referred to as chronic absenteeism (21, 22). Academic achievement refers to students' performance on school-based evaluations such as course grades, cumulative grade point averages (GPAs), and standardized test scores (23). These two domains are conceptually distinct yet empirically intertwined indicators of academic functioning.

One context in which academic functioning may be vulnerable is during school transitions, which occur in education systems worldwide (23). In Canada, some students experience a middle school transition in Grade 6 or Grade 7, and most students transition to secondary school between Grade 7 and Grade 10, depending on the province. Compared to elementary school, which offers consistent structure and support, the transition to secondary school can feel unfamiliar and unpredictable. Students must navigate larger environments, shifting schedules, greater academic demands, increased autonomy, and changes in peer groups, often with less adult oversight (24–27). These challenges can heighten students' concerns and stress as they enter a new phase of schooling (28, 29).

Cross-sectional and short-term longitudinal studies indicate that students often show increased absences and declines in grades or test scores immediately following the transition to secondary school (6, 30–32). However, little is known about how these short-term disruptions fit within students’ long-term developmental trajectories. Although many countries have prioritized monitoring student attendance [e.g. (33, 34)], Canadian data are limited. As outlined by Whitley et al. (35), there are several contributing factors, including (1) lack of federal oversight; (2) limitations of national cross-sectional research studies that include only single age groups (e.g., PISA; Grade 8 students (36); (3) prior national longitudinal studies included single items on days skipped [e.g., NLSCY (37)]; and days attended of the last 7 days [e.g., CHSCY, 2023 (38)], with ongoing surveys [e.g., CHSCY, 2025 (39)] omitting school attendance; and (4) until recently, absenteeism has not been a research focus of Canadian education scholars (40).

In the current study, we jointly modeled school absences and academic achievement in a large Canadian cohort followed annually from Grades 5 through 12. This design allowed us to examine how attendance and grades co-developed across elementary and secondary school, whether the transition to secondary school marked a discontinuity in these trajectories, and which individual and contextual factors differentiated adaptive vs. maladaptive pathways.

1.1 School Absences Over Time and Across School Transitions

School absences are typically characterized by a ‘U’ pattern, with high absences in pre-school/early elementary years, generally low and stable rates in elementary grades, and rise sharply in secondary school, largely driven by increasing unexcused absences (1), a pattern documented in cross-sectional reports from national governments (41), school boards (42), and research organizations (43). Longitudinal analyses replicate these trends, showing either stable (30) or slight declines in attendance and increases in unexcused absences across mid-elementary grades (44, 45), and steeper increases during secondary school (1, 30, 45).

Although these reports provide population averages, researchers have used person-centered analytic approaches, like latent class growth analysis and growth mixture modeling, to study heterogeneity in school absenteeism longitudinally over time to classify students into subgroups based on similar patterns of attendance. This approach has been done with data from American, Finnish, and British students examining different periods of compulsory schooling including early elementary school (46, 47), middle-school (48), across full elementary [K-8;

(49)], middle through secondary school [Grades 6-12; (50)], and one study across full compulsory education [England, Years 1-11; (1)].

Across studies, researchers have consistently identified between three and six trajectory classes of school absences, with notable developmental shifts from elementary into secondary school. In the elementary and middle school years (46–50), most students (46%–90%) follow a low-stable absence trajectory (i.e., few absences), while smaller groups (5%–30%) show moderate-stable, decreasing, or gradually increasing absences, and a minority (1%–8%) demonstrate chronic high or early-onset high absences. By secondary school, however, heterogeneity becomes more pronounced. Benner and Wang (50)¹ reported that approximately one-third of students maintained low absences, while the remainder showed moderate-to-high and increasing absences, and Dräger et al. (1) identified five distinct classes spanning compulsory education, with two large groups showing consistently low (66%) or moderate authorised absences (28%), and smaller groups following increasing unauthorised or authorised absences (6% combined). These findings suggest that although most students experience consistently low levels of school absenteeism, risk for moderate and chronic absences grows during the upper schooling years, particularly in subgroups whose absences escalate over time.

These developmental shifts are evident, yet few studies have modeled the transition point itself. Benner and Graham (30) demonstrated marked increases in absences across the first two years of secondary school compared to the average slope across two years of middle school; however, they focused on demographic and school structural aspects and did not look at unaccounted-for heterogeneity in patterns. Dräger et al. (1) charted trajectories of absences across elementary and secondary school but did not statistically account for the impact of transition. Benner and Wang (50) did address the transition in overall curves through a piecewise model, allowing different slopes in elementary and secondary school; however, the approach was not carried through in the class analysis where separate middle- and secondary-school models were estimated and the odds of moving class to class were assessed. These approaches prevent a unified test of continuity and create difficulties in testing whether slope changes at Grade 8 to Grade 9 are statistically significant for subgroups of students, and as a result, subtle patterns that

¹ Benner and Wang [13] modeled attendance rates (days present), not absences. For consistency, their classes are described here in terms of the absence equivalents (e.g., decreasing attendance=increasing absences).

unfold across the secondary school transition may be overlooked. Beyond documenting trajectories, absence classes are also differentially associated with academic outcomes.

Students with moderate or increasing school absences show poorer performance across multiple indicators, including standardized test scores in elementary and middle school (46, 47), GPA and graduation in secondary school (50), higher dropout risk (49), and lower performance in General Certificate of Secondary Education, particularly for increasing unauthorized absences (1). In predicting school absences classes, most studies have focused on school-level correlates (e.g., teacher experience, school size) and demographics (e.g., gender, SES) and have not considered individual-level processes, such as bullying victimization or mental health problems, that may shape trajectories. Moreover, even though Benner and Wang (50) adjusted for Grade 8 GPA, they did not model the time-varying interplay between absences and GPA. Considering that GPA and absences are more strongly correlated when measured proximally (5, 8), greater variability in post-transition grades may have been overlooked, and accounting for this interdependence could have altered study conclusions. These limitations highlight the need for models that span elementary through secondary school and explicitly capture how school absences and academic performance co-develop across transitions.

1.2 Grades, Test Scores, and GPA Over Time and Across School Transitions

Like absences, researchers have examined average trajectories of academic achievement across compulsory schooling. In elementary years, students display steady gains in reading, math, and core skills (51–54), with middle school students experiencing a temporary disruption (55). The secondary school transition has been shown to be an inflection point; GPAs are stable through middle school but drop sharply at the secondary school transition, after which they level off or decline (30, 32, 53). However, there is variation in students' academic achievement over time.

Across studies, researchers have typically identified three to four latent classes of academic achievement, with patterns differing across schooling periods. In the elementary years, while most students (50%–75%) follow stable or improving trajectories, patterns among lower-performing students vary by study (52, 54). Fu et al. (52) identified a class with declining achievement (26%) and another class that remained persistently low-achieving (24%), whereas Lu (54) found that the lowest-performing math skills group was characterized by slower, but still positive, growth over time. In a two-year study of Chinese middle (Grade 7) and secondary

school (Grade 10) students (56), observed four classes ranging from high-positive (20%), mid-negative (38%), and two low-stable groups (33%, 9%). In a study of upper-year elementary Canadian students, Duchesne et al. (57) identified three academic functioning classes: stable-high (63%), stable-low (23%), and declining (14%). At the start of secondary school, three and four distinct trajectory classes are consistently identified. In the U.S., Bowers and Sprott (58) reported four classes across the first three semesters of secondary school, with the largest groups comprising roughly 19% (high-achieving stable) and 57% each (mid-achieving stable) and two smaller groups (mid-decreasing 11%; low-increasing 14%). In China, Liu and Lu (45) found three classes during the first year of senior secondary school, with a high declining group making up nearly 80% of the sample and the remaining students divided across increasing or normative (moderate-stable) groups. Over a long span across secondary school, researchers have identified three profiles including high (stable or slightly-increasing), moderate declining grades, and low-increasing classes (59, 60).

The inconsistency in trajectory study findings may be due to differences in achievement assessments which are confounded by nation. Most studies of Chinese youth rely on outcomes of standardized exams in Chinese, English, and math (45, 52, 56), whereas studies of American students rely on GPA (58, 59) or single-subject scores [e.g., math; (54)], or subjects analyzed separately in Taiwan (60), and the Canadian study included a 2-item parent-reported composite of academic motivation and achievement (57). Moreover, studies did not consistently span the same academic period and were isolated to elementary (52, 54) or secondary school (58, 59). When middle school and secondary school samples were included in a single study, they were analyzed as one sample (45), precluding an analysis of differences in trajectories of middle and secondary school students. Many studies also span only 1.5–2 years (45, 58), which means we know little about long term patterns. These findings show that while person-centered analyses highlight clear heterogeneity in academic achievement, especially in secondary school, these studies do not explicitly assess how different groups of students change academically across school transitions.

School transitions frequently represent inflection points in academic achievement. Temporary interruptions or declines in grades have been observed following entry into both middle school (55) and secondary school (26, 30). Reyes et al. (31) documented that although students had similar grades pre-transition, the amount of decline immediately following the

transition (i.e., minimal, moderate, or major) was associated with their grades and absences across the remainder of secondary school, but the low sample size precluded statistical tests of these hypotheses. In a statewide longitudinal study, Schwerdt and West (61) found that students transitioning to middle school in Grade 6 or 7 experienced sustained achievement declines through Grade 10, whereas those remaining in K–8 schools were more stable. Students entering secondary school in Grade 9 also showed a GPA drop, followed by partial recovery. Vasquez-Salgado and Chavira (32) reported similar findings in Latino youth, noting steep GPA declines across the Grade 8–9 transition, particularly among higher-achieving students, with gender differences in post-transition slopes (girls declining, boys rising). Although informative, most studies rely on averages (assuming a single path for all students) or short-term comparisons (with limited assessments on either side of the transition). Few have used trajectory models with statistical discontinuities across a long span accounting for heterogeneity, leaving unclear whether observed declines reflect developmental changes or transition-linked turning points, and whether subsets of students respond differently.

1.3 Grades and Absences

Dräger et al. (62) recently found that school absences in the year before secondary school transition and in the 4 years after were most strongly associated with final secondary exam scores and highlighted the importance of the secondary school transition period. Although Benner and Graham (30) examined the impact of school transition on academic functioning using attendance and GPA, these highly correlated areas were looked at separately, and a joint trajectory was not examined, leaving readers to infer associations between the rate of change in increasing absences and declining GPA in secondary school. Grades and school absences are studied separately, but these domains are strongly interconnected. Indeed, national cohort studies consistently show that students who miss more school earn lower grades and test scores and are less likely to pursue postsecondary education (63, 64). This association holds across developmental stages and national contexts, suggesting that achievement and engagement are mutually reinforcing. As discussed above, both absences and grades display various pathways, and students following problematic trajectories often have lower achievement and higher dropout risk (1, 47, 49, 50).

Despite these parallels, to our knowledge, no published study has modeled grades and absences jointly to capture how they co-develop or whether transitions alter their association.

Instead, absences are usually treated as predictors or outcomes of achievement [e.g., (1, 5, 62)]. This segmented approach does not address whether subgroups of students experience coupled trajectories. For example, it is unclear if chronic absenteeism predominantly occurs among those on declining GPA pathways, or whether stable attendance buffers grade declines at school transitions. In the current study, we addressed this knowledge gap by applying multi-trajectory modeling to identify co-occurring patterns of grades and absences across Grades 5–12 and tested whether the secondary school transition (Grade 8–9) marked a discontinuity in these joint pathways.

1.4 Correlates

A range of individual and contextual factors shape students' academic trajectories, especially during school transitions. The earlier move to middle school can either foster resilience or act as a sensitizing event that heightens vulnerability to later adjustment difficulties (65, 66). Gender may moderate how students respond to school transition. For example, boys often struggle more with adapting to new expectations than girls (29, 67). On the other hand, Vasquez-Salgado and Chavira (32) found that although both genders showed declines in GPA during the secondary transition, girls' grades tended to continue declining while boys' GPA tended to increase across the first two years of secondary school. Socioeconomic status also matters, with achievement gaps between low- and high-SES youth widening after entry into secondary school (68). Transitions coincide with changes in peer relations, including bullying involvement (69), and shifts in internalizing problems such as depression and anxiety (26, 70, 71); these areas of psychosocial functioning are also associated with school absenteeism and poorer achievement (7, 72–75).

1.5 Current Study

In the present study, we build on prior research by jointly modeling school absences and grades across adolescence (i.e., Grades 5–12) in a large, longitudinal cohort of Canadian students. Although most prior studies have examined these domains separately, our unified approach identified heterogeneous multi-trajectory groups that reflect how absences and grades fluctuate together across adolescence. We also examined whether these joint pathways showed discontinuities at the secondary school transition, addressing a critical gap in the literature where transitions have rarely been modeled as potential turning points. Finally, we examined whether joint trajectory group membership was associated with individual and contextual correlates,

including gender, socioeconomic background, bullying victimization, depression and anxiety symptoms, and elementary school structure (i.e., K-8 vs. middle school).

Existing academic studies typically describe pre- and post-transition patterns or identify trajectories across schooling but do not statistically model the transition itself as a discontinuity, leaving it unclear whether observed changes reflect general developmental trends or true transition-linked turning points [see (69), for an example in bullying]. Although multi-trajectory modeling has been increasingly applied in areas such as mental health (71), it has rarely been used to study academic functioning, and no prior work has examined absences and grades in a single model across school transitions. Accordingly, we identified joint trajectories of grades and absences from Grades 5 through 12. Specifically, we tested whether these trajectories demonstrated discontinuities at the secondary school transition and examined if individual and contextual factors differentiated membership in distinct joint trajectory groups.

We predicted that we would identify four to six distinct joint trajectories reflecting different combinations of absences and GPA. Specifically, we anticipated low-stable, moderate-increasing, and high-chronic patterns of absences, with faster increases during secondary school, combined with at least three GPA trajectories (high-stable, moderate-declining, and low-stable). We further predicted overlapping trajectories, such that students with consistently low absences would correspond to high-stable GPA trajectories, whereas those with chronic or escalating absences would cluster in low or declining GPA groups. To support validity, classes were compared on parent-reported absences and standardized achievement test scores with the expectation that at-risk classes would display higher parent-reported days absent and lower standardized achievement scores.

Consistent with prior work, we also predicted that gender and socioeconomic background would differentiate trajectory group membership. Beyond demographic factors, we predicted that poorer psychosocial functioning (i.e., higher bullying victimization and higher depression and anxiety symptoms), examined as averages within elementary and secondary school for parsimony, would be found in academic functioning classes characterized by chronic or increasing absences and low and declining achievement. We also predicted that students experiencing middle school would have a higher likelihood of belonging to at risk groups compared to those in full elementary (K-8) schools (61).

2 Materials and Methods

2.1 Participants

Data were drawn from the McMaster Teen Study, a comprehensive multi-informant, multi-method, longitudinal study of students with a focus on interpersonal relationships, mental health, and academic achievement. In Time 1 of the study (spring 2008), Grade 5 students were recruited from 51 randomly selected schools from one large southern Ontario Public School Board. A total of 1023 students took part in the first year and 875 families agreed to take part in the longitudinal study; 703 participants took part in at least one follow-up between Time 2 and Time 8 (Grade 12), with 701 having data on grades and absences. In the first year of the study, students were on average 10.91 years old ($SD = 0.36$), half were girls (53%), and most were White (76%; 16% racially/ethnically-diverse; 8% missing). Most parents had completed postsecondary education (69.6%), and the reported median household income fell between \$70,000–\$80,000 CAD, comparable to both the municipal and provincial medians at the time of recruitment (www.statcan.gc.ca).

2.2 Procedure

University research ethics and parental consent and student assent were obtained annually. In the first year of the study, survey data were collected from students in schools and in subsequent years at participants' homes (paper/pencil or online) and parents/guardians completed a telephone interview. Official school records were obtained from the participating school board (Grades 5–12). See Vaillancourt et al. (69) for details.

2.3 Measures

2.3.1 Academic functioning

Teacher-reported grades and school absences from grades 5 to 12 were obtained from the participating school boards.

2.3.1.1 Days absent

In elementary school, the total number of days absent from school were obtained from school records. In secondary school, the number of classes missed per class were provided from school records; days absent per term was computed by an average of class absences and term absences were summed for a total score. Days absent per year were converted to a percentage score of the total instructional days absent, which were correlated across time, $r_s = .22-.83$.

2.3.1.2 Grades

In elementary school, letter grades were obtained for each term (T1-T3, 3 terms; T4, 2 terms²) for courses in English, French, math, science (T1-T4), social studies (T1 and T2), and history (T3 and T4). When participants had more than one grade within a subject (e.g., English reading, writing, and oral), grades were averaged prior to computing term averages. In secondary school, percentage scores were obtained for each course and converted to letter grades for consistency with elementary school data. Secondary school courses were diverse in the type of classes students could take and the academic stream. All available course grades were averaged. Grades ranged from <D- = 0 to A+ = 12 (D- = 50%–52%; D = 53%–56%; D+ = 57%–59%; C- = 60%–62%; C = 63%–66%; C+ = 67%–69%; B- = 70%–72%; B = 73%–75%; B+ = 76%–79%; A- = 80%–84%; A = 85%–89%; A+ = 90%–100%). Correlations between term GPAs within a given year (Grades 5–8) were high, $r_s = .86-.93$, as were GPA across years, $r_s = .65-.88$. Because of the varied courses that students could take in secondary school, a traditional reliability coefficient could not be computed. Secondary school GPAs from Grades 9–12 were highly correlated, $r_s = .63-.89$.

2.3.2 Latent class validation items

2.3.2.1 Parent-reported days absent

In Grades 6 to 12, parents reported the approximate number of days during the school year that their child was absent from school for any reason using a 6-point scale (0 = zero; 1 = 1–3 days; 2 = 4–6 days; 3 = 7–10 days; 4 = 11–20 days; 5 = more than 20 days).

2.3.2.1 Standardized test scores

In Grade 6, students completed Ontario's Education Quality and Accountability Office (EQAO) assessments in reading, writing, and mathematics and in Grade 9 completed a standardized math assessment. These province-wide standardized tests evaluate student achievement against Ontario curriculum expectations (76). EQAO results were obtained from the participating school board. The possible values for EQAO scores were 0.1 (below provincial expectations) to 4.9 (above provincial expectations).

2.3.3 Latent class correlates

2.3.3.1 Demographics

² During Time 4 (Grade 8) of data collection the Ministry of Education of Ontario changed provincial report card requirements. Instead of three term reports students received a preliminary report and two official term assessments. The school board provided the research team with the two official reports in Time 4 data collection.

In the first year of the study, student participants reported their gender (coded as: girl = 1; boy = 0). Participants and their parents reported their racial/ethnic background in Time 1 and Time 2 (i.e., White, Middle Eastern-Canadian, African/West-Indian-Canadian, South-Asian-Canadian, Asian-Canadian, Native-Canadian, South/Latin-American-Canadian, and Other). Although the racial/ethnic diversity is representative of the population from which participants were sampled, due to the low frequencies of racially/ethnically diverse groups, race/ethnic background was re-coded as White (coded 0) and racially/ethnically-diverse (coded 1). Household income and parental education were reported by parents in the parent interview in Time 1 (and Time 2 if not reported in Year 1). Income was reported using 8 categories (1 < \$20,000, 2 = 20,000–30,000, 3 = 30,000–40,000, 4 = 40,000–50,000, 5 = 50,000–60,000, 6 = 60,000–70,000, 7 = 70,000–80,000, 8 > 80,000) and the highest level of education attained was reported using 5 categories (1 = Did not complete secondary school, 2 = Completed secondary school, 3 = College diploma or trades certificate, 4 = University undergraduate degree, 5 = University graduate degree).

2.3.3.2 Elementary school type

In elementary school, some students were enrolled in a kindergarten to Grade 8 school (coded 0), and others experienced a middle school transition in Grade 6 or Grade 7 (coded 1).

2.3.3.3 Mental health symptoms

Depression and anxiety symptoms were measured from Grade 5 to Grade 12 using the Behavior Assessment System for Children-2 [BASC-2 (77)], with the child version administered in Grades 5 and 6 and the adolescent version in Grades 7–12. Items were rated on a 4-point scale (0 = *never* to 3 = *almost always*) or dichotomously (0 = *false*, 2 = *true*). Items that were common to both versions were used in the present study, following procedures by Krygsman and Vaillancourt (78). Subscales included symptoms of depression (12 items) and anxiety (10 items). Scales demonstrated excellent internal consistency (depression $\alpha = .87-.91$; anxiety $\alpha = .85-.91$). Items within subscales were summed within year and then averaged over schooling period to create composite scores for elementary and secondary school.

2.3.3.4 Bullying victimization

In Grade 5 to Grade 12 participants completed the Vaillancourt and Hymel Bullying Involvement Scale that assessed bullying victimization and perpetration (79, 80). Participants read a definition of bullying before reporting how often in the last 3 months that they have

experienced being bullied. Five items were asked including a general question, physical, verbal, social, and cyber bullying, with several examples of what the targeted behaviour entailed. Youth responded using a 5-point frequency scale (0 = *never*, 1 = *only once or twice*, 2 = *2 or 3 times a month*, 3 = *once a week*, 4 = *several times a week*). Items were averaged to create annual composite scores and had good internal consistency ($\alpha = .79-.82$). Elementary school (Grade 5 to Grade 8) and secondary school (Grade 9 to Grade 12) scores were averaged, respectively.

2.4 Statistical Analysis

2.4.1 Descriptive statistics and missingness

Participants in the analytic sample were compared to non-participants based on Grade 5 demographic variables (i.e., gender, ethnicity, household income, parent education) and Grade 5 days absent and GPA. Group comparisons were conducted using two-tailed independent-samples *t*-tests and chi-square tests of independence. Little's MCAR test was applied to assess the randomness of missing data in the analytic sample. Mplus was used to derive estimated means and correlations for absences and GPA using full information maximum likelihood estimation with robust standard errors to account for missing data and non-normality.

2.4.2 Average growth curves

Mplus version 8.11 (Muthén and Muthén, 2017) was used to estimate parallel-process piecewise latent growth curve models for GPA and absences, applying full information maximum likelihood to address missing data, with robust standard errors (i.e., maximum likelihood robust estimation; MLR) to account for deviations from normality. Consistent with Rioux et al. (113), the models incorporated level and slope discontinuities, enabling trajectories to shift around a specified event. The transition to secondary school was modeled as this event. Growth parameters for grades and absences were correlated. Each outcome included two segments: Grades 5–8 (pre-transition) and Grades 9–12 (post-transition), both specified with linear and quadratic parameters to capture potential nonlinear change. A level discontinuity at Grade 9 allowed for a level change in trajectories between Grades 8 and 9. Models included covariance terms between latent curve factors. Model adequacy was assessed using conventional fit statistics, with criteria of $CFI \geq 0.95$, $RMSEA \leq 0.06$, $SRMR \leq 0.08$, and a nonsignificant χ^2 test indicating acceptable fit (81).

We further examined if elementary and secondary school curves had a similar shape by setting slope and quadratic parameter estimates equal and testing equality using the Wald chi-

square test. We also examined if there was a marked change in absences and grades immediately before and after the secondary school transition by computing estimated scores in Grade 8 and Grade 9 and testing for equality using the Wald chi-square test.

2.4.3 Heterogeneous classes

Parallel-process Latent Class Growth Analysis [LCGA; also referred to as Group-Based Multi Trajectory Modeling, GBMTM (82)] was applied to identify unobserved subgroups of students who shared similar developmental patterns in absences and grades. Model fit was evaluated using the Bayesian Information Criterion (BIC), the Lo–Mendell–Rubin Likelihood Ratio Test (LMR-LRT), and the Bootstrapped Likelihood Ratio Test (BLRT), with classification quality supported by posterior probabilities greater than 0.70. Final models were selected based on statistical fit, theoretical clarity, and adequate group size ($\geq 2\%$ of the sample) with trajectory shapes consistent with the existing literature. Models with up to nine classes were estimated. Trajectory estimates at Grade 8 and Grade 9 were compared to evaluate changes around the transition to secondary school.

2.4.4 Class validation

To substantiate class configuration, we examined differences in parent-reported absences across time from Grade 6 to Grade 12 and standardized test scores in Grade 6 (i.e., reading, writing, math) and Grade 9 (i.e., math) using ANOVA and *post hoc* pairwise comparisons.

2.4.5 Class correlates

After identifying trajectory classes, we examined whether they were differentially associated with hypothesized correlates, including gender, socioeconomic background, and mental health functioning in elementary and secondary school. Preliminary chi-square tests and ANOVAs were conducted, and only correlates that were statistically significant at $p < .05$ were probed, using Fisher's Least Significant Difference test where homogeneity of variance tests were not rejected, and Dunnett's T3 where the test of homogeneity of variance was rejected. The Benjamini–Hochberg correction was applied to omnibus and post hoc tests to control for multiple comparisons (83).

2.4.6 Sensitivity analysis

A sensitivity analysis was conducted to examine whether the class structure could be replicated using a subset of participants that had data in both elementary school and in secondary school ($n = 573$).

3 Results

3.1 Participants

Of the 875 participants enrolled, 701 had data on absences/grades and comprised the analytic sample. Compared to participants not retained for longitudinal analyses, the analytic sample had higher parental education [$t(805) = -6.261, p < .001$], household income [$t(770) = -6.060, p < .001$] and were more likely to be White [82.4% vs. 64.3%; $\chi^2(1, N = 787) = 22.785, p < .001$]. No significant differences emerged between included and excluded participants on sex [$\chi^2(1, N = 875) = 0.037, p = .848$]. Those in the analytic sample differed on Grade 5 absences [$t(801) = 3.997, p < .001$] and GPA [$t(829) = -6.303, p < .001$]. Little's MCAR test suggested that data in the analytic sample were not missing completely at random [$\chi^2(880) = 1658.006, p < .001$]. Missingness on absences and grades in later waves was associated with earlier observed higher absences and lower grades. Consistent with standard practice (84), data were treated as missing at random using full information maximum likelihood (FIML) estimation in analyses.

3.2 Descriptive statistics and correlations

Table 1 includes the descriptive statistics for school absences and grades across time, as well as for correlates. Within-time correlations between absences and grades ($r_s = -.619$ to $-.126, p_s < .001$) and across-time associations were statistically significant, ranging from low to moderate ($r_s = -.573$ to $-.102, p_s < .05$). Stability across adjacent time points was high for absences ($r_s = .542$ to $.831, p_s < .001$) and grades ($r_s = .773$ to $.887, p_s < .001$).

3.3 Average trajectories – parallel-process piecewise latent growth curve models

3.3.1 Model fit

Parameter estimates for the discontinuity level and curve parallel-process latent growth models for grades and absences are presented in Table 2. The preliminary model yielded a non-positive definite residual covariance matrix. To remedy this, the quadratic variance components were successively constrained to 0 until the model ran without error (variance of elementary and secondary school quadratic parameters for absences and GPA constrained to 0). The resulting model fit was acceptable, $\chi^2(88) = 312.010, p < .001$, CFI = .950, RMSEA = .060 (90% CI = .053–.068), SRMR = .075 (see Figure 1). The intercept, slope, and level parameters had statistically significant variance estimates. In this model, the intercepts of percent days absent and GPA were negatively correlated, $r = -.203, p < .001$, as were slope factors in elementary, $r =$

-.465, $p < .001$, and secondary school, $r = -.637$, $p < .001$. The secondary school level change factors for absences and GPA were also correlated, $r = -.661$, $p < .001$, with larger increases in absences associated with larger decreases in GPA.

3.3.2 Secondary school transition

The elementary and secondary school portions of the absences trajectory were not equal, $\chi^2(2) = 101.329$, $p < .001$, and there was an increase of 2.76% of instructional days between Grade 8 and Grade 9, $\chi^2(1) = 65.918$, $p < .001$. In elementary school, the average absences curve was slightly increasing, with a statistically significant increase across the secondary school transition, and the secondary school average curve increased at a higher rate than in elementary school.

The elementary and secondary school portions of the GPA trajectory were not equal, $\chi^2(2) = 68.687$, $p < .001$. In elementary school, the average GPA curve was flat, whereas in secondary school, the average GPA curve was decreasing with a slight rebound in Grade 12. The Grade 8 and Grade 9 average estimated GPA scores were not different, $\chi^2(1) = 2.262$, $p = .133$.

3.4 Heterogeneous classes: Parallel-process latent class growth models

The seven, eight, and nine-class models did not replicate the best log-likelihood, even with increased random starts. These higher-order models consistently identified a class of three individuals. To aid in model identification, these cases were then excluded from analysis and all solutions were re-run. Fit indices are shown in Table 3. The lowest log-likelihood was not replicated for the nine-class solution and was not considered a viable solution. BIC declined steadily from the two- through eight-class solutions. All models produced posterior probabilities above .70, entropy between .884 and .901, and significant BLRT values. The seven- and eight-class solutions did not add conceptual clarity beyond the six-class solution. The six-class model had adequate group sizes and yielded conceptually meaningful distinctions. Starting values from this model were used to test a model with twice the random starts to ensure the lowest loglikelihood value was replicated. For reasons of model fit, parsimony, and interpretability, the six-class solution was selected as the final latent class growth model (see Figure 2; Table 4).

Three classes demonstrated stable absences in elementary school with slightly increasing absences in secondary school that were paired with relatively stable trajectories of GPA, while another three classes had chronically increasing absences over elementary and secondary school, which were paired with variable trajectories of GPA. One third of students followed a high-

achieving increasing trajectory for GPA (“As”) across Grades 5–12 ($n = 225$; 32.2%) with low absences in elementary school that slightly increased across secondary school. Over one quarter of students showed a similar pattern (slight increase and relatively stable secondary school) with slightly lower intercept (“Bs”) ($n = 203$; 29.1%). The absences trajectory for this class was similar to the “As” class. Class 3 ($n = 123$; 17.6%; “B/Cs”) displayed stable elementary grades, starting at a 6.81 GPA (C+/B–) intercept, that remained stable over secondary school. Students in this class also followed a low trajectory of absences that increased over secondary school, and exceeded the chronically absent cutoff (i.e., 10%) by Grade 12.

The remaining three classes demonstrated more variable trajectories. Class 4 showed an increasing elementary absences trend with steeply increasing absences across secondary school, reaching an estimated 27% days absent by Grade 12. This pattern of absences was coupled with stable B-level GPA through elementary school and into Grade 9 which declined across the remainder of secondary school ($n = 57$; 8.2%; “increasing absences/elementary Bs, secondary school decline”). Class 5 showed low-stable elementary school absences, increasing significantly over the transition, with quadratic growth in secondary school, reaching 40% days absent by Grade 12. This was paired with declining C-level grades in elementary school that continued through Grade 11, increasing slightly in Grade 12 ($n = 67$; 9.6%; “increasing absences/declining Cs”). Class 6 displayed chronically increasing absences across elementary school, with a marked increase in Grade 8 to Grade 9, before declining across secondary school. The trend for elementary school GPA was like Class 5; however, they exhibited more than a full letter grade drop in GPA from Grade 8–9 before increasing to nearly Grade 5 levels in Grade 12 ($n = 23$; 3.3%; “chronically absent/elementary Cs/transition decline-rebound”).

3.4.1 Class validation

To substantiate the class structure, we examined differences between academic functioning classes on parent-reported absences in Grades 6–12 and standardized test scores in Grade 6 and Grade 9. The classes differed on parent-reported days absent in all seven years examined, $ps < .001$. In Grade 6 and Grade 7, the three stable absences classes and the increasing absences/declining Cs classes did not differ and were lower than the remaining two classes with elevated absences and changed over time in line with the estimated proportion of days. In Grade 9 and 10, the increasing absences/elementary Bs- secondary school decline and increasing absences/declining Cs classes were higher than the stable absences groups, and lower than the

elevated trajectory class. In Grades 11 and 12, there were no differences between the three elevated trajectories on parent-reported absences. The classes also differed on EQAO scores in Grade 6 reading, $F(5, 666) = 84.585, p < .001$, writing, $F(5, 668) = 67.946, p < .001$, and math, $F(5, 664) = 72.001, p < .001$. or all subjects, the Stable absences/As class reported the highest scores, followed by the Stable absences/Bs class, then the Increasing absences/Bs- secondary school decline class (writing scores not different). All classes with increasing/chronic absences scored similarly on math and writing, with the Stable absences/B/Cs class outperforming the chronic absences/elementary Cs-transition decline-rebound class. Classes also differed on the Grade 9 standardized math assessment, $F(5, 668) = 45.316, p < .001$, with Stable absences/As and Stable absences/Bs achieving higher scores than the other four classes.

3.4.2 Class correlates

All results are presented in Table 5. The Benjamini-Hochberg correlation was performed on Omnibus chi-square and F statistics (no changes) and for pairwise comparisons, where 14 of the 38 statistically significant (i.e., $p < .05$) comparisons were corrected and no longer considered statistically significant.

3.4.2.1 Demographics

Gender was significantly associated with class membership with a large effect size ($\phi = .263$), with more girls than expected (standardized residual = 3.2) and fewer boys than expected (standardized residual = -3.4) in the Stable absences/As class and fewer girls expected (standardized residual = -3.2) and more boys than expected (standardized residual = 3.4) in the Stable absences/B/Cs class. Race/ethnicity and elementary school type (Kindergarten to Grade 8 vs. middle school) were not associated with class membership. Classes also differed by household income (moderate-large effect; $\eta^2 = .124$). The “Chronic absences/elementary Cs transition decline-rebound” class had the lowest household income (exception “Increasing absences/Declining Cs”). For parental education, Stable absences/As and Stable absences/Bs had higher parental education than other classes (large effect; $\eta^2 = .174$).

3.4.2.2 Bullying victimization

Although statistically significant omnibus tests were found for bullying victimization in elementary and secondary school, the effect sizes were small. The Levene's test of homogeneity of variance was statistically significant, and pairwise comparisons were completed with the Dunnett T3 test. Following the BH corrections for multiple testing, in elementary school, the

Stable absences/As class reported lower bullying victimization compared to the Increasing absences/declining Cs class. Although the Chronic absences/elementary Cs-transition decline-rebound class reported the highest victimization rates, the relatively higher standard errors likely precluded detection of a statistically significant result. There were no differences in secondary school bullying victimization scores.

3.4.2.3 Mental health symptoms

The six academic functioning classes were found to differ on mental health symptomology, with small to medium effect sizes ($\eta^2 = .015-.069$). In elementary school, the Stable absences/As class reported lower depression scores compared to the Stable absences/B/Cs. The Chronic absences/elementary Cs transition decline-rebound class reported higher depression symptoms than the Stable absences/As and Stable absences/Bs classes. There were no differences in anxiety symptoms in elementary school. In secondary school, there were no statistically significant pairwise comparisons between classes for depression symptoms. The Stable absences/B/Cs class reported lower secondary school anxiety symptoms than the “Increasing absences/Elementary Bs secondary school decline” and the “Chronic absences/Elementary Cs transition decline-rebound” classes.

3.5 Sensitivity analysis

Classes were estimated using a subset of participants who had data in elementary school and in secondary school ($n = 573$). The structure and trajectories of academic functioning classes replicated those found with the full sample. Specifically, class sizes were within 0.17%-2.77% of classes estimated using FILM with participants with any data see Supplementary Figure S1.

4 Discussion

4.1 Summary of Key findings, interpretation, and integration

We followed a large cohort of Canadian students from Grades 5 through 12 to examine the co-development of school absences and academic achievement, with attention to changes surrounding the secondary school transition from Grade 8 to Grade 9. On average, absences increased, and GPA remained relatively stable across the eight-year period, with the steepest changes emerging after entry to secondary school. Using piecewise latent growth models, we found a significant discontinuity in absences at Grade 9; compared to Grade 8, students missed approximately 3% more instructional days in the first year of secondary school which was followed by a continued upward trend through Grade 12. GPA trajectories, by contrast, were

stable across elementary school, and declined only modestly in secondary school. We also observed that higher percent days absent and increasing absences trajectories were associated with lower GPAs and declining GPA trajectories. Further, significant variation in parameter estimates indicated heterogeneity in trajectories of absences and GPAs.

Person-centered analyses revealed six distinct joint trajectories of absences and GPA. Most students were in one of three groups that exhibited consistently low elementary school absences, increasing slightly in secondary school and relatively stable academic achievement with high (As), moderate (Bs), or mid-range (B/Cs) GPAs. The remaining one-fifth of students were classified in one of three groups demonstrating chronic or increasing absences, coupled with distinct GPA trajectories: (1) increasing absences with stable elementary B-level GPAs declining in secondary school, (2) increasing absences with declining Cs, and (3) chronic absences with elementary C-level GPAs with transition decline–rebound. Class membership was differentiated by gender, socioeconomic status (SES), and mental health symptoms. Girls were overrepresented in the stable absences/stable As class, and boys were overrepresented in the stable absences/stable B/Cs class. Students in the increasing absences/declining GPA classes had the lowest SES. The chronic increasing absences class had the highest depression symptoms scores in elementary school (compared to stable absences/As and stable absences Bs) with a trend in secondary school, and higher anxiety symptoms in secondary school compared to the stable B/Cs class. These results support that absences and academic achievement are developmentally intertwined and that the transition to secondary school marks a turning point in this coupling, particularly for students already showing early risk indicators.

Our results converge with international findings showing increased school absenteeism and, for some students, academic difficulties during secondary school transitions (24, 26, 70). Both domains demonstrated the characteristic pattern of positive, stable functioning in elementary school followed by divergence and widening disparities during secondary school. Although there are no published Canadian longitudinal studies for comparison, our average trajectory for absences appears remarkably similar to the cross-sectional absences by grade figure published by the Toronto District School Board (42). These findings extend the robust pattern of transition-linked academic vulnerability identified in U.S. and European samples (30, 46, 49) to a Canadian context where such longitudinal data have been lacking.

In the absence of comparable joint-trajectory studies, our results are consistent with prior research on single construct trajectories indicating that most students maintained low absence levels (46, 48, 49), whereas a subset displayed escalating or chronic absenteeism (1, 47, 50). Our GPA trajectories align with prior research showing most students followed high- or moderate-stable pathways, whereas a smaller proportion showed consistently low or declining grades (54, 58–60). The three stable GPA groups in our study (A, B, and B/C level) correspond to these normative patterns, while the declining and chronically low trajectories follow risk groups reported in U.S. and Chinese samples (45, 56). Extending prior short-term studies, our eight-year data show that GPA recovery after decline was uncommon, indicating that achievement gaps often consolidate following the high-school transition. The chronic absences class showed notable variation in secondary school in both absences and GPA, which fluctuated in tandem. This small class, representing 3% of the sample, did demonstrate a coupled pattern of decline in academic functioning followed by improvement; however, the class had trajectory parameter estimates with high standard errors relative to other classes, leading us to use caution interpreting findings involving this class. It is possible that this class was composed of students who were absent from school for a variety of reasons (e.g., high medical needs; severe truancy) and encompassed heterogeneity within itself, which could contribute to the lack of differences in examining class correlates. For example, Dräger et al. (1) found separate classes with strongly increasing authorised absences (1.62%) and strongly increasing unauthorised absences (0.82%).

Replicating prior findings, we found gender differences by class membership, aligning with Alhadabi and Li (59), who found higher and more stable achievement trajectories among girls. Our results also support international evidence that SES remains a central determinant of academic functioning (64, 68), underscoring the need to address structural inequities that contribute to attendance-related disengagement. Unlike others who have found that racially/ethnically diverse students were more likely to follow at-risk academic trajectories of absences (46, 47, 50) or grades (59), we found that academic functioning classes did not vary by race/ethnicity. It is possible that findings may have been different if we had accounted for the school context of racial composition. Minority students do better after school transition when they are in a school with a higher proportion of same race/ethnic peers (24, 30). Findings may also have been masked due to our crude classification of White and racially/ethnically diverse backgrounds (an analytic decision based on low representation of several minorities) or by

failure to consider other factors that impact Canadian children, such as rurality. In Canada, territorial findings by the Department of Education Government of Yukon (85) indicate that half (51%) of students missed 20 or more days of school, and this was especially problematic for rural elementary (74%) and rural secondary (80%) students with similar rates reported by students who identified as Yukon First Nation (79% overall; 77% elementary; 81% secondary). More research is needed on the nuances of the Canadian landscape.

Beyond demographic factors, psychosocial correlates further differentiated academic functioning classes, although their effects were comparatively modest. Consistent with research linking peer difficulties and emotional problems to school engagement (7, 72, 73, 86–88), students in classes marked by increasing or chronic absences and declining grades reported higher depression and, to a lesser extent, anxiety symptoms. Surprisingly, larger effects between groups were not found, given the consistent small to moderate effects found between emotional symptoms and academic functioning (72, 73, 89). Differences in bullying victimization were small but followed the same gradient, albeit few statistically significant comparisons, with higher victimization in lower-achieving, high-absence groups. By combining scores for depressive symptoms, anxiety symptoms, and bullying victimization across the entire schooling period, we may have unintentionally masked year-to-year changes that could emerge with a more fine-grained analysis, especially given the variation observed across the three at-risk classes. Finally, elementary school structure (K-8 vs. middle-school) was unrelated to trajectory membership, in contrast to studies showing that students attending middle school experience declines in grades and attendance compared to those in K-8 schools (25, 90, 91). However, others have shown that school configuration alone exerts minimal influence on academic outcomes once individual and family factors are considered (61).

Our study extends prior research in several important ways. First, to our knowledge, it is the first Canadian longitudinal analysis spanning eight years of schooling, including mid-elementary school through secondary school with official school-record data. Second, by jointly modeling absences and GPA, we provide evidence that these two indices of academic functioning co-evolve. Previous research has largely treated one as a predictor of the other [e.g., (1, 5, 62)], overlooking the possibility that the two domains of functioning are mutually reinforcing, as has been suggested (6, 44, 49). The present multi-trajectory approach revealed that students with persistently high or increasing absences rarely sustain high GPA levels, and

that the combination of chronic absenteeism and declining grades often emerges around transition years. These findings also refine prior reports of transition-linked achievement declines. Whereas Benner and Graham (30) and Vásquez-Salgado and Chavira (32) documented sharp drops in grades at the transition, our results indicate this was true for a small group of students. The findings suggest that the move from elementary to secondary school may represent a sensitive period for some students, especially those already experiencing socioeconomic or emotional difficulties.

4.2 Mechanisms and Explanatory Frameworks

The study findings support conceptualizing academic functioning as a single system of engagement and achievement, rather than separate constructs. For some students, changes in function coincided with the secondary school transition. The observed patterns here can be interpreted using complementary frameworks. From a dynamic systems perspective (92, 93), absences and GPA form interdependent subsystems within a larger network of academic functioning. Perturbations at the school transition, such as increased academic demands, reduced teacher continuity, and changes in the peer group, can destabilize established patterns and prompt reorganization toward new equilibrium states such as resilience, disengagement, or re-engagement. As an example, in the chronic absence/transition decline–rebound class, students' absences spiked at the transition but partially recovered by Grade 12, suggesting potential re-stabilization following adaptation. Other students were more resilient to the school transition, following developmentally appropriate pathways of attendance and stable achievement. Alternatively, the secondary school transition can be viewed as a transition-linked turning point, that is, the overlap of a significant life event (i.e., the transition into secondary school) on a developmental process (i.e., adolescence). This period can be a particularly vulnerable time as it also coincides with profound developmental changes in cognition, and social, emotional, and biological development (94), leading to substantial changes in psychosocial functioning in the immediate and long-term (95). Students with differing prior experiences may respond to such transitional events in varying ways including the emergence of new behaviour, discontinuation of existing behaviour, or changes in behavioural patterns (95). In the present study, most students continued on a path of developmentally normative growth in absences and maintained consistent GPAs; however, others were vulnerable to the transition, experiencing changes in their attendance and achievement.

Increased absences can disrupt instructional continuity, which in turn reduces achievement and reinforces school avoidance. This feedback loop is well documented in previous research (5, 96). Socioeconomic disparities may exacerbate this cycle by limiting access to transportation, health care, and parental monitoring (3). Mental health difficulties, particularly depressive symptoms, can further impair concentration and motivation (97), leading to both increasing absences and decreasing grades (73). Conversely, strong parental and teacher support, school belonging, and consistent expectations may sustain engagement through school transition related stress (70, 98).

4.3 Strengths and Limitations

This study has several notable strengths. We used objective school-record data on absences and grades, minimizing recall and social desirability biases inherent in self- or parent-report measures. The eight-year longitudinal design with 4 years on either side of the secondary school transition allowed us to account for adequate time before the transition as well as how adaptation to the secondary school transition unfolded across secondary school, two notable limitations in extant school transition research (26, 70). Testing a baseline variable-centered model allowed us to examine the strength of association between curves on absences and grades. Employing parallel-process piecewise growth models and multi-trajectory analyses provided a rigorous test of whether the secondary school transition constitutes a developmental discontinuity and identified subgroups following distinct joint pathways. Class validation using parent-reported absences and standardized test scores adds convergent validity to the six-class solution. The subsample sensitivity analysis yielded comparable classes, supporting the robustness of our findings. Finally, we provide much-needed data on Canadian students (35).

Notwithstanding the notable strengths of the study, several limitations warrant consideration. First, absence records did not distinguish excused (e.g., health) vs. unexcused (e.g., skipping class) absences. Prior work shows these forms of absenteeism have differential rates of change over compulsory schooling (1) and relate differently to grades, with a higher proportion of unexcused absences more strongly related to lower test scores (96). Second, for consistency all grade data were converted to letter grades; the conversion likely reduced the variability that would have been observed in continuous percentage scores. Third, data were drawn from a single Ontario public school board, limiting generalizability to other school

districts, provinces, and territories. Fourth, attrition was modest but systematic; students with lower GPAs and higher absences at baseline were underrepresented in later waves, potentially underestimating the prevalence of chronic absence trajectories. Fifth, the chronic absence class had a small sample size, and the comparison of correlates may have been underpowered to detect differences between classes. Sixth, correlates of bullying victimization and mental health symptoms were examined concurrently rather than dynamically, precluding conclusions about directionality.

4.4 Future Directions

Future research should expand on the present findings in several ways. Although we have begun to understand how the elementary to secondary school transition influences trajectories of academic functioning, bullying victimization (69), and internalizing problems (71), it remains unclear how these areas of functioning are associated in different academic periods, particularly across school transitions. Models that parse within-person and between-person variation, such as the random-intercept cross-lagged panel model (99, 100) or the autoregressive latent trajectory model with structured residuals model (101), could test temporal precedence and cascading effects among absences, achievement, peer relationships, and emotional well-being (102). Such models allow testing of how factors may initiate a cascade of school withdrawal to declining achievement, as well as plausible mechanisms. For example, bullying victimization may prompt school refusal, leading to loneliness and internalizing symptoms, resulting in achievement declines. In addition, multi-trajectory modeling approaches with simultaneous trajectories of academic functioning, bullying victimization, and internalizing symptoms would clarify the degree to which these domains co-develop and identify distinct subgroups characterized by similar patterns of risk and adaptation across the school transition.

Future research should also examine early adult functional outcomes (e.g., post-secondary enrollment and completion, earnings, positive relationships) of differing joint trajectory classes. For example, students with declining GPAs and those with low-increasing GPAs over the first 1.5 years of secondary school were far more likely to drop out of secondary school compared to mid-achieving students (58), underscoring the long-term risks associated with these lower-achieving trajectories. Extending this work beyond a deficit-focused framework to include indicators of positive behavioural adjustment, such as prosocial behaviour and school engagement, would further help identify resilient developmental profiles, which could inform

prevention and intervention programs. Incorporating reason-coded absence data (i.e., excused vs. unexcused) would allow finer-grained analyses of risk mechanisms as unexcused absences are more related to academic risk than excused (21).

As this is the first eight-year study of Canadian students' absence and grade data, results require replication, not only with the time frame, but also in other provinces across the country. Given Canada's increasingly diverse population (103), future studies should examine cultural and regional differences, including Indigenous, First-Nations, Métis, and rural communities in northern Canada where absenteeism rates remain disproportionately high compared to non-First Nations-identifying and urban students (85). Indeed, researchers have highlighted the urgent need to understand school attendance supports among Indigenous students in Canada (104). Understanding these Canada-specific contextual factors is essential for designing equitable policy. Finally, for studies including data collected during the COVID-19 pandemic, careful attention should be given to school closures and other mitigating factors, as school absenteeism and grades were adversely affected (105–107).

4.5 Implications

The findings of the present study have several practical implications. At the practice level, the results underscore the importance of monitoring both school attendance and GPA as early indicators of disengagement. Schools could integrate routinely collected attendance and grade data into early warning systems to flag students exhibiting upward absence trends or GPA declines, especially during school transition years. Kearney et al. (108) highlighted the potential early warning sign that school attendance problems play in identifying students at risk for academic failure, mental health difficulties, and school dropout, emphasizing the importance of early detection and intervention to prevent these cascading adverse outcomes. At the policy level, the results reinforce calls for standardized national reporting of attendance metrics (35) to enable longitudinal tracking and cross-provincial/territorial comparisons. Finally, our findings highlight the need for multi-tiered intervention approaches (109). Universal strategies such as consistent attendance messaging and supportive school climates should be complemented by targeted supports for youth exhibiting early risk (e.g., frequent absences in late elementary school; increasing absences in early secondary school) and intensive interventions for those with chronic absence (11). Addressing SES-related disparities through equitable access to health, transportation, and academic resources remains critical (110). Several Canadian provincial

governments have proposed such principles of early warning and tiered intervention through formal policy directives [e.g. (111, 112)].

5 Conclusion

This study provides the first Canadian longitudinal evidence that school attendance and academic achievement are developmentally intertwined across the transition to secondary school. Although most students maintain consistent attendance and achievement, a significant minority follow risk trajectories marked by increasing absences and declining GPA, particularly among students with lower SES. Students in the most at-risk classes showed slightly increased bullying victimization and internalizing symptoms. Monitoring the joint progression of school absences and achievement can help educators identify students at risk of disengagement before such patterns become entrenched. Supporting continuity of learning and connection during school transitions is therefore essential to promoting long-term educational success.

Data availability statement

The data that support the findings of this study are available on reasonable request to the corresponding author. The data are not publicly available due to privacy and ethical restrictions associated with longitudinal studies. Requests to access the datasets should be directed to Tracy Vaillancourt.

Ethics statement

The studies involving humans were approved by McMaster Research Ethics Board, McMaster University, and the Social Sciences and Humanities Research Ethics Board, University of Ottawa. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin and participants provided assent/consent.

Author contributions

HB: Data curation, Formal analysis, Investigation, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. TV: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Visualization, Writing – review & editing.

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Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. Tracy Vaillancourt declared that she was an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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Supplementary material

The Supplementary Material for this article can be found online at:

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References

1. Dräger J, Klein M, Sosu E. Trajectories of school absences across compulsory schooling and their impact on children's academic achievement: an analysis based on linked longitudinal survey and school administrative data. *PLoS One*. (2024) 19(8):e0306716. doi: 10.1371/journal.pone.0306716
2. Keppens G. School absenteeism and academic achievement: does the timing of the absence matter? *Learn Instr*. (2023) 86(August):101769. doi: 10.1016/j.learninstruc. 2023.101769
3. Klein M, Sosu E. School absences, academic achievement, and adolescents' post- school destinations. *Oxford Rev Educ*. (2025) 51(3):339–56. doi: 10.1080/03054985. 2024.2308520
4. Klein M, Sosu EM, Dare S. School absenteeism and academic achievement: does the reason for absence matter? *AERA Open*. (2022) 8:23328584211071115. doi: 10.1177/23328584211071115
5. Liu J, Lee M, Gershenson S. The short- and long-run impacts of secondary school absences. *J Public Econ*. (2021) 199:104441. doi: 10.1016/j.jpubeco.2021.104441
6. Roderick M, Camburn EM. Risk and recovery from course failure in the early years of high school. *Am Educ Res J*. (1999) 36(2):303–43. doi: 10.3102/00028312036002303
7. Gubbels J, Van Der Put CE, Assink M. Risk factors for school absenteeism and dropout: a meta-analytic review. *J Youth Adolesc*. (2019) 48(9):1637–67. doi: 10.1007/s10964-019-01072-5
8. Dräger J, Klein M, Sosu E. The long-term consequences of early school absences for educational attainment and labour market outcomes. *Br Educ Res J*. (2024) 50(4):1636–54. doi: 10.1002/berj.3992
9. French MT, Homer JF, Popovici I, Robins PK. What you do in high school matters: high school GPA, educational attainment, and labor market earnings as a young adult. *East Econ J*. (2015) 41(3):370–86. doi: 10.1057/eej.2014.22
10. Kearney CA. School absenteeism and school refusal behavior in youth: a contemporary review. *Clin Psychol Rev*. (2008) 28(3):451–71. doi: 10.1016/j.cpr.2007.07.012
11. Kearney CA, González C, Graczyk PA, Fornander MJ. Reconciling contemporary approaches to school attendance and school absenteeism: toward promotion and nimble response, global policy review and implementation, and future adaptability (part 1). *Front Psychol*. (2019) 10:2222. doi: 10.3389/fpsyg.2019.02222

12. Maravilla JC, Betts KS, Couto e Cruz C, Alati R. Factors influencing repeated teenage pregnancy: a review and meta-analysis. *Am J Obstet Gynecol.* (2017) 217(5):527–545.e31. doi: 10.1016/j.ajog.2017.04.021
13. Sörberg Wallin A, Koupil I, Gustafsson J-E, Zammit S, Allebeck P, Falkstedt D. Academic performance, externalizing disorders and depression: 26,000 adolescents followed into adulthood. *Soc Psychiatry Psychiatr Epidemiol.* (2019) 54(8):977–86. doi: 10.1007/s00127-019-01668-z
14. Bradley BJ, Greene AC. Do health and education agencies in the United States share responsibility for academic achievement and health? A review of 25 years of evidence about the relationship of adolescents' academic achievement and health behaviors. *J Adolesc Health.* (2013) 52(5):523–32. doi: 10.1016/j.jadohealth. 2013.01.008
15. Gakh M, Coughenour C, Assoumou BO, Vanderstelt M. The relationship between school absenteeism and substance use: an integrative literature review. *Subst Use Misuse.* (2020) 55(3):491–502. doi: 10.1080/10826084.2019.1686021
16. Kendler KS, Ohlsson H, Fagan AA, Lichtenstein P, Sundquist J, Sundquist K. Nature of the causal relationship between academic achievement and the risk for alcohol use disorder. *J Stud Alcohol Drugs.* (2020) 81(4):446–53. doi: 10.15288/jsad. 2020.81.446
17. Barnert ES, Perry R, Shetgiri R, Steers N, Dudovitz R, Heard-Garris NJ, et al. Adolescent protective and risk factors for incarceration through early adulthood. *J Child Fam Stud.* (2021) 30(6):1428–40. doi: 10.1007/s10826-021-01954-y
18. Epstein S, Roberts E, Sedgwick R, Polling C, Finning K, Ford T, et al. School absenteeism as a risk factor for self-harm and suicidal ideation in children and adolescents: a systematic review and meta-analysis. *Eur Child Adolesc Psychiatry.* (2020) 29(9):1175–94. doi: 10.1007/s00787-019-01327-3 in early
19. Gunnell D, Löfving S, Gustafsson J-E, Allebeck P. School performance and risk of suicide adulthood: follow-up of two national cohorts of Swedish schoolchildren. *J Affect Disord.* (2011) 131(1):104–12. doi: 10.1016/j.jad. 2011.01.002
20. Kosik R, Fan A, Mandell G, Su T-P, Nguyen T, Chen J, et al. Academic performance in childhood and the risk of attempting suicide as an adult. *Eur J Psychiatry.* (2017) 31(2):73–9. doi: 10.1016/j.ejpsy.2017.03.002

21. Henderson CM, Fantuzzo JW. Challenging the core assumption of chronic absenteeism: are excused and unexcused absences equally useful in determining academic risk Status? *J Educ Students Placed Risk (JESPAR)*. (2023) 28(3):259–93. doi: 10.1080/10824669.2022.2065636
22. Attendance Works. *Chronic Absence (2025)*. Available online at: <https://www.attendanceworks.org/chronic-absence/the-problem/> (Accessed October 10, 2025).
23. Organisation for Economic Co-operation and Development (OECD). *Education GPS (2023)*. Available online at: <https://gpseducation.oecd.org/CountryProfile?primaryCountry=CAN> (Accessed October 10, 2025).
24. Benner AD. The transition to high school: current knowledge, future directions. *Educ Psychol Rev.* (2011) 23(3):299–328. doi: 10.1007/s10648-011-9152-0
25. Eccles JS, Lord S, Midgley C. What are we doing to early adolescents? The impact of educational contexts on early adolescents. *Am J Educ.* (1991) 99(4):521–42. doi: 10.1086/443996
26. Evans D, Borriello GA, Field AP. A review of the academic and psychological impact of the transition to secondary education. *Front Psychol.* (2018) 9:1482. doi: 10.3389/fpsyg.2018.01482
27. Spernes K. The transition between primary and secondary school: a thematic review emphasising social and emotional issues. *Res Papers Educ.* (2022) 37(3):303–20. doi: 10.1080/02671522.2020.1849366
28. Beatson R, Quach J, Canterford L, Farrow P, Bagnall C, Hockey P, et al. Improving primary to secondary school transitions: a systematic review of school- based interventions to prepare and support student social-emotional and educational outcomes. *Educ Res Rev.* (2023) 40:100553. doi: 10.1016/j.edurev.2023. 100553
29. Rice F, Ng-Knight T, Riglin L, Powell V, Moore G, McManus IC, et al. Pupil mental health, concerns and expectations about secondary school as predictors of adjustment across the transition to secondary school: a longitudinal multi- informant study. *School Mental Health.* October. (2021) 21:279–98. doi: 10.1007/ S12310-021-09415-Z
30. Benner AD, Graham S. The transition to high school as a developmental process among multiethnic urban youth. *Child Dev.* (2009) 80(2):356–76. doi: 10.1111/j.1467-8624.2009.01265.x

31. Reyes O, Gillock KL, Kobus K, Sanchez B. A longitudinal examination of the transition into senior high school for adolescents from urban, low-income Status, and predominantly minority backgrounds. *Am J Community Psychol.* (2000) 28(4):519–44. doi: 10.1023/A:1005140631988
32. Vasquez-Salgado Y, Chavira G. The transition from middle school to high school as a developmental process among latino youth. *Hisp J Behav Sci.* (2014) 36(1):79–94. doi: 10.1177/0739986313513718
33. U.S. Department of Education. *Chronic Absenteeism (2025)*. Available online at: <http://www.ed.gov/teaching-and-administration/supporting-students/chronic-absenteeism> (Accessed October 10, 2025).
34. Department for Education, Government of the United Kingdom. *Working Together to Improve School Attendance (2024)*. Available online at: <https://www.gov.uk/government/publications/working-together-to-improve-school-attendance>, GOV.UK (Accessed October 6, 2025).
35. Whitley J, McBrearty N, Rogers MA, David Smith J. The current state of school attendance research and data in Canada. *Educ Sci.* (2025) 15(8):964. doi: 10.3390/educsci15080964
36. Organisation for Economic Co-operation and Development (OECD). *PISA: Programme for International Student Assessment (2025)*. Available online at: <https://www.oecd.org/en/about/programmes/pisa.html> (Accessed October 10, 2025)
Available
37. Statistics Canada. *National Longitudinal Survey of Children and Youth (NLSCY) (2009)*. online at: <https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=4450> (Accessed October 9, 2025).
38. Statistics Canada. *Canadian Health Survey on Children and Youth—2023 (2023)*. Available online at: https://www23.statcan.gc.ca/imdb/p3Instr.pl?Function=assembleInstr&a=1&&lang=en&Item_Id=1509628#qb1514463 (Accessed October 9, 2025).
39. Statistics Canada. *Canadian Health Survey on Children and Youth—2025 (2025)*. Available online at: https://www23.statcan.gc.ca/imdb/p3Instr.pl?Function=assembleInstr&lang=en&Item_Id=1574659 (Accessed October 9, 2025).

40. Birioukov A. Absent on absenteeism: academic silence on student absenteeism in Canadian education. *Canad J Educ.* (2021) 44(3):718–31. doi: 10.53967/cje-rce.v44i3.4663
41. Hancock KJ, Shepherd CCJ, Lawrence D, Zubrick SR. *Student Attendance and Educational Outcomes: Every Day Counts*. Canberra: Department Of Education, Employment Workplace Relations (2013). 263 pages. doi: 10.13140/2.1.4956.6728
42. Brown RS. Absenteeism in the TDSB. *Res Today.* (2009) 4(1). (2 page document). Toronto District School Board. Available online at: https://www.tdsb.on.ca/Portals/research/docs/reports/RT_Absenteeism.pdf
43. Balfanz R, Byrnes V. *The Importance of Being There: A Report on Absenteeism in the Nation's Public Schools*. Baltimore: Johns Hopkins University Center for Social Organization of Schools (2012).
44. Kieffer MJ, Marinell WH, Neugebauer SR. Navigating into, through, and beyond the middle grades: the role of middle grades attendance in staying on track for high school graduation. *J Sch Psychol.* (2014) 52(6):549–65. doi: 10.1016/j.jsp.2014.09.002
45. Liu Y, Lu Z. Trajectories of Chinese students' sense of school belonging and academic achievement over the high school transition period. *Learn Individ Differ.* (2011) 21(2):187–90. doi: 10.1016/j.lindif.2010.12.007
46. Wei W. Exploring patterns of absenteeism from prekindergarten through early elementary school and their associations with children's academic outcomes. *AERA Open.* (2024) 10:23328584241228212. doi: 10.1177/23328584241228212
47. Simon O, Nylund-Gibson K, Gottfried M, Mireles-Rios R. Elementary absenteeism over time: a latent class growth analysis predicting fifth and eighth grade outcomes. *Learn Individ Differ.* (2020) 78:101822. doi: 10.1016/j.lindif.2020.101822
48. Tunkkari M, Kiuru N, Virtanen T, Vasalampi K. Antecedents of developmental trajectories of school absences among adolescents. *Scand J Educ Res.* (2025):1–14. doi: 10.1080/00313831.2025.2506380
49. Schoeneberger JA. Longitudinal attendance patterns: developing high school dropouts. *Clear House.* (2012) 85(1):7–14. doi: 10.1080/00098655.2011.603766
50. Benner AD, Wang Y. Shifting attendance trajectories from middle to high school: influences of school transitions and changing school contexts. *Dev Psychol.* (2014) 50(4):1288–301. doi: 10.1037/a0035366

51. Espy KA, Fang H, Charak D, Minich N, Gerry Taylor H. Growth mixture modeling of academic achievement in children of varying birth weight risk. *Neuropsychology*. (2009) 23(4):460–74. doi: 10.1037/a0015676
52. Fu R, Chen X, Wang L, Yang F. Developmental trajectories of academic achievement in Chinese children: contributions of early social-behavioral functioning. *J Educ Psychol*. (2016) 108(7):1001–12. doi: 10.1037/edu0000100
53. Lee J. Tripartite growth trajectories of Reading and math achievement: tracking national academic progress at primary, middle, and high school levels. *Am Educ Res J*. (2010) 47(4):800–32. doi: 10.3102/0002831210365009
54. Lu Y. Modeling math growth trajectory—an application of conventional growth curve model and growth mixture model to ECLS K-5 data. *J Educ Iss*. (2016) 2(1):166. doi: 10.5296/jei.v2i1.9197
55. Akos P, Rose RA, Orthner D. Sociodemographic moderators of middle school transition effects on academic achievement. *J Early Adolesc*. (2015) 35(2):170–98. doi: 10.1177/0272431614529367
56. Nie Q, Teng Z, Yang C, Lu X, Liu C, Zhang D, et al. Psychological suzhi and academic achievement in Chinese adolescents: a 2-year longitudinal study. *Br J Educ Psychol*. (2021) 91(2):638–57. doi: 10.1111/bjep.12384
57. Duchesne S, Larose S, Guay F, Vitaro F, Tremblay R. The transition from elementary to high school: the pivotal role of mother and child characteristics in explaining trajectories of academic functioning. *Int J Behav Dev*. (2005) 29(5):409–17. doi: 10.1080/01650250500206067
58. Bowers AJ, Sprott R. Examining the multiple trajectories associated with dropping out of high school: a growth mixture model analysis. *J Educ Res*. (2012) 105(3):176–95. doi: 10.1080/00220671.2011.552075
59. Alhadabi A, Li J. Trajectories of academic achievement in high schools: growth mixture model. *J Educ Iss*. (2020) 6(1):140–65. doi: 10.5296/jei.v6i1.16775
60. Fu YC, Chen SL, Quetzal AS, Lee HM, Lin YH. Group-Based trajectory model to analyze the growth of Students' academic performance: a longitudinal investigation at one Taiwanese high school. *Asia Pac Educ Rev*. (2022) 23(3):515–26. doi: 10.1007/s12564-022-09792-3

61. Schwerdt G, West MR. The impact of alternative grade configurations on student outcomes through middle and high school. *J Public Econ.* (2013) 97:308–26. doi: 10.1016/j.jpubeco.2012.10.002
62. Dräger J, Klein M, Sosu E. Does the impact of pupil absences on achievement depend on their timing? *Am Educ Res J.* (2025) 62(5):872–908. doi: 10.3102/00028312251347666
63. Cattan S, Kamhöfer DA, Karlsson M, Nilsson T. The long-term effects of student absence: evidence from Sweden. *The Economic Journal.* (2023) 133(650):888–903. doi: 10.1093/ej/ueac078
64. Klein M, Sosu EM. School attendance and academic achievement: understanding variation across family socioeconomic Status. *Sociol Educ.* (2024) 97(1):58–75. doi: 10.1177/00380407231191541
65. Akos P, Galassi JP. Middle and high school transitions as viewed by students, parents, and teachers. *Prof School Counseling.* (2004) 7(4):212–21.
66. Wade M, Prime H, Browne DT. Why we need longitudinal mental health research with children and youth during (and after) the COVID-19 pandemic. *Psychiatry Res.* (2020) 290:113143. doi: 10.1016/j.psychres.2020.113143
67. Symonds JE, Galton M. Moving to the next school at age 10–14 years: an international review of psychological development at school transition. *Review of Education.* (2014) 2(1):1–27. doi: 10.1002/rev3.3021
68. Caro DH, McDonald JT, Douglas Willms J. Socio-economic status and academic achievement trajectories from childhood to adolescence. *Canad J Educ.* (2009) 32(3):558–90.
69. Vaillancourt T, Brittain H, Farrell AH, Krygsman A, Vitoroulis I. Bullying involvement and the transition to high school: a brief report. *Aggress Behav.* (2023) 49(4):409–17. doi: 10.1002/ab.22082
70. Jindal-Snape D, Hannah EFS, Cantali D, Barlow W, MacGillivray S. Systematic literature review of primary–secondary transitions: international research. *Review of Education.* (2020) 8(2):526–66. doi: 10.1002/rev3.3197
71. Brittain H, Vaillancourt T. *Childhood to Adolescence Co-Occurring Depression and Anxiety Trajectories Across School Transition: Early Adulthood Mental Health and Functional Outcomes* (2025). Under review.

72. Finning K, Ukoumunne OC, Ford T, Danielsson-Waters E, Shaw L, Romero De Jager I, et al. Review: the association between anxiety and poor attendance at school— a systematic review. *Child Adolesc Ment Health*. (2019) 24(3):205–16. doi: 10.1111/ camh.12322
73. Finning K, Ukoumunne OC, Ford T, Danielsson-Waters E, Shaw L, Romero De Jager I, et al. The association between child and adolescent depression and poor attendance at school: a systematic review and meta-analysis. *J Affect Disord*. (2019) 245:928–38. doi: 10.1016/j.jad.2018.11.055
74. Högberg B, Strandh M, Petersen S, Nilsson K. Associations between academic achievement and internalizing disorders in Swedish students aged 16 years between 1990 and 2018. *Eur Child Adolesc Psychiatry*. (2025) 34(5):1661–71. doi: 10.1007/ s00787-024-02597-2
75. Rogers MA, Klan A, Oram R, Krause A, Whitley J, Smith DJ, et al. School absenteeism and child mental health: a mixed-methods study of internalizing and externalizing symptoms. *School Ment Health*. (2024) 16(2):331–42. doi: 10.1007/ s12310-024-09640-2
76. Queen’s Printer for Ontario. *EQAO: Ontario’s Provincial Assessment Program: Its History and Influence, 1996-2012*. Toronto: Education Quality and Accountability Office (2013).
77. Reynolds CR, Kamphaus RW. *Behavior Assessment System for Children*. 2nd Ed Pearson. Bloomington, MN: Pearson Assessments (2004).
78. Krygsman A, Vaillancourt T. Longitudinal associations between depression symptoms and peer experiences: evidence of symptoms-driven pathways. *J Appl Dev Psychol*. (2017) 51:20–34. doi: 10.1016/j.appdev.2017.05.003
79. Olweus D. *The Revised Olweus Bully/Victim Questionnaire*. Bergen, Norway: University of Bergen (1996).
80. Vaillancourt T, Trinh V, McDougall P, Duku E, Cunningham L, Cunningham C, et al. Optimizing population screening of bullying in school-aged children. *J Sch Violence*. (2010) 9(3):233–50. doi: 10.1080/15388220.2010.483182
81. West SG, McNeish D, Savord A. Model fit in structural equation modeling. In: Hoyle RH, editor. *Handbook of Structural Equation Modeling*. Guilford Press (2023) 2nd Ed. p. 184–205.
82. Nagin DS, Jones BL, Passos VL, Tremblay RE. Group-Based multi-trajectory modeling. *Stat Methods Med Res*. (2018) 27(7):2015–23. doi: 10.1177/0962280216673085

83. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J R Stat Soc B.* (1995) 57(1):289–300. doi: 10.1111/j.2517-6161.1995.tb02031.x
84. Enders CK. *Applied Missing Data Analysis*. 2nd Ed New York: The Guilford Press (2022).
85. Department of Education, Government of Yukon. *Yukon Wide Student Data Report— School Year 2023–24* (2025). Available online at: <https://yukon.ca/sites/default/files/2025-01/edu-Yukon-wide-report-2023-24.pdf> (Accessed October 6, 2025).
86. Moore SE, Norman RE, Suetani S, Thomas HJ, Sly PD, Scott JG. Consequences of bullying victimization in childhood and adolescence: a systematic review and meta- analysis. *World J Psychiatry.* (2017) 7(1):60–76. doi: 10.5498/wjp.v7.i1.60
87. Nakamoto J, Schwartz D. Is peer victimization associated with academic achievement? A meta-analytic review. *Soc Dev.* (2010) 19(2):221–42. doi: 10.1111/j. 1467-9507.2009.00539.x
88. Samara M, Da Silva Nascimento B, El-Asam A, Hammuda S, Khattab N. How can bullying victimisation lead to lower academic achievement? A systematic review and meta-analysis of the mediating role of cognitive-motivational factors. *Int J Environ Res Public Health.* (2021) 18(5):2209. doi: 10.3390/ijerph18052209
89. Bücker S, Nuraydin S, Simonsmeier BA, Schneider M, Luhmann M. Subjective well-being and academic achievement: a meta-analysis. *J Res Pers.* (2018) 74:83–94. doi: 10.1016/j.jrp.2018.02.007
90. Alspaugh JW. Achievement loss associated with the transition to middle school and high school. *J Educ Res.* (1998) 92(1):20–5. doi: 10.1080/ 00220679809597572
91. Weiss CC, Christine Baker-Smith E. Eighth-grade school form and resilience in the transition to high school: a comparison of middle schools and K-8 schools. *J Res Adolesc.* (2010) 20(4):825–39. doi: 10.1111/j.1532-7795.2010.00664.x
92. Granic I, Hollenstein T. A survey of dynamic systems methods for developmental psychopathology. In: Cicchetti D, Cohen DJ, editors. *Developmental Psychopathology*. 1st Ed Wiley. Hoboken, NJ: Wiley (2015) p. 889–930. doi: 10. 1002/9780470939383.ch22
93. Thelen E, Smith LB. *A Dynamic Systems Approach to the Development of Cognition and Action*. Cambridge, MA: MIT Press (1994).

94. Best O, Ban S. Adolescence: physical changes and neurological development. *Br J Nurs.* (2021) 30(5):272–75. doi: 10.12968/bjon.2021.30.5.272
95. Graber JA, Brooks-Gunn J. Transitions and turning points: navigating the passage from childhood through adolescence. *Dev Psychol.* (1996) 32(4):768–76. doi: 10.1037/0012-1649.32.4.768
96. Gottfried MA. Excused versus unexcused: how student absences in elementary school affect academic achievement. *Educ Eval Policy Anal.* (2009) 31(4):392–415. doi: 10.3102/0162373709342467
97. Grahek I, Shenhav A, Musslick S, Krebs RM, Koster EHW. Motivation and cognitive control in depression. *Neurosci Biobehav Rev.* (2019) 102(July):371–81. doi: 10.1016/j.neubiorev.2019.04.011
98. Barber BK, Olsen JA. Assessing the transitions to middle and high school. *J Adolesc Res.* (2004) 19(1):3–30. doi: 10.1177/0743558403258113
99. Mulder JD, Hamaker EL. Three extensions of the random intercept cross-lagged panel model. *Struct Equ Model.* (2021) 28(4):638–48. doi: 10.1080/10705511.2020.1784738
100. Hamaker EL, Kuiper RM, Grasman RPPP. A critique of the cross-lagged panel model. *Psychol Methods.* (2015) 20(1):102–16. doi: 10.1037/a0038889
101. Curran PJ, Howard AL, Bainter SA, Lane ST, McGinley JS. The separation of between-person and within-person components of individual change over time: a latent curve model with structured residuals. *J Consult Clin Psychol.* (2014) 82(5):879–94. doi: 10.1037/a0035297
102. Brittain H, Vaillancourt T. Longitudinal associations between academic achievement and depressive symptoms in adolescence: methodological considerations and analytical approaches for identifying temporal priority. In: Lemonda CS, Lockman JJ, editors. *Advances in Child Development and Behavior*, vol. 64. Cambridge, MA: Academic Press (2023) p. 327–55. doi: 10.1016/bs.acdb.2022.11.003
103. Statistics Canada. Canada in 2041: *A Larger, More Diverse Population with Greater Differences Between Regions* (2022). Available online at: <https://www150.statcan.gc.ca/n1/en/daily-quotidien/220908/dq220908a-eng.pdf?st=uKbUpdB> (Accessed October 6, 2025).

104. Rogers M, Aglukark K. Supporting school attendance among indigenous children and youth in Canada: a rapid review and call to action. *First Peoples Child Fam Rev.* (2024) 19(1):32–46. doi: 10.7202/1114911ar
105. Engzell P, Frey A, Verhagen MD. Learning loss due to school closures during the COVID-19 pandemic. *Proc Natl Acad Sci USA.* (2021) 118(17):e2022376118. doi: 10.1073/pnas.2022376118
106. Kuhfeld M, Soland J, Tarasawa B, Johnson A, Ruzek E, Liu J. Projecting the potential impact of COVID-19 school closures on academic achievement. *Educ Res.* (2020) 49(8):549–65. doi: 10.3102/0013189X20965918
107. Maldonado JE, De Witte K. The effect of school closures on standardised student test outcomes. *Br Educ Res J.* (2022) 48(1):49–94. doi: 10.1002/berj.3754
108. Kearney CA, Dupont R, Fensken M, González C. School attendance problems and absenteeism as early warning signals: review and implications for health-based protocols and school-based practices. *Front Educ.* (2023) 8:1253595. doi: 10.3389/feduc.2023.1253595
109. Graczyk PA, Kearney CA. Roadmap for implementing a multi-tiered system of supports framework to improve school attendance. *Curr Psychol.* (2024) 43(17):15286–307. doi: 10.1007/s12144-023-05478-0
110. Sosu EM, Dare S, Goodfellow C, Klein M. Socioeconomic Status and school absenteeism: a systematic review and narrative synthesis. *Rev Educ.* (2021) 9(3): e3291. doi: 10.1002/rev3.3291
111. Government of Manitoba. *School Attendance | Manitoba Education and Early Childhood Learning* (2025). Available online at: <https://www.edu.gov.mb.ca/k12//attendance/policies.html> (Accessed October 10, 2025).
112. Nova Scotia Department of Education and Early Childhood Development. *Student Attendance and Engagement Policy* (2025). Available online at: <https://www.ednet.ns.ca/student-attendance-and-engagement-policy> (Accessed October 10, 2025).
113. Rioux C, Stickley ZL, Little TD. Solutions for latent growth modeling following COVID-19-related discontinuities in change and disruptions in longitudinal data collection. *Int J Behav Dev.* (2021) 45(5):463–73. doi: 10.1177/01650254211031631

Table 1.

	<i>M</i>	<i>SD</i>	Correlations															
Variable			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Percent days absent																		
1. Grade 5	3.77	3.57	1															
2. Grade 6	3.99	3.57	.589	1														
3. Grade 7	5.03	4.46	.461	.542	1													
4. Grade 8	5.57	5.13	.436	.509	.641	1												
5. Grade 9	8.51	8.48	.281	.375	.455	.564	1											
6. Grade 10	7.83	7.85	.270	.332	.403	.484	.831	1										
7. Grade 11	13.59	11.75	.243	.306	.303	.410	.625	.690	1									
8. Grade 12	15.96	13.39	.221	.254	.247	.382	.593	.651	.777	1								
Grade Point Average																		
9. Grade 5	8.11	1.58	<i>-.126</i>	-.152	-.133	-.145	-.259	-.297	-.336	-.294	1							
10. Grade 6	8.29	1.49	<i>-.112</i>	-.185	-.124	-.134	-.240	-.274	-.297	-.286	.827	1						
11. Grade 7	8.16	1.93	<i>-.119</i>	-.213	-.168	-.181	-.304	-.327	-.339	-.318	.767	.827	1					
12. Grade 8	8.49	2.16	<i>-.102</i>	-.200	-.222	-.261	-.350	-.378	-.378	-.378	.726	.792	.875	1				
13. Grade 9	8.55	2.55	<i>-.118</i>	-.184	-.242	-.255	-.560	-.534	-.516	-.501	.654	.661	.721	.773	1			
14. Grade 10	8.25	2.95	<i>-.136</i>	-.204	-.253	-.249	-.573	-.619	-.562	-.545	.652	.642	.713	.755	.887	1		
15. Grade 11	7.83	3.04	<i>-.117</i>	-.185	-.181	-.212	-.469	-.504	-.596	-.579	.629	.622	.664	.692	.821	.835	1	
16. Grade 12	8.14	3.02	<i>-.108</i>	<i>-.142</i>	-.171	-.180	-.394	-.420	-.505	-.583	.553	.559	.586	.622	.735	.763	.836	1

Descriptive Statistics and Correlations Among Annual Scores for Percent Days Absent from School and GPA in Grades 5 Through 12

Estimated means, standard deviations, and correlations from Mplus (using full information maximum likelihood estimation). Correlations in italics significant at $p < .05$. All other correlations significant at $p \leq .001$.

Table 2.

	<i>estimate</i>	<i>s.e.</i>	<i>p</i>
% days absent			
Intercept	3.800	0.139	<.001
Slope 1	0.452	0.181	.013
Quadratic 1	0.071	0.060	.233
Slope 2 ^a	-1.261	0.340	<.001
Quadratic 2	1.303	0.133	<.001
Event – secondary school	4.763	0.375	<.001
GPA			
Intercept	8.128	0.060	<.001
Slope 1	0.030	0.042	.474
Quadratic 1	0.024	0.014	.079
Slope 2	-0.499	0.074	<.001
Quadratic 2	0.106	0.026	<.001
Event – secondary school	0.419	0.084	<.001

Parameter estimates for absences and GPA parallel-process discontinuity latent growth curves.

GPA, grade point average. Level and slope discontinuity latent growth curve models. Slope 1 and quadratic 1 are parameter estimates representing the average elementary school (Grades 5–8) curve and slope 2 and quadratic 2 are parameter estimates representing the average secondary school (Grades 9–12) curve. Event is for the additional level change associated with secondary school. Covariance terms between latent curve factors also estimated in the models. Statistically significant parameter estimates are bolded.

^aThe negative slope reflects the initial rate of change at Grade 9, whereas the quadratic term dominates the overall trajectory shape; linear and quadratic parameters should be interpreted jointly.

Table 3.

No. of Groups	BIC	LMR-LRT	BLRT	Entropy
Co-occurring depression and anxiety symptoms				
1 Class	48192.902		-	-
2 Class	45256.548	<.001	< .001	0.901
3 Class	44211.088	.014	< .001	0.895
4 Class	43713.629	.256	< .001	0.897
5 Class	43248.892	.437	< .001	0.906
6 Class	42948.251	.121	< .001	0.886
7 Class	42741.257	.569	< .001	0.884
8 Class	42533.737	.746	< .001	0.889
9 Class ^a	<i>best loglikelihood not replicated</i>			

Fit indices for latent class for absences and GPA.

BIC, Bayesian information criterion; LMR-LRT, Lo-Mendell-Rubin likelihood ratio test; BLRT, bootstrapped likelihood ratio test. Bold are the final selected class solutions.

^aBest log likelihood not replicated.

Table 4.

	% days absent				GPA		
	<i>n / %</i>	<i>estimate</i>	<i>s.e.</i>	<i>p</i>	<i>estimate</i>	<i>s.e.</i>	<i>p</i>
Class 1 Stable absences/As							
	225/32.2%						
Intercept		3.482	0.239	<.001	9.558	0.078	<.001
Slope 1		-0.161	0.260	.536	0.076	0.060	.203
Quadratic 1		0.175	0.080	.028	0.082	0.018	<.001
Slope 2		-1.224	0.327	<.001	-0.085	0.062	.168
Quadratic 2		0.913	0.106	<.001	0.005	0.021	.814
Event – secondary school		1.612	0.303	<.001	1.424	0.074	<.001
Class 2 Stable absences/Bs							
	203/29.1%						
Intercept		2.690	0.228	<.001	8.267	0.119	<.001
Slope 1		-0.081	0.239	.734	-0.016	0.080	.837
Quadratic 1		0.201	0.085	.019	0.068	0.024	.005
Slope 2		-1.196	0.468	.011	-0.364	0.149	.015
Quadratic 2		1.205	0.176	<.001	0.057	0.051	.258
Event – secondary school		3.057	0.420	<.001	0.856	0.147	<.001
Class 3 Stable absences/B/Cs							
	123/17.6%						
Intercept		2.970	0.285	<.001	6.812	0.168	<.001
Slope 1		0.546	0.303	.072	-0.083	0.142	.558
Quadratic 1		-0.057	0.104	.582	0.012	0.040	.771
Slope 2		-1.330	0.984	.177	-0.323	0.219	.141
Quadratic 2		1.418	0.508	.005	0.028	0.085	.738
Event – secondary school		3.015	0.664	<.001	0.032	0.244	.895
Class 4 Increasing absences/elementary Bs-High school decline							
	57/8.2%						
Intercept		8.009	1.129	<.001	7.934	0.245	<.001
Slope 1		2.053	0.978	.036	-0.075	0.133	.574
Quadratic 1		-0.249	0.323	.441	0.005	0.04	.908
Slope 2		-1.052	1.623	.517	-1.298	0.407	.001
Quadratic 2		1.842	0.738	.013	0.239	0.181	.189
Event – secondary school		6.098	1.405	<.001	0.243	0.300	.418
Class 5 Increasing absences/declining Cs							
	67/9.6%						
Intercept		4.067	0.437	<.001	6.248	0.191	<.001
Slope 1		0.531	0.460	.249	0.305	0.203	.134
Quadratic 1		0.091	0.172	.598	-0.204	0.071	.004

Slope 2	-0.020	2.209	.993	-2.257	0.351	<.001
Quadratic 2	2.690	0.847	.002	0.677	0.141	<.001
Event – secondary school	11.345	1.473	<.001	-1.650	0.321	<.001
Class 6 - Chronic absences/elementary Cs/transition decline-rebound						
23/3.3%						
Intercept	7.459	1.004	<.001	6.340	0.336	<.001
Slope 1	0.992	1.542	.520	0.394	0.361	.275
Quadratic 1	1.033	0.629	.101	-0.273	0.126	.030
Slope 2	-6.013	5.359	.262	0.533	1.030	.605
Quadratic 2	-0.023	1.997	.991	0.258	0.351	.463
Event – secondary school	35.247	4.624	<.001	-4.464	0.511	<.001

Parameter estimates for percentage days absences and GPA parallel-process discontinuity latent class growth curve analysis.

GPA, grade point average. Statistically significant parameter estimates are bolded. Linear slope and quadratic terms should be interpreted jointly when evaluating trajectory shape.

Table 5. Class Associations

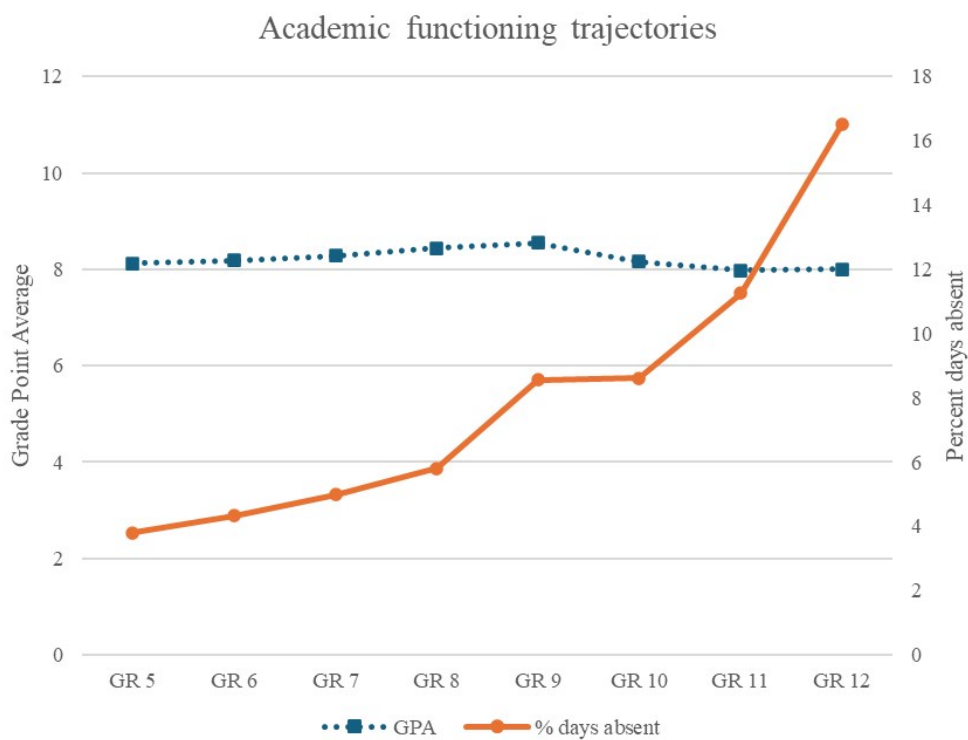
Correlates	χ^2 / F	df	p	Phi /Eta-squared	Percentage/Mean					
					C1	C2	C3	C4	C5	C6
					Stable absences As (32.2%)	Stable absences Bs (29.1%)	Stable absences B/Cs (17.6%)	Increasing absences Elementary Bs secondary school decline (8.2%)	Increasing absences Declining Cs (9.6%)	Chronic absences Elementary Cs transition decline-rebound (3.3%)
Sex (% girls) ¹	48.221	5	<.001	.263	68.4% ^a	49.3% ^b	31.7% ^c	57.9% ^{ab}	43.3% ^{bc}	56.5% ^{ab}
Ethnicity ¹	4.850	5	.435	.087	85.2%	82.5%	76.1%	84.6%	79.3%	85.0%
Middle school ¹	6.036	5	.303	.093	48.7%	51.0%	39.3%	52.6%	41.8%	52.4%
Household income (Grade 5)	18.237	5	<.001	.124	6.91 ^a	6.51 ^a	5.48 ^b	5.66 ^{ab}	5.13 ^c	3.43 ^c
Parental education (Grade 5) ²	28.047	5	<.001	.174	3.60 ^a	3.29 ^b	2.84 ^c	2.64 ^{cd}	2.52 ^{cd}	2.18 ^d
Bullying victimization (Grades 5-8)	8.216	5	<.001	.056	0.54 ^a	0.69 ^{ab}	0.73 ^{ab}	0.67 ^{ab}	0.95 ^b	1.09 ^{ab}
Bullying victimization (Grades 9-12)	3.589	5	.003	.033	0.32 ^a	0.37 ^a	0.30 ^a	0.41 ^a	0.55 ^a	0.52 ^a
Depression symptoms (Grades 5-8)	10.258	5	<.001	.069	3.26 ^a	4.37 ^{ab}	4.98 ^{bc}	4.57 ^{abc}	6.26 ^{bc}	8.52 ^c
Depression symptoms (Grades 9-12)	4.945	5	<.001	.044	4.30 ^a	4.68 ^a	5.38 ^a	7.37 ^a	5.96 ^a	9.33 ^a
Anxiety symptoms (Grades 5-8)	2.083	5	.066	.015	7.09	7.51	7.93	8.29	8.72	8.88
Anxiety symptoms (Grades 9-12) ²	3.146	5	.008	.029	9.93 ^{ab}	9.56 ^{ab}	8.68 ^a	11.98 ^b	9.16 ^{abc}	14.02 ^{bc}

Class associations.

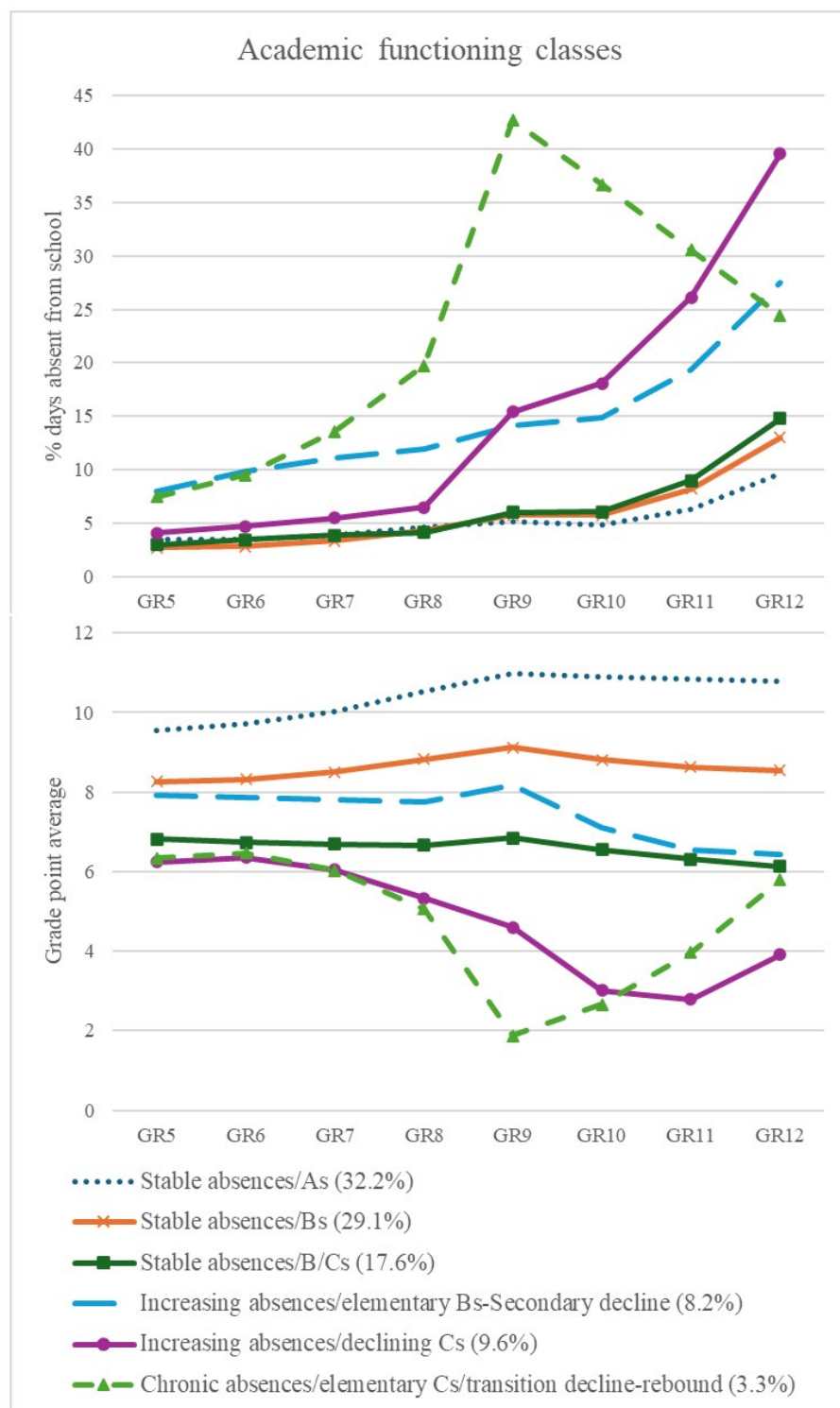
Pair-wise comparisons not examined for non-significant tests. Comparisons adjusted for multiple testing. Each superscript letter within a row denotes a subset of academic functioning categories whose proportions or means levels do not differ significantly from each other, $p > .05$, and after applying the Benjamini -Hochberg correction.

¹ Chi-square, all other results are ANOVA

² Levene’s statistic, $p > .05$, LSD *post-hoc* pair-wise comparisons, all others are Dunnet’s T3

Figure 1.

GR = Grade. GPA = Grade point average. Percent days absent and GPA parallel-process piecewise latent growth curve model with level and curve discontinuity. Grades 5–8 are elementary school and Grades 9–12 are secondary school

Figure 2

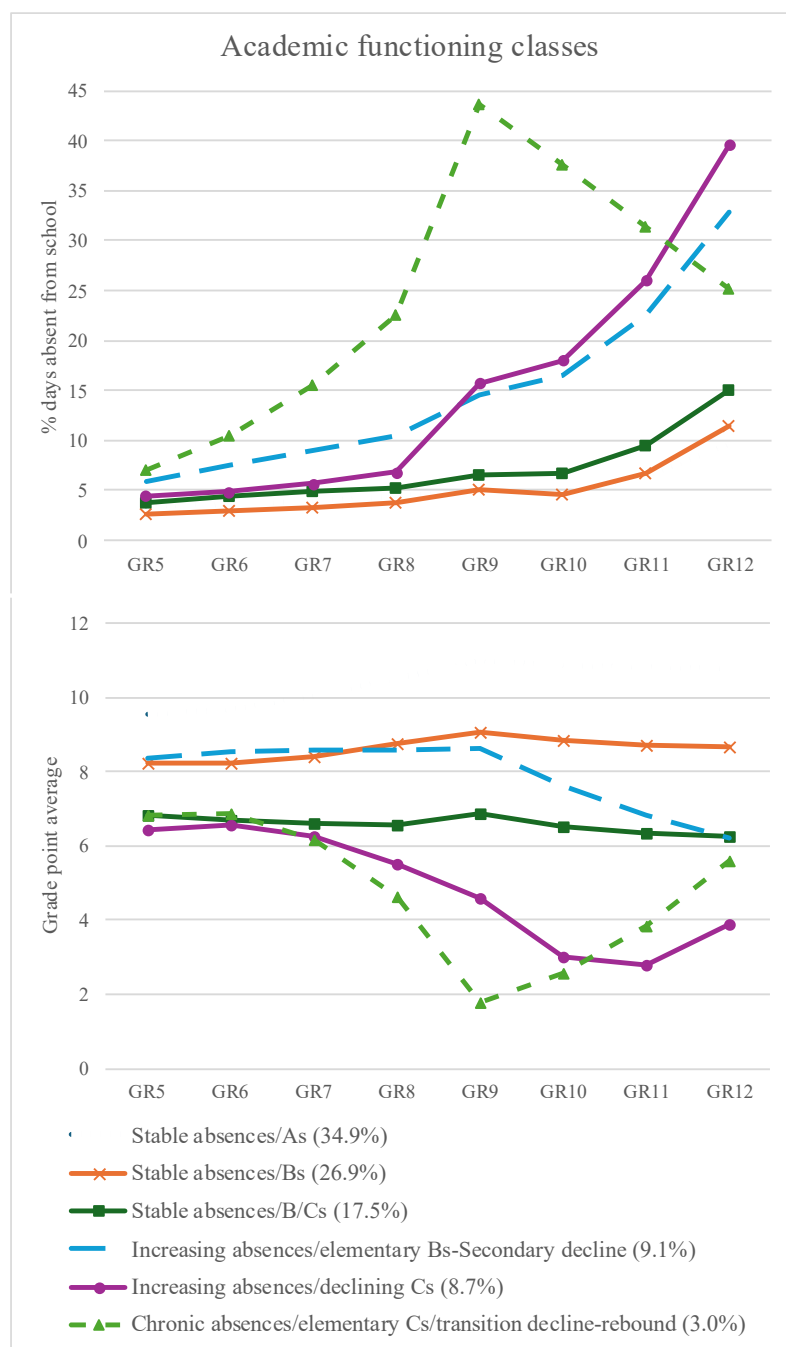
GR=Grade. GPA = Grade point average. Percent days absent and GPA parallel-process latent class growth analysis six class solution. Grades 5–8 are elementary school and Grades 9–12 are secondary school.

Paper 1: Supplementary materials

School Attendance Matters: Co-occurring Trajectories of School Attendance and Academic Achievement from Elementary to Secondary School in a Canadian Context

Brittain, H. & Vaillancourt, T. (2026)

Supplementary Figure 1.



Supplementary Figure 1. Sensitivity analysis Absences and GPA Parallel-Process

Discontinuity Latent Class Growth Curve Analysis. GR=Grade. GPA=Grade point average.

Percent days absent and GPA parallel-process latent class growth analysis six class solution using a sub-sample with data in both elementary and secondary school ($n=573$). Grades 5 to 8 are elementary school and Grades 9 to 12 are secondary school.

Chapter 3 – Paper 2: Childhood to Adolescence Co-Occurring Depression and Anxiety Trajectories Across School Transition: Early Adulthood Mental Health and Functional Outcomes

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Note: Throughout this study we refer to “high school transition”. The term is used synonymously with “secondary school transition” used throughout the dissertation.

Key points

Question: How do co-occurring depression and anxiety symptoms from childhood through adolescence, shaped by the high school transition, relate to psychosocial correlates and early adulthood outcomes?

Findings: Six symptom trajectories were identified. Some youth showed symptom increases during or after the high school transition, particularly in anxiety. Others experienced stable or decreasing symptoms over time.

Meaning: High school transition can intensify or reduce internalizing symptoms. Supportive relationships and targeted transition support may buffer risk and improve long-term mental health and functional outcomes.

Abstract

Importance: Depression and anxiety are the most common mental disorders in late adolescence and predict future mental illness and functional impairments. Understanding how school transitions affect the development and course of these symptoms can inform targeted prevention and intervention strategies.

Objective: To examine heterogeneity in co-occurring trajectories of depression and anxiety symptoms across eight years of childhood and adolescence in relation to the high school transition and to assess associations with psychosocial correlates and early adulthood mental health and functioning.

Design, Setting, and Participants: A 12-year longitudinal cohort study of 701 participants assessed annually from age 11 (grade 5) to age 22.

Exposure: Transition from elementary to high school (between grades 8 and 9).

Main Outcomes and Measures: Annual assessments of adolescent depression and anxiety symptoms (ages 11–18) using the *Behavior Assessment System for Children–Second Edition*. Subgroups defined by co-occurring symptom trajectories. Correlates included sex, child maltreatment, socioeconomic status, and interpersonal relations (family, peer, school). Outcomes included mental disorders at ages 19/20 and 21/22 (assessed via the *M.I.N.I. International Neuropsychiatric Interview*), and indicators of occupational and educational functioning.

Results: Six classes were identified: (1) Low symptoms (39.4%); (2) Low depression/Moderate anxiety (26.0%); (3) Low depression/Moderate-Increasing anxiety/Stable high school (13.1%); (4) Low depression/Moderate anxiety/Increasing (10.4%); (5) High-Decreasing (6.6%); and Moderate-Increasing/High (4.6%). Risk classes had higher proportions of girls and individuals with maltreatment histories, lower SES, and poorer family and peer relationships. Bullying victimization and lower school connectedness distinguished risk groups from the low-symptom group. The moderate-increasing/high group had the poorest outcomes in early adulthood, with significantly elevated risk of mental disorders (OR range: 3.89–42.64) and high rates of subclinical/clinical depression and anxiety symptoms. In contrast, the high-decreasing group showed improved outcomes comparable to the low-symptom group.

Conclusions and Relevance: Youth follow distinct trajectories of co-occurring depression and anxiety across adolescence. For some, the high school transition corresponds with a marked increase in symptoms, while others experienced a deflected increasing symptomology. Early

interventions, particularly those addressing bullying and promoting school belonging, may help reduce internalizing symptoms and improve long-term mental health outcomes.

Introduction

Mental health disorders contribute substantially to the global economic burden (Arias et al., 2022), and are among the leading causes of disability worldwide (GBD 2019 Mental Disorders Collaborators, 2022), particularly among children and youth aged 10 to 24 years (Kieling et al., 2024). Depression and anxiety are the most common mental disorders in late adolescence (Kieling et al., 2024), with 6-month prevalence rates in Canadian youth aged 12 to 17 of 7.53% ($SE=1.15$; major depressive disorder) and 14.85% ($SE=1.31$; any anxiety disorder; Georgiades et al., 2019).

Mental health challenges that emerge in adolescence often persist into adulthood; 50% to 75% of adult mental disorders begin during this developmental period (Jones, 2013; Kim-Cohen et al., 2003), and are linked to a wide range of adverse outcomes, including school dropout, early pregnancy and parenthood, unemployment, and work-related absences (Clayborne et al., 2019; Narusyte et al., 2017). Subthreshold depression and generalized anxiety symptoms in adolescence carry similar risk for functional impairment, comorbidity, and suicide ideation as major depressive and generalized anxiety disorders (Noyes et al., 2022; Volz et al., 2022). Notably, these disorders are highly comorbid, especially in children and adolescents (Angold & Cotello, 1993; Costello et al., 2003; Melton et al., 2016). Such comorbidities, even subclinical, are associated with symptom severity, complex treatment options, and increased risk for functional problems like familial conflict and academics (Melton et al., 2016). However, concurrent comorbidity does not mean identical developmental course in depression and anxiety symptoms. Different co-developing pathways may be associated with different risk factors and be differentially related to problematic outcomes. It is important to identify distinct and co-occurring patterns of depression and anxiety across adolescence and associations with early adulthood functional outcomes and mental health problems. Identifying risk and protective factors of different patterns of functioning is crucial for targeted intervention and prevention efforts.

A prominent, nearly universal environmental change that adolescents encounter is high school transition (European Education and Culture Executive Agency, 2023; OECD, 2023). Research on how students respond to this change is mixed (Benner et al., 2017; Fréchette-Simard et al., 2023; Jelen et al., 2023; Lester et al., 2013; Lester & Cross, 2015; Lipps, 2005; Mander & Lester, 2017; Newman, 2007; Seifert & Schulz, 2007; Virtanen et al., 2019), and is likely due to

the use of short-term methods that do not account for long-term change and adjustment (Beatson et al., 2023; Benner, 2011; Evans et al., 2018; Jindal-Snape et al., 2021; Jindal-Snape & Bagnall, 2023). Accordingly, it remains unclear how students with differing symptom trajectories respond to the transition to high school. For some, this major life event may exacerbate existing symptoms, while for others, it may serve a protective role by interrupting a pattern of increasing distress.

Examinations of symptom trajectories across school transitions have typically focused on single disorders in isolation. Specifically, studies of anxiety have often centered on the transition to middle school, while research on depression has more commonly examined the high school transition. For example, in an American elementary school sample ($N=631$) followed prospectively from Grades 2 through 8, Nelemans et al. (2018) noted that although most students experienced consistently low (70%) or high (11%) anxiety levels, 5% experienced sharp increases and 14% showed decreases following the middle school transition. Olivier et al. (2023) examined depression symptoms trajectories in 2696 academic-track Finnish students in the last 3 years of elementary school (compulsory school – grades 7, 8 and 9) and 2 years of upper secondary school (secondary 2 and 3; year 1 secondary not recorded). They identified 5 groups: low increasing (4%), low stabilizing (6%), moderate stabilizing (37%), mild increasing (48%), and high stable (5%). It is unclear if results would differ had non-academic track students been included since they may respond quite differently to the changing demands of secondary school. In another study, Wang et al. (2018) examined trajectories of depression separately across junior high school (grades 7-9) and senior high school (grades 10-12) in 2,687 Taiwanese youth. They found three trajectories in junior high schools, termed JS-low-stable (77%), cumulative (17%), and high-improving (6%), as well as three in senior high school—HS-low-stable (71%), moderate-stable (7%), and heightening (22%). Although most stayed on a low-stable trajectory across high school (67%), those in the JS-low-stable group had a 17% chance of transitioning to a higher symptom group. The cumulative class was also more likely to transfer to the heightening class in senior high school than remaining or improving. Although these descriptive analyses provide insight into responses to school transitions within a single domain of internalizing problems, substantial evidence supports the high comorbidity (Melton et al., 2016) and bidirectional temporal associations (Jacobson & Newman, 2017) between depression and anxiety in adolescence.

The few studies that have examined co-occurring group-based trajectories of depression and anxiety have consistently identified five to six subgroups (Lallukka et al., 2019; Liang et al., 2023; Olino et al., 2010, 2014). These typically include a low-symptom class, one or more high-symptom classes (Lallukka et al., 2019; Liang et al., 2023), and additional classes characterized by prominent symptoms of either depression or anxiety, or elevated probabilities of disorder (Liang et al., 2023; Olino et al., 2010, 2014). For example, in their study of adolescent girls (aged 10-16 years), Olino et al. (2014) found five classes. Class 1 (70.2%) had consistently low depression and anxiety symptoms; Class 2 (11.2%) had high depression with moderate anxiety; Class 3 (9.7%) had increasing depression and consistently moderate anxiety; Class 4 (4.7%) had increasing anxiety and consistently moderate depression; and Class 5 (4.1%) began with high anxiety and depression that decreased over time.

However, these studies examined adolescence into mid-adulthood, ranging from ages 16 to 43 (Lallukka et al., 2019) and 16 to 30 (Olino et al., 2010), using only four timepoints, thereby overlooking symptom fluctuations and excluding early adolescence, a critical period when internalizing symptoms often begin to emerge. Some focused on diagnostic outcomes rather than symptomatology (Olino et al., 2010), despite evidence that subclinical symptoms are also predictive of adverse outcomes (Georgiades et al., 2006; Noyes et al., 2022; Volz et al., 2022), while others were limited to female samples (Olino et al., 2014). Moreover, none have accounted for stressful life events (risk factors for at-risk high depression groups (Shore et al., 2018)), such as high school transition, even when the age band of the sample would likely have allowed for such analysis (e.g., ages 10-16 (Olino et al., 2014)). Consequently, the role of school transition in influencing the development, recession, or maintenance of the co-occurrence of depression and anxiety symptoms remains unclear. Further, although Olino et al. (2014) examined group differences on some important criterion variables associated with internalizing problems, such as interpersonal functioning, externalizing problems, parental psychopathology, and home environment, the measures were assessed once at the start of the study, age 10, and do not reflect changes over time, such as the notable decline in peer victimization from elementary to high school experienced by some students (Vaillancourt et al., 2023).

In addition to examining predictors and correlates of group membership, it is important to examine the long-term outcomes of trajectory groups. Olino et al. (2010) reported the prevalence of lifetime (i.e., < age 30) rates of specific anxiety and depressive disorders within each of their

six classes. Although informative, such details do not assess temporal associations between patterns of adolescent internalizing symptoms and risk for mental health disorders in early adulthood. Youth experiencing depression and anxiety disorders are also at increased risk of failing to complete secondary school and unemployment (Clayborne et al., 2019).

Current study

Discerning the risk and protective factors and early adulthood outcomes of unique and overlapping patterns of adolescent depression and anxiety symptoms during adolescence is vital for effective intervention and prevention. As such, we examined the heterogeneity in separate and co-occurring trajectories of depression and anxiety symptoms in a cohort of adolescents (i.e., grade 5 to 12 (G5-G12); age 11 to 18), with particular attention to symptom fluctuations relative to the high school transition (i.e., G8 to G9). We then examined individual and contextual risk and protective factors as co-occurring class correlates, including sex, child maltreatment, SES, and interpersonal relations (i.e., family, peer, school; Gardner et al., 2019; Olino et al., 2010; Shore et al., 2018), and associations with early adulthood (ages 19 to 22) mental health and functional (i.e., school and work) problems.

Based on prior research, we expected identification of three to four distinct groups for depression symptoms (Schubert et al., 2017; Shore et al., 2018) and four to five groups for anxiety symptoms (De La Torre-Luque et al., 2020a; Nelemans et al., 2018; Xu et al., 2021a), with transitions having an impact on subsets of these groups. Given the high comorbidity of depression and anxiety symptoms (Melton et al., 2016), we expected that depression symptoms groups and anxiety symptoms groups would be moderately associated. Based on limited studies of co-occurring symptoms trajectories (Lallukka et al., 2019; Liang et al., 2023; Olino et al., 2010, 2014), we expected 5-6 classes. We expected that girls and those having experienced child maltreatment would be more likely to follow at-risk trajectories (Olino et al., 2010). Moreover, students in at-risk symptoms groups would be more likely to report risk factors such as poorer family, peer, and school relations, and be at elevated risk for mental disorders and functional problems in early adulthood.

Methods

Participants and procedure

Data were drawn from the McMaster Teen Study, a longitudinal cohort study of Canadian youth designed to examine associations between peer victimization, mental health, and academic achievement. In spring of 2008 (Time 1; G5) participants were recruited from a random sample of 51 schools with Grade 5 classrooms within a single public schoolboard. All Grade 5 students within the selected schools were eligible. A total of 875 participants were recruited to take part in the longitudinal arm of the study with 701 participating in at least one follow-up time point. In the first year, participants received a pack of gum for returning the consent form and in subsequent waves received a gift card, which increased in value (e.g., Age 12: \$10; Age 22: \$50; \$50/interview). Data collection occurred annually (i.e., age 11 in 2008; age 26 in 2023)³ with participants having the option to take part in a survey at each wave and mental health interview at age 19 and age 21 (or the following year if not completed; $n=365$ completed at least one interview). Parents had the option to participate in a telephone interview in Time 1-8. Research ethics approval was obtained annually by the corresponding author's home university as was assent from youth participants and consent from parent/guardians.

Measures

Internalizing symptoms (age 11-18)

Depression and anxiety symptoms. Participants completed The Behavior Assessment System for Children-2 (BASC-2 (Reynolds & Kamphaus, 2004)), self-report of personality child version in G5 and G6 and adolescent version in grades 7 through 12. Twelve items measuring depression symptoms were common to both versions. Four items were rated on a 4-point scale (0, never; 1, sometimes; 2, often; and 3, almost always) and eight were rated true (2) or false (0); e.g., "I feel sad"). Ten items that assess anxiety symptoms that are common across child and adolescent self-report versions. Eight items were rated on a 4-point scale and two items rated true or false (e.g., "I get nervous"). Depression items were summed to create a composite score as were anxiety items. Higher scores reflected higher symptoms. Within each time the depression symptoms scale had excellent internal consistency reliability (Cronbach's $\alpha = .87-.91$) as did the anxiety symptoms scale (Cronbach's $\alpha = .85-.91$; see Table 1).

Correlates

³ Only data from 2008-2019 were used in the current study. Years 2020-2023 were not used because we want results to be generalizable to a broader context and not dependent on changes due to the COVID-19 pandemic.

Elementary school type. Some students were enrolled in a kindergarten to G8 school (coded 0), and others experienced a middle school transition in G6 or G7 (coded 1).

Child maltreatment. The Childhood Experiences of Violence Questionnaire - Short Form (CEVQ-SF; (Walsh et al., 2008) was used to evaluate experiences of child maltreatment. This retrospective assessment consists of 7 questions regarding physical and sexual abuse, with responses measured on a 5-point scale (ranging from never to over 10 times). A threshold score of 3–5 instances for any item was used to classify abuse, except in the case of sexual abuse, where any reported experience was sufficient for classification as abuse (Tanaka et al., 2011; Walsh et al., 2008). The CEVQ-SF was administered to participants once at age 19 or 20 (T9 or T10). Based on established criteria (Tanaka et al., 2011; Walsh et al., 2008), maltreatment was classified as maltreated (1 = any instance of physical or sexual maltreatment or both) and no maltreatment (0 = no reported physical or sexual maltreatment).

Demographics. Parents provided their highest completed level of education (Years 1, 7, and 8; 1, did not complete high school to 5, graduate degree), as well as their household income in Canadian dollars (Years 1, 3, 5, 7, and 8; 1, <\$20 000 to 8, >\$80000). Because of the high stability in parental education ($r = 0.813\text{--}0.907$, $p < .001$) and household income ($r = 0.713\text{--}0.946$, $p < .001$), only the first, most complete, time point was used.

Family Functioning. Parents reported on family functioning in G5 to G12. The Impact on Child Functioning scale of the Brief Child and Family Phone Interview (BCFPI-3; Boyle et al., 2009; Cunningham et al., 2009) includes six statements about an individuals' family (e.g., "We express feelings to each other") that are rated using a 4-point Likert scale (*Strongly agree* = 4, *Agree* = 3, *Disagree* = 2, *Strongly disagree* = 1). A composite score is created from the 6 items (reverse scoring 1 item). In the current sample, the family functioning scale had good internal consistency ($\alpha = .72\text{--}.86$). Elementary school (G5-G8) and high school (G9-G12) scores were averaged, respectively.

Bullying victimization. Self reports of bullying victimization were collected from youth annually over 8 years (i.e., G5 to G12) using the Vaillancourt and Hymel Bullying Involvement Questionnaire (Vaillancourt et al., 2010) which includes a definition of bullying before asking youth to report how often in the last 3-months that they have experienced bullying. The scale consists of five questions including a general question (Olweus, 1996), physical, verbal, social, and cyber bullying, which include several examples of what the targeted behaviour entailed.

Youth responded using a 5-point frequency scale (0 = *never*, 1 = *only once or twice*, 2 = *2 or 3 times a month*, 3 = *once a week*, 4 = *several times a week*). In the current sample the internal consistency ($\alpha = .79-.82$). Elementary school (G5-G8) and high school (G9-G12) scores were averaged, respectively.

School climate. In G5 and G6 the Sense of School as a Community Scale (Developmental Studies Centre, 1997) was used to assess participants' feelings of how supported, welcomed, and safe they feel about their school as a whole by answering 14 items using a 5-point scale (*disagree a lot*, *disagree a little*, *maybe*, *agree a little*, *agree a lot*). The scale was adapted for the current study; item 12 ("I feel that I can talk to the teachers in this school about problems that are bothering me") was removed and replaced with an additional item ("We help new students feel accepted in this school"). The internal consistency for the scale was high ($\alpha = .91-.93$).

Beliefs about the transition experience. Participants reported on the quality of their transition to high school in G9 (McDougall & Hymel, 1998). Experiences were measured with five questions (e.g., "How happy are you about your first year of high school?"). Scale items were rated with 1 representing a more positive experience and 5 representing a more negative experience. ($\alpha = .85$).

School bonding. In G9 to G12, participants completed the People in My Life Scale, School Bonding subscale (Cook et al., 1995). They are asked to respond to 8 items using a 4-point scale (*almost never or never true*, *sometimes true*, *often true*, and *almost always or always true*). These items ask students feelings about school (e.g., "Most mornings I look forward to going to school") (Murray & Greenberg, 2006). The school bonding subscale had adequate reliability ($\alpha = .84-.85$).

Peer social support. Social support from peers was measured G9 to G12 with the intimacy and group integration subscales of the Relational Provision Loneliness Questionnaire (RLPQ), which measures intimacy (emotional connection) and group integration (social connection) in personal peer relationships (Hayden, 1989). The RPLQ assesses perceptions of social support and items relate to thoughts and evaluations of social situations (Terrell-Deutsch, 1999). The intimacy and the group integration subscales both consist of seven items, which are measured along a 5-point scale (4=*YES*; 3=*yes*, 2=*sometimes*, 1=*no*, 0=*NO*). Both subscales had acceptable reliability (intimacy $\alpha = .92-.93$; group integration $\alpha = .92-.93$).

Early-adulthood outcomes

Job risk. In the four years after high school (i.e., ages 19-22) participants were asked if they had walked off a job, or quit, without giving notice; quit a job without any other means of support; or quit your main job without having enough savings to live on. Those agreeing with any of these statements at any of the four follow-up time points were classified as job-risk (0=no job-risk; 1=job-risk).

Postsecondary education. In the four years after high school (i.e., ages 19-22) participants were asked if they attended a postsecondary institution (i.e., college, university, technical/vocational, or apprenticeship/trade school). Participants were coded as having postsecondary education or not (0 = postsecondary; 1 = no postsecondary education).

Mental disorders. At ages 19-20 and 21-22 participants took part in the short (15-30 minutes) M.I.N.I. International Neuropsychiatric Interview (Sheehan et al., 2016). The MINI is based on DSM-IV (DSM-5 in later years) and ICD-10 criteria (Sheehan et al, 1998) and demonstrates strong agreement with the Structured Clinical Interview for DSM (SCID) and the Composite International Diagnostic Interview (CIDI). Disorders assessed included current major depressive episode, Generalized Anxiety Disorder (GAD), Obsessive-Compulsive Disorder (OCD), Social Anxiety Disorder (SAD), Panic Disorder (PD), and Agoraphobia. Responses were coded according to the manual to determine diagnosis status (0=no diagnosis; 1=diagnosis at either age 19–20 or 21–22). The M.I.N.I was administered by trained graduate level counselling psychology students supervised by the second author (Ph.D. level clinical psychologist) and another Ph.D. level psychotherapist.

Internalizing symptoms (age 19-22). Participants completed the BASC-2, self-report, college version (SRP-COL) (Reynolds & Kamphaus, 2004) at ages 19-22. For depression, four items were rated on a 4-point Likert-type scale of never = 0 to almost always = 3 and nine items as true = 2 or false = 0 (e.g., “I feel sad”). For anxiety, ten items were rated on the 4-point scale and four items as true/false (e.g., “I get nervous”). Items were summed to create depression and anxiety scores, respectively. Cronbach’s α was excellent for depression ($\alpha = .90-.92$) and anxiety ($\alpha = .93-.94$). Following procedures by Krygsman et al. (2023), the scores were dichotomized using subclinical cutoff score of $t=60$ (1=clinical/subclinical; 0=not at risk).

Statistical Analysis

Descriptive statistics and missingness

Using SPSS v29.0.2.0, the analytic sample was compared to those without longitudinal data on demographics. Analyses included independent-samples, 2-tailed t -tests and χ^2 tests of independence. Little's Missing Completely at Random (MCAR) test was performed.

Average growth curves

Mplus version 8.11 (Muthén & Muthén, 1998) was used to estimate latent growth curve models using full information maximum likelihood (FIML) allowing for missing data. As outlined by Rioux et al. (2021), level and curve discontinuity using piecewise latent growth curves allow for trajectories to have a marked change in level and slope differences before and after a specified event. We examined the impact of transitioning to high school on changes in depression and anxiety symptoms trajectories. For both depression and anxiety symptoms, two distinct trajectories were evaluated: one from G5 to G8 (pre-transition) and another from G9 to G12 (post-transition), each incorporating slope and quadratic parameters to represent rate changes around the transition to high school (Figure 1). Level discontinuity was included by modeling an initial intercept at G5 along with a level change at G9 to account for possible shifts in trajectories between G8 and G9. The model's overall fit for the sample was assessed using criteria such as a comparative fit index (CFI) over 0.95, RMSEA under 0.06, SRMR under 0.08, and χ^2 test (West et al., 2023).

Univariate group-based trajectory models

Group-Based Trajectory Modeling (GBTM; also known as Latent Class Growth Analysis (LCGA)) was used to discover unobserved latent subgroups with similar developmental patterns (Nagin, 2005; Nagin et al., 2018; Nylund-Gibson & Choi, 2018).

Fit was evaluated using the Bayesian Information Criterion (BIC), the Lo-Mendell-Rubin Likelihood Ratio Test (LMR-LRT), and the Bootstrapped Likelihood Ratio Test (BLRT), supported by posterior probabilities $>0.70^4$, theoretical validity, clinical utility, and conceptual clarity, that is sufficient individuals in each group, and patterns consistent with the literature (Nagin, 2005). Models with up to six groups were estimated for depression symptoms and anxiety symptoms, based on prior literature (De La Torre-Luque et al., 2020b; Nelemans et al., 2014, 2014; Schubert et al., 2017; Shore et al., 2018; Xu et al., 2021b).

⁴ Of note, when the average posterior probabilities for trajectory group membership exceed 0.70, the impact of classification errors on hypothesis tests concerning differences between trajectory groups is minimal ^{33,34}.

Group-based multi-trajectory model (GBMTM)

After determining the number of univariate groups, intersecting class-correspondence was examined using cross-tabulations (Van Der Nest et al., 2025) and Cramer's V was used as evidence of strength of correspondence (i.e., $V=0$ negligible, $0.35 < V < 0.39$ moderate; Van Der Nest et al., 2025). The maximum number of multi-trajectory groups to be estimated was established by the number of cross-tabulations greater than 2% of the sample plus 1 (Van Der Nest et al., 2025). The same procedure followed to determine GBMTMs was followed to determine the number of multi-trajectory classes. Once the number of classes was finalized, the Estimated symptoms levels in G8 and G9 were compared to assess changes around the transition to high school.

Correlates and early adulthood outcomes. Multivariate classes were examined for differential associations with correlates (chi-square; ANOVA) and adulthood outcomes (logistic regression). To control for Type 1 error, the Benjamini–Hochberg (BH) correction for multiple testing on omnibus tests (as a set) and post-hoc comparisons (as a set) was used (Benjamini & Hochberg, 1995).

Sensitivity analysis

We further examined the assumption of missing at random by investigating parent- and youth-reported variables that have been associated with depression and anxiety in past research. Variables that were related to missingness as well as correlated with anxiety and/or depression symptoms were used as informative variables in multiple imputation ($n=100$) of depression symptoms and anxiety symptoms scores. Variables used in multiple imputation include sex, ethnicity, household income, parental education; parent-reported symptoms of attention deficit hyperactivity disorder, oppositional defiant disorder, conduct disorder, separation anxiety, general anxiety, depression; parent-reported family functioning; self-reports of aggressive behaviour, bullying victimization and perpetration, hyperactivity symptoms, interpersonal relationships, and empathy. The number and shape of the curves derived from FIML and MI⁵ were compared. Replication of class sizes and shape of GBMTM curves supported evidence of validity of the main results.

Results

⁵ Due to estimation problems with the multiple imputed data class estimation with outcomes (using bayes estimation for rare events) we could not use the multiple imputation dataset for the main analysis.

Participants

Of 875 participants, 701 were included in the analytic sample. In G5, participants were on average 10.91 years old ($SD=0.36$), 52.9% were girls, and 75.9% were white (16.3% non-white; 7.8% missing). Most parents had completed postsecondary education (69.6%) and a median household income of \$70,000-80,000 CAN, representing city and province medians (*Statistics Canada*, n.d.). Participants included in the analytic sample had higher mean levels of parental education ($t=-5.147, p<.001$) and household income ($t=-5.608, p<.001$) were more likely to be white (82.4%; $\chi^2=22.804, p<.001$) than those who did not provide longitudinal data (64.1% white). The analytic sample and those not included did not differ on sex ($\chi^2=0.550, p=.479$), G5 depression ($t=1.548, p=.122$), or anxiety symptoms ($t=0.527, p=.487$). Depression and anxiety symptoms data were not MCAR ($\chi^2(1119)=1242.565, p=.006$). Data were assumed missing at random.

Descriptive statistics

Descriptive statistics for depression and anxiety symptoms (G5-12) are presented in Table 1. Within-time correlations between depression and anxiety symptoms were high ($r=.495-.656, p<.001$), and across-time associations were moderate ($r=.138-.547, p<.006$). Associations between adjacent time points were high for depression ($r=.433-.656, p<.001$) and anxiety symptoms ($r=.507-.787, p<.001$; Table 2).

Average growth curves

Depression symptoms. Parameter estimates for the discontinuity level and curve latent growth curve for depression and anxiety symptoms are found in Table S1. The model for depression symptoms had good fit, $\chi^2(9) = 16.633, p = .055$, CFI = 0.990, RMSEA = 0.035, 90% CI = [0.000–0.061], SRMR = 0.022 (Figure 1). All parameter estimates had significant variation. The elementary and high school curves different, Wald $\chi^2(2) = 65.96, p<.001$. The elementary school portion of the curve was characterized by quadratic change across G5 to G8 in a concave-up form, illustrated by a decreasing curve. The second curve representing change during high school from G9 to G12 demonstrated a convex pattern of increasing depression symptoms at the start of high school, which stabilized by grade 12. Between G8 and G9 there was a significant increase in the average level of depression symptoms (unstandardized = -0.608, $SE = 0.23$, Wald $\chi^2(1)=6.993, p=.008$).

Anxiety symptoms. The discontinuity level and curve model for anxiety symptoms had a good fit, $\chi^2(9) = 7.211$, $p = .615$, CFI = 1.000, RMSEA = 0.000, 90% CI [0.000–0.036], SRMR = 0.010 (see Figure 1). All parameter estimates had significant variation, with the exception of slope 1. The elementary and high school curves were different, Wald $\chi^2(2) = 28.739$, $p < .001$. The elementary school portion of the curve was characterized by concave upward quadratic growth across G5–G8 illustrated by decreasing (G5–G6) then increasing growth. The second curve, representing change during high school, demonstrated an increasing convex shape from G9 to G12. Estimated average anxiety symptoms in G8 and G9 were not statistically different (unstandardized = 0.308, $SE = 0.202$, Wald $\chi^2(1) = 2.331$, $p = .127$).

Univariate Group-Based Trajectory Models

Depression symptoms. Fit indices are presented in Table 3. The BIC made a relatively large drop from the one to two class solution with slower declines through the three to five class solutions. All solutions yielded posterior probabilities $> .70$. Entropy was similar across all solutions and BLRT was significant for each additional class solution. The LMR-LRT was significant, in favour of the two compared to one class solution, and marginally significant for the three class over two class solution. The five- and six-class solutions yielded three class with small cell sizes ($< 6\%$) whereas the four-class included one small class (i.e., 3.8%). Visual inspection of the estimated means for each solution indicated that the four-class solution included a class with a small proportion of the sample clinically elevated scores in high school. Relying on content expertise and parsimony, the four-class solution was selected as the final univariate model for depression symptoms. The most distinct characteristics of the trajectories, such as average levels, curve shape, or change in high school, relative to other trajectories, were used to name each group (see Figure S1A).

Most youth followed a low, relatively stable, path from G5 to G8 ($n = 510$; 72.8%), termed “low” (difference G8 vs G9 = -0.120 , $p = .452$). The next largest group included 16.1% of the sample ($n = 113$), following a low elementary then moderate symptoms high school path, termed “low-moderate” (difference G8 vs G9 = 2.879 , $p = .001$). The third group demonstrated elevated symptoms in elementary school to moderate symptoms in high school ($n = 51$; 7.3%; “high-moderate”; difference G8 vs G9 = -2.915 , $p = .140$). The final group ($n = 27$; 3.9%) had moderate symptoms across elementary school, increasing after the transition (difference G8 vs G9 = 6.252 ,

$p=.002$), peaking with clinical levels by G10 before declining to moderate by G12, termed “moderate-high” (Table S2 for parameter estimates).

Anxiety symptoms. Similar to depression symptoms models, anxiety models demonstrated decreasing BIC for every additional class (Table 3). Entropy was consistent across models and the BLRT was significant for each additional class solution. All solutions yielded posterior probabilities $> .70$. The LMR-LRT indicated statistically significant improvements up to the four-class solution. All solutions yielded sufficiently sized classes. Visual inspection of the estimated means for each class solution showed theoretically sound and meaningful groups up to the five-class solution, which was selected as the final model.

Approximately half of the sample follow a relatively low stable trajectory across G5 through G12 ($n=316$; 45.1%; “low-low”). One-quarter of the sample follow a low-increasing path from G5 through G12 ($n=188$; 26.8%; “low-increasing”). The third group included 51 participants (7.3%) who began with moderate anxiety symptoms, increasing in elementary school and through the first year of high school, called “moderate-high”. The fourth group ($n=81$; 11.6%) demonstrated high increasing levels in elementary school that were curtailed following the high school transition remaining stable in high school. The final group ($n=65$; 9.3%) began with high levels, decreasing over elementary school with stable moderate levels in high school, called “high-declining”. See Table S2 for parameter estimates. Only the “moderate-high” class had statistically significant increase in scores between G8 and G9 (2.939, $p=.002$).

Depression and anxiety symptoms classes – class association. Univariate GBTMs resulted in a four-class solution for depression symptoms and five-class solution for anxiety symptoms. Depression symptoms classes and anxiety symptoms classes demonstrated moderate correspondence, $\chi^2(12)=285.059$, $p<.001$, Cramér's $V=0.368$. Eight of the cells had $>2\%$ of the sample, indicating that up to nine classes should be tested in the GBMTM (Figure 3, Table 4).

Group-Based Multi-Trajectory Models

Fit indices are presented in Table 3. The best log likelihood was not replicated in nine-class solution, even with doubling random starts, and was not considered as a valid solution. BIC values declined for from the 2-class solution through the 8-class solution. All solutions yielded posterior probabilities $> .70$. Entropy fell between .797 and .851. BLRT was significant for each additional class solution. The eight-class solution yielded three class with small cell sizes ($<5\%$) while the seven-class solution had two at $<5\%$ and one at 6.7%. The 6-class solution had

sufficient class sizes while yielding clinically meaningful differences between classes. One class included <5% of the sample but appeared distinct from the others. The 6-class solution was selected as the final GBMTM based on parsimony and content expertise. See Table 5 for parameter estimates and Figure 4 for trajectory plots (Figure S2 for alternative presentation).

Class 1 included 39.37% of the sample and demonstrated consistently low stable depression and anxiety symptoms, with slight decline in elementary school and slight incline in high school (“Low”). Class 2, termed “Low depression/Moderate anxiety” (25.96%) was characterized by low depression symptoms (slight decline in elementary school; stable in high school) and moderate anxiety symptoms (stable in elementary school and high school). Class 3 had low depression symptoms (concave up in elementary school and stable in high school) and moderate-increasing anxiety symptoms (increasing in elementary school but not statistically significant; stable in high school). Class 4 followed a similar elementary school pattern to class 2 but increased in symptoms at the high school transition and through high school, although estimates were not statistically significant (“low depression/Moderate anxiety/Increasing high school”; 10.41%). Although slope and quadratic estimates for the curve of Class 4 were not statistically significant, curves for both depression and anxiety started relatively high in early elementary school and declined through G12 (“High-decreasing”; 6.56%). Class 6 was the smallest containing 4.57% of the sample. The curve was characterized by initial moderate depression and anxiety symptoms that increased markedly through mid-high school, with depression symptoms recovering to moderate by G12 (Moderate-increasing/ High/depression recovery; 4.57%). In terms of high school transition effects, only C4 “Low depression/Moderate anxiety/Increasing high school” had statistically significant increases in both depression symptoms (3.812, $p=.002$) and anxiety symptoms (-2.408, $p=.029$) before and after the transition (i.e., G8 vs G9).

Correlates associated with GBMTM classes.

Sex and childhood maltreatment were significantly associated with GBMTM classification whereas race/ethnicity and elementary school type (K-G8 vs K-G5/6) were not. Demographics (household income, parental education), family functioning (G5-8; G9-12), school climate (G5-6; G9-12), social support (group integration, personal intimacy; G9-12), and high school transition experiences (G9) varied by class (Table 6; Figure 5).

C6 Moderate-increasing/High DEP recovery (4.57%). Few differences were found between this class and other classes on elementary school correlates. They reported lower school climate and higher bullying victimization than the Low and Low dep/Moderate anxiety groups (C1 and C2). In high school, they reported the most problematic functioning relative to all other groups (exception – moderate increasing C5).

C5 High-decreasing - 6.56%. The high-decreasing class reported the lowest school climate and highest bullying victimization scores in elementary school as well as lower family functioning than the C3 Low DEP-moderate increasing/stable high school and low classes (C1, C2) (elementary and high school). In high school, although they still had poorer functioning than the Low class (C1), they had similar functioning to the four classes marked by moderate symptoms in high school (C2, C3, C4, and C6; exception lower than C2 low depression/moderate anxiety on group integration) and better functioning compared to C6 Moderate increasing/ High class (exception personal intimacy, no difference).

C4 Low DEP/Moderate ANX /Increasing - 10.41%. Compared to the Low and Low depression/Moderate anxiety (C1 and C2), C4 reported lower elementary school climate and higher bullying victimization scores as well as poorer scores on all high school correlates. Compared to C3 Low DEP-moderate increasing ANX/stable high school, they also reported lower elementary family functioning, higher high school bullying victimization and lower school bonding and group integration.

C3 Low DEP/Moderate-Increasing ANX - stable HS - 13.12%. On average, C3 reported mid-range scores on correlates in elementary school (higher family functioning, climate, and lower victimization vs high-decreasing C5; higher victimization than C1 low, and C2 low DEP/moderate ANX) and in high school, with better functioning than C4 Low DEP-moderate increasing ANX and C5 High-decreasing, and more problematic functioning than C1 Low.

C2 Low DEP/Moderate ANX - 25.96%. The low depression/moderate anxiety class had similar levels of functioning in elementary school compared to C1 Low (exception peer victimization, $C1 < C2 < C3$). C1 and C2 were differentiated in high school with C2 showing poorer scores on victimization, transition to high school experiences, school bonding, and group integration.

C1 Low - 39.37%. The low class had higher average income and higher parental education than C4 Low DEP-moderate increasing ANX, C5 High-decreasing, and C6 Moderate

increasing/ High. The low group reported the lowest scores on peer victimization and best outcomes on all other correlates (exception personal intimacy compared to C2 Low depression moderate anxiety).

Early adulthood outcomes

Prevalence of early adulthood functional and mental health problems are presented in Table 7. Due to low frequency of mental health conditions on the M.I.N.I. (4.9%-12.9%), cross tabulations with depression/anxiety trajectory classes produced small (or null) cell sizes. To estimate models with rare events, the Bayes estimator was selected with non-informative default priors. All odds ratios and 95% credible intervals (controlling for sex, parental education, and household income) are reported in Table 8.

C6 Moderate-increasing/High DEP recovery (4.57%). The high-risk group was at elevated risk for job-risk compared to C1 Low and C3 Low DEP/Moderate-Increasing ANX - stable HS classes. Compared to all other classes, C6 Moderate-increasing/High DEP recovery was at greatest risk for having current depression (exception C4 Low DEP/Moderate ANX /Increasing), Current General Anxiety, OCD, Current Social Anxiety, and Agoraphobia. C6 moderate-increasing/high DEP recovery was also at higher risk for panic disorder relative to C1 Low and C2 Low DEP/Moderate ANX. They were also at higher risk than all other groups for subclinical/clinical levels of self-reported depression (exception C4 Low DEP/ Moderate increasing ANX) and anxiety symptoms.

C5 high-decreasing was at higher risk for sub-clinical/clinical depression and anxiety compared to C1 Low. They had a *lower* risk of agoraphobia sub-clinical/clinical anxiety than C3 Low DEP-moderate increasing ANX-stable HS and C4 Low DEP-moderate increasing ANX.

C4 Low DEP/Moderate ANX /Increasing – (10.41%). Compared to C1 Low and C3 Low DEP/Moderate-Increasing ANX - stable HS, C4 Low DEP/Moderate ANX /Increasing was at higher risk for experiencing job risk, and not having attended postsecondary education. C4 Low DEP/Moderate ANX /Increasing was at higher risk, compared to C1 Low and C2 Low DEP/Moderate ANX for Current general anxiety, current social anxiety, and panic disorder. Compared to the C1 Low, they were also at higher risk for OCD. C4 Low DEP/Moderate ANX /Increasing class was also at higher risk than all other classes (expectation C3 Low DEP-moderate increasing ANX-stable HS and C5 high-decreasing) for agoraphobia. They were also at higher risk than all other classes (expectation C6 Moderate-increasing/High DEP recovery) for

self-reported subclinical/clinical levels of depression and higher risk for anxiety symptoms compared to the Low and Low DEP/Moderate ANX classes (C1 and C2).

C3 Low DEP/Moderate-Increasing ANX - stable HS (13.12%). The Low DEP/Moderate-Increasing ANX - stable HS class was at higher risk for Current General Anxiety and Panic disorder than C1 Low and C2 Low DEP/Moderate ANX. They were also at higher risk of current social anxiety and compared to C1 Low. C3 was at higher risk for subclinical/clinical levels of self-reported anxiety symptoms compared to C1 and C2 but not different from these classes on self-reported depression symptoms.

C2 Low DEP/Moderate ANX (25.96%) and C1 Low (39.37%). C1 and C2 did not have different risk for any of the early adulthood functional outcomes and mental health diagnoses, nor did they differ from C5 High-decreasing. However, *C2 Low DEP/Moderate ANX* was at higher risk for self-reported subclinical/clinical depression and anxiety symptoms compared to C1 Low.

Sensitivity analysis results

GBMTM curves resulting from MI analyses followed similar shapes as those in the main results using FIML without additional informative variables. Class sizes for the smallest four classes were within |0.56|-|1.24|% of the population and the larger two classes were within 2.74% and 5.06% of the FIML estimates. Similarities in classes and curves supported the validity of the initial findings. See Figure S3.

Discussion

The co-occurrence of depression and anxiety symptoms trajectories over 8 years of adolescence were examined relative to high school transition, as well as to document concurrent correlates (i.e., individual, interpersonal, contextual) and mental health and functional problems in early adulthood. Six subgroups were identified and were differentiated by patterns of depression and symptoms, some that changed according to high school transition; three groups had consistently low depression symptoms but differed on anxiety symptoms (low (39.37%), moderate (25.96%), increasing in elementary/stable high school (13.12%); one had low depression/moderate anxiety/increasing symptoms following transition (10.41%); one had high decreasing symptoms (6.56%); and one had moderate increasing symptoms (4.57%). The number of co-occurring symptoms curves replicates those found prior studies (Liang et al., 2023; Olino et al., 2010, 2014). Like others we found that some classes were marked by prominent

symptoms of one disorder with the other being low, as well as symptoms fluctuating simultaneously (Lallukka et al., 2019; Liang et al., 2023; Olino et al., 2010, 2014).

Our findings complement the limited research on internalizing symptoms variation across school transitions. We replicated some of the sub-groups found in Nelemans et al.'s (2018) study of middle school transition and anxiety symptoms. For example, they found that 5% experienced sharp increases in anxiety symptoms following transition, consistent with our “moderate-high” class (7.4%) found in the univariate GBMTMs. They also found 14% showed decreases in anxiety following the middle school transition. This was not replicated in our univariate analyses; however, in the GBMTM, the High declining class (6.56%) had a marked decrease in depression symptoms from elementary to high school. In contrast to our findings, Olivier et al. (2023) did not find evidence of a declining class in their study of depression symptoms from late elementary to upper secondary. It is possible that this difference is due to sample variations. Olivier et al.'s sample consisted of only academic-stream Finnish students, whereas Nelemans et al. and the current study were conducted with North American community samples. Higher academic achievement is associated with higher socially prescribed and self-oriented perfectionism, with the later having stronger associations at the high school transition (Endleman et al., 2022). The academic pressures on higher achieving students may have further hindered alleviation from depressive symptoms.

For some, the transition marked a deflection in favour of more positive experiences, but for others, the transition was associated with an increase in internalizing symptoms. Some of the classes appeared to begin experiencing symptoms changes in G8 (see Figure 2), the pre-transition year. Indeed, the anticipation of navigating a new, often larger, environment and adjusting to logistical changes (e.g., moving classes) and increased academic requirements, greater autonomy, changes in peer group dynamics, and reduced adult guidance and oversight (Benner, 2011; Eccles et al., 1991; Evans et al., 2018; Spernes, 2022), can invoke feelings of concern (Beatson et al., 2023; Rice et al., 2021; Spernes, 2022) before the event has occurred, and even after the transition, especially for girls (Rice et al., 2021).

We found several notable differences in individual factors and elementary and secondary school relational and contextual correlates of the trajectory classes. Girls and those who had experienced child maltreatment were overrepresented in all risk classes, and individuals in the low and low depression/moderate anxiety classes also had higher parental education and

household income than classes with more symptoms of depression and anxiety. These findings replicate others (Olino et al., 2010) and are not surprising as girls/women and maltreated individuals are more likely to experience internalizing problems compared to boys/men (Keyes & Platt, 2024) and those who not having experienced child maltreatment (Gardner et al., 2019), and low socioeconomic status is consistently linked with depression and anxiety (Lemstra et al., 2008).

Compared to the low depression/moderate anxiety (stable) group, the low depression/moderate anxiety *increasing* group reported lower school climate (G5-G6) and higher average elementary school bullying victimization yet were not otherwise differentiated on elementary factors. In line with their diverging symptoms levels at the transition, the increasing group reported poorer correlates in high school. It is possible that collapsing scores over schooling period may have masked variations in bullying victimization across time. Indeed, Vaillancourt et al. (2023) found a sub-group of students whose elementary bullying victimization trajectory mirrors that of depression and anxiety found in the “low depression/moderate anxiety-increasing” class. Poor peer relationships in elementary school may have predisposed them to experience greater internalizing problems in G8, which in turn may have contributed to their poor experiences, and escalating symptoms. Notably, Krygsman and Vaillancourt (2017) found evidence of a symptoms driven pathway from depression symptoms to peer rejection across the high school transition and from depression symptoms to peer abuse in the first year of high school (G9 to G10). It is possible that a more fine-grained analysis may tease apart the temporal sequence, providing insight into intervention areas to curb the symptoms increases experienced post-transition.

The moderate increasing/high depression class had very similar elementary school levels of anxiety as the low depression/moderate increasing anxiety/stable high school class. Although their elementary depression symptoms trajectories varied, these classes only differed on the proportion of youth reporting child maltreatment (52.38% vs 20.97%) and parental education but not other demographic or elementary school interpersonal/environmental correlates. Those whose anxiety was curtailed at the high school transition reported more positive transition experiences and high school interpersonal relations. It is possible that the pre-existing moderate depression scores in the increasing group created a susceptibility to continue developing increasing depression and anxiety symptoms, leading to a bias in perceiving their environment

and peer relations as being more negative than may be perceived by others (De Los Reyes & Prinstein, 2004). The moderately increasing class was 2.5 times more likely than the high school stable class to experience job risk, and 4.8 to 12.0 times more likely to experience various mental disorders in early adulthood (except panic disorder). When examining prevalence of mental disorder within the moderate increasing class, proportion experiencing disorders in early adulthood ranged from 33.3% (panic disorder) to 66.7% (current generalized anxiety disorder). Furthermore, 76.9% of those in the high-increasing group self-reported sub-clinical/clinical symptoms of depression and 100% self-reported sub-clinical/clinical symptoms of anxiety. The moderate increasing class was 4.3 to 10.2 times more likely than other groups (except low depression/moderate anxiety-increasing) to experience current depressive disorder or to report subclinical/clinical levels of depression symptoms in early adulthood. This homotypic continuity of depression from late adolescence to early adulthood speaks to the entrenchment of depression as people age (Copeland et al., 2013). Additional research is needed to identify correlates of those whose increasing symptoms curbed after school transition, to derail the continuation of symptoms into adulthood.

There is much to be learned from the decreasing class. One-third of the class reported child maltreatment, they came from lower SES backgrounds compared to those in the lowest symptoms classes, reported low school climate in G5/6, and the highest elementary bullying victimization scores. In high school they reported functioning like those in the Low depression - moderate increasing anxiety-stable high school and moderate increasing depression/anxiety groups, yet their depression and anxiety scores declined over time. In early adulthood the declining class had similar risk of developing mental disorder and functional problems as those in the Low, and Low depression/moderate anxiety classes, with the exception of self-reported depression and anxiety compared to the low class. These encouraging outcomes emphasize the resilience of these youth and indicate the necessity to explore individual, environmental, and their interactive factors and that derail elevated symptomology in early adolescence. Interestingly, bullying victimization was reduced by nearly one full point for these adolescents. The association between peer abuse and trajectory classes calls for a more refined analysis of the person-level, year-by-year associations between changes in peer victimization and changes in internalizing problems.

In addition to examining the role of bullying victimization in the development and maintenance of internalizing problems, our results highlight other relationship areas worthy of further study. The declining class reported the lowest school climate scores in elementary school, yet high school bonding, group integration, and personal intimacy scores were on par with the Low depression-moderate increasing anxiety-stable high school and Moderate increasing depression/anxiety classes. More studies untangling the directionality of belonging and mental health problems are needed. Results of a recent systematic review of school-based interventions at the elementary to secondary school transition for social-emotional and educational outcomes indicated that programs targeting belonging post-transition demonstrated good quality evidence (Beatson et al., 2023).

Strengths and Limitations

In the current study, the shortcomings of prior research were addressed by examining co-occurring symptoms of depression and anxiety with eight waves of data, while statistically modeling the transition to high school. The current study has many strengths, many of which aid in mitigating effects of bias in results, including annual assessments over 12 years using multiple reporter sources (self-reports, parent-reports, and clinical interviews); multi-item measures with excellent psychometric properties; clinical diagnostic assessment; randomized population-based sample; rigorous analyses; and attending to a pertinent environmental risk, high school transition. The study sample was representative of the population which they were recruited from, supporting the generalizability of our findings. Further, classes were replicated using multiple-imputation informed by self- and parent-reported variables associated with missingness. Notwithstanding these strengths, there are also limitations. Per the study ethics protocol, the second author contacted participants with clinical depression scores following annual survey completion. Since we lacked information on interventions the participants underwent, we could not account for them in our analyses, potentially introducing bias by reducing clinically significant mental health cases. Although parents participated in the study, we lacked assessments of parental psychopathology, which is linked to trajectories of internalizing symptoms (Olino et al., 2014). Using self-reported assessments of internalizing problems to create the trajectory groups and peer and school relations might introduce bias by inflating associations due to shared method variance (Hawker & Boulton, 2000; Podsakoff et al., 2003); however, trajectory classes were similarly associated with both diagnosis (clinical interviews)

and clinical status from self report in early adulthood, supporting the robustness of association regardless of reporter type.

Although GBMTM is a robust person-centered method for identifying clusters of participants following similar patterns, it does not allow us to determine the directionality or causality between the pathways of internalizing problems and the covariates assessed in this study. The association between peer abuse and class membership found in this study calls for more refined analysis of the year-by-year, within-person level associations between changes in victimization and changes in internalizing problems.

Conclusions

Subsets of adolescents follow different patterns of co-occurring depression and anxiety symptoms that appear to fluctuate relative to high school transition. For some, this transition was related to marked increases in depression and anxiety symptoms, whereas for others, the transition deflected a path of increasing symptomology. These divergent patterns highlight the need for research evaluating interventions that prepare and support youth before and during the high school transition. In addition to mental health promotion programs targeting school students, bullying prevention initiatives may also contribute to improved adolescent mental health (Fraguas et al., 2021). Such efforts may ultimately reduce the risk of developing mental disorders and experiencing vocational and occupational difficulties in early adulthood.

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References

- Angold, & Cotello. (1993). Depressive comorbidity in children and adolescents: Empirical, theoretical, and methodological issues. *American Journal of Psychiatry*, 150(12), 1779–1791. <https://doi.org/10.1176/ajp.150.12.1779>
- Arias, D., Saxena, S., & Verguet, S. (2022). Quantifying the global burden of mental disorders and their economic value. *eClinicalMedicine*, 54, 101675. <https://doi.org/10.1016/j.eclinm.2022.101675>
- Beatson, R., Quach, J., Canterford, L., Farrow, P., Bagnall, C., Hockey, P., Phillips, E., Patton, G. C., Olsson, C. A., Ride, J., McKay Brown, L., Roy, A., & Mundy, L. K. (2023). Improving primary to secondary school transitions: A systematic review of school-based interventions to prepare and support student social-emotional and educational outcomes. *Educational Research Review*, 40, 100553. <https://doi.org/10.1016/j.edurev.2023.100553>
- Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society. Series B (Methodological)*, 57(1), 289–300.
- Benner, A. D. (2011). The Transition to High School: Current Knowledge, Future Directions. *Educational Psychology Review*, 23(3), 299–328. <https://doi.org/10.1007/s10648-011-9152-0>
- Benner, A. D., Boyle, A. E., & Bakhtiari, F. (2017). Understanding Students' Transition to High School: Demographic Variation and the Role of Supportive Relationships. *Journal of Youth and Adolescence*, 46(10), 2129–2142. <https://doi.org/10.1007/s10964-017-0716-2>
- Boyle, M. H., Cunningham, C. E., Georgiades, K., Cullen, J., Racine, Y., & Pettingill, P. (2009). The Brief Child and Family Phone Interview (BCFPI): 2. Usefulness in screening for child and adolescent psychopathology. *Journal of Child Psychology and Psychiatry*, 50(4), 424–431. <https://doi.org/10.1111/j.1469-7610.2008.01971.x>
- Clayborne, Z. M., Varin, M., & Colman, I. (2019). Systematic Review and Meta-Analysis: Adolescent Depression and Long-Term Psychosocial Outcomes. *Journal of the American Academy of Child & Adolescent Psychiatry*, 58(1), 72–79. <https://doi.org/10.1016/j.jaac.2018.07.896>

- Cook, E. T., Greenberg, M. T., & Kusche, C. A. (1995). People in my life: Attachment relationships in middle childhood. *Society for Research in Child Development, Indianapolis, IN*.
- Copeland, W. E., Adair, C. E., Smetanin, P., Stiff, D., Briante, C., Colman, I., Fergusson, D., Horwood, J., Poulton, R., Jane Costello, E., & Angold, A. (2013). Diagnostic transitions from childhood to adolescence to early adulthood. *Journal of Child Psychology and Psychiatry*, 54(7), 791–799. <https://doi.org/10.1111/jcpp.12062>
- Costello, E. J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and Development of Psychiatric Disorders in Childhood and Adolescence. *Archives of General Psychiatry*, 60(8), 837–844. <https://doi.org/10.1001/archpsyc.60.8.837>
- Cunningham, C. E., Boyle, M. H., Hong, S., Pettingill, P., & Bohaychuk, D. (2009). The Brief Child and Family Phone Interview (BCFPI): 1. Rationale, development, and description of a computerized children's mental health intake and outcome assessment tool. *Journal of Child Psychology and Psychiatry*, 50(4), 416–423. <https://doi.org/10.1111/j.1469-7610.2008.01970.x>
- De La Torre-Luque, A., Fiol-Veny, A., Balle, M., Nelemans, S. A., & Bornas, X. (2020a). Anxiety in Early Adolescence: Heterogeneous Developmental Trajectories, Associations with Risk Factors and Depressive Symptoms. *Child Psychiatry & Human Development*, 51(4), 527–541. <https://doi.org/10.1007/s10578-019-00936-y>
- De La Torre-Luque, A., Fiol-Veny, A., Balle, M., Nelemans, S. A., & Bornas, X. (2020b). Anxiety in Early Adolescence: Heterogeneous Developmental Trajectories, Associations with Risk Factors and Depressive Symptoms. *Child Psychiatry & Human Development*, 51(4), 527–541. <https://doi.org/10.1007/s10578-019-00936-y>
- De Los Reyes, A., & Prinstein, M. J. (2004). Applying Depression-Distortion Hypotheses to the Assessment of Peer Victimization in Adolescents. *Journal of Clinical Child & Adolescent Psychology*, 33(2), 325–335. https://doi.org/10.1207/s15374424jccp3302_14
- Developmental Studies Centre. (1997). *Student perceptions of feelings about classroom and school*. Author.
- Eccles, J. S., Lord, S., & Midgley, C. (1991). What are we doing to early adolescents? The impact of educational contexts on early adolescents. *American Journal of Education*, 99(4), 521–542. <https://doi.org/10.1086/443996>

- Endleman, S., Brittain, H., & Vaillancourt, T. (2022). The longitudinal associations between perfectionism and academic achievement across adolescence. *International Journal of Behavioral Development*, 46(2), 91–100. <https://doi.org/10.1177/01650254211037400>
- European Education and Culture Executive Agency. (2023). The structure of the European education systems 2023/2024: Schematic diagrams. In *Eurydice Facts and Figures*. Publications Office of the European Union.
- Evans, D., Borriello, G. A., & Field, A. P. (2018). A Review of the Academic and Psychological Impact of the Transition to Secondary Education. *Frontiers in Psychology*, 9, 1482. <https://doi.org/10.3389/fpsyg.2018.01482>
- Fraguas, D., Díaz-Caneja, C. M., Ayora, M., Durán-Cutilla, M., Abregú-Crespo, R., Ezquiaga-Bravo, I., Martín-Babarro, J., & Arango, C. (2021). Assessment of School Anti-Bullying Interventions: A Meta-analysis of Randomized Clinical Trials. *JAMA Pediatrics*, 175(1), 44. <https://doi.org/10.1001/jamapediatrics.2020.3541>
- Fréchette-Simard, C., Plante, I., Duchesne, S., & Chaffee, K. E. (2023). A Latent Growth Analysis of Individual Factors Predicting Test Anxiety During the Transition from Elementary to Secondary School. *The Journal of Early Adolescence*, 43(3), 265–293. <https://doi.org/10.1177/02724316221104198>
- Gardner, M. J., Thomas, H. J., & Erskine, H. E. (2019). The association between five forms of child maltreatment and depressive and anxiety disorders: A systematic review and meta-analysis. *Child Abuse & Neglect*, 96, 104082. <https://doi.org/10.1016/j.chiabu.2019.104082>
- GBD 2019 Mental Disorders Collaborators. (2022). Global, regional, and national burden of 12 mental disorders in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. *The Lancet Psychiatry*, 9(2), 137–150. [https://doi.org/10.1016/S2215-0366\(21\)00395-3](https://doi.org/10.1016/S2215-0366(21)00395-3)
- Georgiades, K., Duncan, L., Wang, L., Comeau, J., Boyle, M. H., & 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. *The Canadian Journal of Psychiatry*, 64(4), 246–255. <https://doi.org/10.1177/0706743719830024>

- Georgiades, K., Lewinsohn, P. M., Monroe, S. M., & Seeley, J. R. (2006). Major Depressive Disorder in Adolescence: The Role of Subthreshold Symptoms. *Journal of the American Academy of Child & Adolescent Psychiatry*, 45(8), 936–944.
<https://doi.org/10.1097/01.chi.0000223313.25536.47>
- Hawker, D. S. J., & Boulton, M. J. (2000). Twenty Years' Research on Peer Victimization and Psychosocial Maladjustment: A Meta-analytic Review of Cross-sectional Studies. *Journal of Child Psychology and Psychiatry*, 41(4), 441–455.
<https://doi.org/10.1111/1469-7610.00629>
- Hayden, L. K. (1989). Children's loneliness. *Unpublished Doctoral Dissertation, University of Waterloo, Waterloo, Ontario, Canada.*
- Jacobson, N. C., & Newman, M. G. (2017). Anxiety and depression as bidirectional risk factors for one another: A meta-analysis of longitudinal studies. *Psychological Bulletin*, 143(11), 1155–1200. <https://doi.org/10.1037/bul0000111>
- Jelen, M. B., Griffiths, S. L., Lucas, L., Saul, J., & Norbury, C. F. (2023). The role of language in mental health during the transition from primary to secondary education. *Quarterly Journal of Experimental Psychology*, 76(12), 2732–2748.
<https://doi.org/10.1177/17470218231158069>
- Jindal-Snape, D., & Bagnall, C. (2023). A systematic literature review of child self-report measures of emotional wellbeing during primary to secondary school transitions. *Assessment and Development Matters*, 15(1), 17–22.
<https://doi.org/10.53841/bpsadm.2023.15.1.17>
- Jindal-Snape, D., Symonds, J. E., Hannah, E. F. S., & Barlow, W. (2021). Conceptualising Primary-Secondary School Transitions: A Systematic Mapping Review of Worldviews, Theories and Frameworks. *Frontiers in Education*, 6, 540027.
<https://doi.org/10.3389/feduc.2021.540027>
- Jones, P. B. (2013). Adult mental health disorders and their age at onset. *British Journal of Psychiatry*, 202(s54), s5–s10. <https://doi.org/10.1192/bjp.bp.112.119164>
- Keyes, K. M., & Platt, J. M. (2024). Annual Research Review: Sex, gender, and internalizing conditions among adolescents in the 21st century – trends, causes, consequences. *Journal of Child Psychology and Psychiatry*, 65(4), 384–407. <https://doi.org/10.1111/jcpp.13864>

- Kieling, C., Buchweitz, C., Caye, A., Silvani, J., Ameis, S. H., Brunoni, A. R., Cost, K. T., Courtney, D. B., Georgiades, K., Merikangas, K. R., Henderson, J. L., Polanczyk, G. V., Rohde, L. A., Salum, G. A., & Szatmari, P. (2024). Worldwide Prevalence and Disability from Mental Disorders Across Childhood and Adolescence: Evidence from the Global Burden of Disease Study. *JAMA Psychiatry*, *81*(4), 347–356.
<https://doi.org/10.1001/jamapsychiatry.2023.5051>
- Kim-Cohen, J., Caspi, A., Moffitt, T. E., Harrington, H., Milne, B. J., & Poulton, R. (2003). Prior Juvenile Diagnoses in Adults with Mental Disorder: Developmental Follow-Back of a Prospective-Longitudinal Cohort. *Archives of General Psychiatry*, *60*(7), 709.
<https://doi.org/10.1001/archpsyc.60.7.709>
- Krygsman, A., & Vaillancourt, T. (2017). Longitudinal associations between depression symptoms and peer experiences: Evidence of symptoms-driven pathways. *Journal of Applied Developmental Psychology*, *51*, 20–34.
<https://doi.org/10.1016/j.appdev.2017.05.003>
- Lallukka, T., Mekuria, G. B., Nummi, T., Virtanen, P., Virtanen, M., & Hammarström, A. (2019). Co-occurrence of depressive, anxiety, and somatic symptoms: Trajectories from adolescence to midlife using group-based joint trajectory analysis. *BMC Psychiatry*, *19*(1). <https://doi.org/10.1186/s12888-019-2203-7>
- Lemstra, M., Neudorf, C., D’Arcy, C., Kunst, A., Warren, L. M., & Bennett, N. R. (2008). A Systematic Review of Depressed Mood and Anxiety by SES in Youth Aged 10–15 Years. *Canadian Journal of Public Health*, *99*(2), 125–129. <https://doi.org/10.1007/BF03405459>
- Lester, L., & Cross, D. (2015). The Relationship Between School Climate and Mental and Emotional Wellbeing Over the Transition from Primary to Secondary School. *Psychology of Well-Being*, *5*(1), 9. <https://doi.org/10.1186/s13612-015-0037-8>
- Lester, L., Waters, S., & Cross, D. (2013). The Relationship Between School Connectedness and Mental Health During the Transition to Secondary School: A Path Analysis. *Australian Journal of Guidance and Counselling*, *23*(2), 157–171.
<https://doi.org/10.1017/jgc.2013.20>
- Liang, Y., Huebner, E. S., & Tian, L. (2023). Joint trajectories of loneliness, depressive symptoms, and social anxiety from middle childhood to early adolescence: Associations

- with suicidal ideation. *European Child & Adolescent Psychiatry*, 32(9), 1733–1744.
<https://doi.org/10.1007/s00787-022-01993-w>
- Lipps, G. (2005). *Making the Transition: The Impact of Moving from Elementary to Secondary School on*.
- Mander, D. J., & Lester, L. (2017). A Longitudinal Study into Indicators of Mental Health, Strengths and Difficulties Reported by Boarding Students as They Transition from Primary School to Secondary Boarding Schools in Perth, Western Australia. *Journal of Psychologists and Counsellors in Schools*, 27(2), 139–152.
<https://doi.org/10.1017/jgc.2017.1>
- McDougall, P., & Hymel, S. (1998). Moving into middle school: Individual differences in the transition experience. *Canadian Journal of Behavioural Science / Revue Canadienne Des Sciences Du Comportement*, 30(2), 108–120. <https://doi.org/10.1037/h0085811>
- Melton, T. H., Croarkin, P. E., Strawn, J. R., & Mcclintock, S. M. (2016). Comorbid Anxiety and Depressive Symptoms in Children and Adolescents: A Systematic Review and Analysis. *Journal of Psychiatric Practice®*, 22(2), 84.
<https://doi.org/10.1097/PRA.0000000000000132>
- Murray, C., & Greenberg, M. T. (2006). Examining the Importance of Social Relationships and Social Contexts in the Lives of Children with High-Incidence Disabilities. *The Journal of Special Education*, 39(4), 220–233. <https://doi.org/10.1177/00224669060390040301>
- Muthén, L. K., & Muthén, B. O. (1998). *Mplus User's Guide* (Version 8) [Computer software]. Muthén & Muthén.
- Nagin, D. S. (2005). *Group-Based Modeling of Development*. Harvard University Press.
- Nagin, D. S., Jones, B. L., Passos, V. L., & Tremblay, R. E. (2018). Group-based multi-trajectory modeling. *Statistical Methods in Medical Research*, 27(7), 2015–2023.
<https://doi.org/10.1177/0962280216673085>
- Narusyte, J., Ropponen, A., Alexanderson, K., & Svedberg, P. (2017). Internalizing and externalizing problems in childhood and adolescence as predictors of work incapacity in young adulthood. *Social Psychiatry and Psychiatric Epidemiology*, 52(9), 1159–1168.
<https://doi.org/10.1007/s00127-017-1409-6>
- Nelemans, S. A., Hale, W. W., Branje, S. J. T., Meeus, W. H. J., & Rudolph, K. D. (2018). Individual differences in anxiety trajectories from Grades 2 to 8: Impact of the middle

- school transition. *Development and Psychopathology*, 30(4), 1487–1501.
<https://doi.org/10.1017/S0954579417001584>
- Nelemans, S. A., Hale, W. W., Branje, S. J. T., Raaijmakers, Q. A. W., Frijns, T., Lier, P. A. C. van, & Meeus, W. H. J. (2014). Heterogeneity in development of adolescent anxiety disorder symptoms in an 8-year longitudinal community study. *Development and Psychopathology*, 26(1), 181–202. <https://doi.org/10.1017/S0954579413000503>
- Newman. (2007). *The Relationship of Social Support to Depressive Symptoms During the Transition to High School*.
- Noyes, B. K., Munoz, D. P., Khalid-Khan, S., Brietzke, E., & Booij, L. (2022). Is subthreshold depression in adolescence clinically relevant? *Journal of Affective Disorders*, 309, 123–130. <https://doi.org/10.1016/j.jad.2022.04.067>
- Nylund-Gibson, K., & Choi, A. Y. (2018). Ten frequently asked questions about latent class analysis. *Translational Issues in Psychological Science*, 4(4), 440–461.
<https://doi.org/10.1037/tps0000176>
- OECD. (2023). *Education GPS*.
<https://gpseducation.oecd.org/CountryProfile?primaryCountry=CAN>
- Olino, T. M., Klein, D. N., Lewinsohn, P. M., Rohde, P., & Seeley, J. R. (2010). Latent trajectory classes of depressive and anxiety disorders from adolescence to adulthood: Descriptions of classes and associations with risk factors. *Comprehensive Psychiatry*, 51(3), 224–235.
<https://doi.org/10.1016/j.comppsy.2009.07.002>
- Olino, T. M., Stepp, S. D., Keenan, K., Loeber, R., & Hipwell, A. (2014). Trajectories of Depression and Anxiety Symptoms in Adolescent Girls: A Comparison of Parallel Trajectory Approaches. *Journal of Personality Assessment*, 96(3), 316–326.
<https://doi.org/10.1080/00223891.2013.866570>
- Olivier, E., Morin, A. J. S., Leo, V., & Salmela-Aro, K. (2023). The interconnected development of depressive symptoms and school functioning from mid-adolescence to early adulthood: A piecewise growth mixture analysis. *Journal of Educational Psychology*, 115(3), 427–445. <https://doi.org/10.1037/edu0000761>
- Olweus, D. (1996). Bullying at School: Knowledge Base and an Effective Intervention Program. *Annals of the New York Academy of Sciences*, 794(1), 265–276.
<https://doi.org/10.1111/j.1749-6632.1996.tb32527.x>

- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Reynolds, C. R., & Kamphaus, R. W. (2004). *Behavior Assessment System for Children—Second edition manual*. Pearson.
- Rice, F., Ng-Knight, T., Riglin, L., Powell, V., Moore, G., McManus, I. C., Shelton, K. H., & Frederickson, N. (2021). Pupil Mental Health, Concerns and Expectations About Secondary School as Predictors of Adjustment Across the Transition to Secondary School: A Longitudinal Multi-Informant Study. *School Mental Health*. <https://doi.org/10.1007/S12310-021-09415-Z>
- Rioux, C., Stickley, Z. L., & Little, T. D. (2021). Solutions for latent growth modeling following COVID-19-related discontinuities in change and disruptions in longitudinal data collection. *International Journal of Behavioral Development*, 45(5), 463–473. <https://doi.org/10.1177/01650254211031631>
- Schubert, K. O., Clark, S. R., Van, L. K., Collinson, J. L., & Baune, B. T. (2017). Depressive symptom trajectories in late adolescence and early adulthood: A systematic review. *Australian & New Zealand Journal of Psychiatry*, 51(5), 477–499. <https://doi.org/10.1177/0004867417700274>
- Seifert, T., & Schulz, H. (2007). The Effects of Pubertal Timing and School Transition on Preadolescents' Well-Being. *Canadian Journal of School Psychology*, 22(2), 219–234. <https://doi.org/10.1177/0829573507302674>
- Sheehan, D., Janavs, J., Baker, R., Sheehan, K. H., Knapp, E., & Sheehan, M. (2016). The MINI international neuropsychiatric interview (Version 7.0. 2) for DSM-5. *Harm Research Institute*.
- Sheehan et al. (1998). *The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10*.
- Shore, L., Toumbourou, J. W., Lewis, A. J., & Kremer, P. (2018). Review: Longitudinal trajectories of child and adolescent depressive symptoms and their predictors - a

- systematic review and meta-analysis. *Child and Adolescent Mental Health*, 23(2), 107–120. <https://doi.org/10.1111/camh.12220>
- Spernes, K. (2022). The transition between primary and secondary school: A thematic review emphasising social and emotional issues. *Research Papers in Education*, 37(3), 303–320. <https://doi.org/10.1080/02671522.2020.1849366>
- Statistics Canada. (n.d.). www.statcan.gc.ca
- Tanaka, M., Jamieson, E., Georgiades, K., Duku, E. K., Boyle, M. H., & MacMillan, H. L. (2011). Survivors of physical and emotional abuse: The association between childhood abuse and labor force outcomes in young adults: Results from the Ontario Child Health Study. *Journal of Aggression, Maltreatment & Trauma*, 20(8), 821–844. <https://doi.org/10.1080/10926771.2011.621851>
- Terrell-Deutsch, B. (1999). The Conceptualization and Measurement of Childhood Loneliness. In K. J. Rotenberg & S. Hymel (Eds.), *Loneliness in Childhood and Adolescence* (pp. 11–33). Cambridge University Press. <https://doi.org/10.1017/CBO9780511551888.002>
- Vaillancourt, T., Brittain, H., Bennett, L., Arnocky, S., McDougall, P., Hymel, S., Short, K., Sunderani, S., Scott, C., Mackenzie, M., & Cunningham, L. (2010). Places to Avoid: Population-Based Study of Student Reports of Unsafe and High Bullying Areas at School. *Canadian Journal of School Psychology*, 25(1), 40–54. <https://doi.org/10.1177/0829573509358686>
- Vaillancourt, T., Brittain, H., Farrell, A. H., Krygsman, A., & Vitoroulis, I. (2023). Bullying involvement and the transition to high school: A brief report. *Aggressive Behavior*, 49(4), 409–417. <https://doi.org/10.1002/ab.22082>
- Van Der Nest, G., Candel, M. J. J. M., Van Breukelen, G. J. P., & Passos, V. L. (2025). Multivariate versus univariate latent trajectory modelling: A comparison of class recovery performance and implications for multivariate model building strategies. *Journal of Statistical Computation and Simulation*, 1–27. <https://doi.org/10.1080/00949655.2025.2465799>
- Virtanen, T. E., Vasalampi, K., Torppa, M., Lerkkanen, M.-K., & Nurmi, J.-E. (2019). Changes in students' psychological well-being during transition from primary school to lower secondary school: A person-centered approach. *Learning and Individual Differences*, 69, 138–149. <https://doi.org/10.1016/j.lindif.2018.12.001>

- Volz, H.-P., Saliger, J., Kasper, S., Möller, H.-J., & Seifritz, E. (2022). Subsyndromal generalised anxiety disorder: Operationalisation and epidemiology – a systematic literature survey. *International Journal of Psychiatry in Clinical Practice*, 26(3), 277–286.
<https://doi.org/10.1080/13651501.2021.1941120>
- Walsh, C. A., MacMillan, H. L., Trocmé, N., Jamieson, E., & Boyle, M. H. (2008). Measurement of victimization in adolescence: Development and validation of the Childhood Experiences of Violence Questionnaire. *Child Abuse & Neglect*, 32(11), 1037–1057.
<https://doi.org/10.1016/j.chiabu.2008.05.003>
- Wang, Y.-C. L., Chan, H.-Y., & Chen, P.-C. (2018). Transitions of Developmental Trajectories of Depressive Symptoms Between Junior and Senior High School Among Youths in Taiwan: Linkages to Symptoms in Young Adulthood. *Journal of Abnormal Child Psychology*, 46(8), 1687–1704. <https://doi.org/10.1007/s10802-018-0408-8>
- West, S. G., McNeish, D., & Savord, A. (2023). Model fit in structural equation modeling. In *Handbook of structural equation modeling* (2nd ed., pp. 184–205).
- Xu, X., Huebner, E. S., & Tian, L. (2021a). Co-Developmental Trajectories of Specific Anxiety Symptoms from Middle Childhood to Early Adolescence: Associations with Psychological Well-Being and Academic Achievement. *Journal of Youth and Adolescence*, 50(6), 1140–1156. <https://doi.org/10.1007/s10964-021-01411-5>
- Xu, X., Huebner, E. S., & Tian, L. (2021b). Co-Developmental Trajectories of Specific Anxiety Symptoms from Middle Childhood to Early Adolescence: Associations with Psychological Well-Being and Academic Achievement. *Journal of Youth and Adolescence*, 50(6), 1140–1156. <https://doi.org/10.1007/s10964-021-01411-5>

Table 1. Descriptive Statistics for Main Study Variables

	Cronbach's alpha	No. of Participants ^a	Score minimum	Score maximum	Mean	Standard deviation
Depressive symptoms						
Grade 5	.892	647	0.00	26.00	5.65	6.03
Grade 6	.866	595	0.00	26.00	4.04	4.68
Grade 7	.872	540	0.00	26.00	3.48	4.66
Grade 8	.877	503	0.00	27.00	3.78	4.84
Grade 9	.893	483	0.00	26.00	4.34	5.60
Grade 10	.908	449	0.00	28.00	5.08	5.96
Grade 11	.895	435	0.00	27.00	5.03	5.64
Grade 12	.879	445	0.00	24.00	5.14	5.37
Anxiety symptoms						
Grade 5	.873	644	0.00	28.00	7.78	5.59
Grade 6	.853	598	0.00	22.00	7.06	4.99
Grade 7	.865	542	0.00	26.00	7.64	5.40
Grade 8	.884	507	0.00	26.00	8.38	5.84
Grade 9	.896	486	0.00	28.00	8.72	6.05
Grade 10	.902	449	0.00	28.00	9.63	6.33
Grade 11	.905	436	0.00	28.00	10.03	6.29
Grade 12	.912	448	0.00	27.00	10.39	6.51

^a Number of participants across time is variable due to attrition or participants opting in or out at specific time points.

Table 2. Correlations Among Observed Depression and Anxiety Symptom Scores from Grades 5 Through 12

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Depressive symptoms																
1. Grade 5	1															
2. Grade 6	.433	1														
3. Grade 7	.386	.603	1													
4. Grade 8	.365	.406	.522	1												
5. Grade 9	.314	.284	.414	.555	1											
6. Grade 10	.396	.265	.365	.457	.641	1										
7. Grade 11	.263	.156	.327	.412	.508	.656	1									
8. Grade 12	.209	.160	.242	.321	.471	.509	.590	1								
Anxiety symptoms																
9. Grade 5	.589	.332	.280	.216	.230	.288	.191	.145	1							
10. Grade 6	.277	.552	.396	.294	.239	.299	.175	.158	.507	1						
11. Grade 7	.286	.304	.504	.377	.339	.328	.300	.240	.387	.587	1					
12. Grade 8	.238	.224	.293	.495	.426	.401	.372	.273	.324	.484	.661	1				
13. Grade 9	.209	.183	.298	.379	.646	.494	.446	.378	.305	.453	.594	.728	1			
14. Grade 10	.243	.186	.259	.359	.447	.656	.523	.469	.275	.424	.509	.616	.668	1		
15. Grade 11	.249	.138	.223	.341	.429	.547	.626	.512	.236	.343	.440	.577	.609	.780	1	
16. Grade 12	.242	.157	.205	.307	.454	.545	.528	.644	.290	.376	.397	.500	.594	.721	.787	1

All $p < .006$

Table 3. Fit Indices for GBTM for Depression Symptoms and Anxiety Symptoms and GBMTM for Co-occurring Depression and Anxiety Symptoms

No. of Groups	BIC	LMR-LRT	BLRT	Entropy
Depression symptoms				
1 Class	25390.168	-	-	-
2 Class	24307.098	< .001	< .001	0.875
3 Class	23954.868	.073	< .001	0.849
4 Class	23768.155	.166	< .001	0.853
5 Class	23651.316	.637	< .001	0.871
6 Class	23542.004	.267	< .001	0.872
Anxiety symptoms				
1 Class	26195.932	-	-	-
2 Class	24852.174	< .001	< .001	0.771
3 Class	24544.764	.001	< .001	0.734
4 Class	24426.922	.030	< .001	0.757
5 Class	24360.046	.069	< .001	0.748
6 Class	24313.522	.499	< .001	0.751
Co-occurring depression and anxiety symptoms				
1 Class	51586.100	-	-	-
2 Class	49337.000	< .001	< .001	0.851
3 Class	48763.540	.097	< .001	0.824
4 Class	48351.930	.064	< .001	0.843
5 Class	48194.047	.455	< .001	0.806
6 Class	48050.021	.610	< .001	0.797
7 Class	47940.632	.267	< .001	0.812
8 Class	47872.200	.609	< .001	0.822
9 Class ^a	<i>best loglikelihood not replicated</i>			

Note. BIC = Bayesian information criterion; LMR-LRT = Lo-Mendell-Rubin likelihood ratio test; BLRT = bootstrapped likelihood ratio test. Bold are the final selected class solutions.

^aThe best log likelihood was not replicated in nine-class solution, even with doubling random starts, and was not considered as a valid solution.

Table 4. Contingency Tables of Cross-Class Assignment Between Univariate GBTM Models for Depression and Anxiety Symptoms

Anxiety class	Depression class				Total
	1. low-low	2. low-moderate	3. high-moderate	4. moderate-high	
1. low-low	42.1%	2.0%	0.9%	0.1%	45.1%
2. low-increasing	19.1%	5.7%	1.1%	0.9%	26.8%
3. moderate-high	1.7%	3.4%	0.3%	1.9%	7.3%
4. high-stable	5.0%	1.3%	3.0%	0.0%	9.3%
5. high-declining	4.9%	3.7%	2.0%	1.0%	11.6%
Total	72.8%	16.1%	7.3%	3.9%	100.0%

$\chi^2(12)=285.059, p<.001$, Cramér's $V=0.368$

Note: Shading indicates cross-classes with fewer than 2% of the sample.

Cramér's V indicates a moderate association between depression symptoms and anxiety symptoms classes.

Table 5. Group Based Multi Trajectory Model Parameter Estimates for Depression and Anxiety Symptoms Classes

Class (n/%)	Depression symptoms					Anxiety symptoms				
	<i>b</i>	95%CI		<i>s.e.</i>	<i>p</i>	<i>b</i>	95%CI		<i>s.e.</i>	<i>p</i>
		<i>Lower</i>	<i>Upper</i>				<i>Lower</i>	<i>Upper</i>		
C1 Low (n=276/39.37%)										
Intercept	3.157	2.319	3.995	0.428	<.001	4.866	3.798	5.935	0.545	<.001
Slope 1	-1.268	-1.915	-0.620	0.330	<.001	-1.360	-2.060	-0.660	0.357	<.001
Quadratic 1	0.224	0.051	0.397	0.088	.011	0.340	0.151	0.529	0.097	<.001
Slope 2	0.424	-0.047	0.894	0.240	.078	0.713	0.102	1.325	0.312	.022
Quadratic 2	-0.046	-0.189	0.097	0.073	.530	-0.088	-0.271	0.096	0.094	.351
Event – high school	-1.955	-2.708	-1.202	0.384	<.001	-1.236	-2.170	-0.302	0.477	.010
C2 Low DEP/Moderate ANX (n=182; 25.96%)										
Intercept	4.661	3.489	5.833	0.598	<.001	7.367	6.014	8.720	0.690	<.001
Slope 1	-1.741	-2.813	-0.668	0.547	.001	-0.117	-1.889	1.655	0.904	.897
Quadratic 1	0.364	0.068	0.659	0.151	.016	0.156	-0.230	0.542	0.197	.428
Slope 2	0.947	-0.128	2.021	0.548	.084	0.989	-0.265	2.243	0.640	.122
Quadratic 2	-0.203	-0.550	0.143	0.177	.250	-0.185	-0.549	0.178	0.186	.318
Event – high school	-1.746	-3.197	-0.295	0.740	.018	1.220	-1.263	3.702	1.267	.336
C3 Low DEP/Moderate-Increasing ANX - stable HS (n=92; 13.12%)										
Intercept	6.543	3.584	9.502	1.510	<.001	10.954	7.349	14.558	1.839	<.001
Slope 1	-3.519	-6.776	-0.261	1.662	.034	-0.453	-4.229	3.322	1.926	.814
Quadratic 1	0.982	0.164	1.800	0.417	.019	0.652	-0.331	1.635	0.502	.194
Slope 2	0.657	-1.403	2.717	1.051	.532	0.736	-1.968	3.441	1.380	.594
Quadratic 2	-0.228	-0.818	0.361	0.301	.448	-0.206	-0.983	0.571	0.396	.604
Event – high school	-1.045	-4.322	2.231	1.672	.532	4.006	0.993	7.018	1.537	.009
C4 Low DEP/Moderate ANX /Increasing (n=73; 10.41%)										
Intercept	7.813	4.692	10.933	1.592	<.001	9.143	6.266	12.019	1.467	<.001
Slope 1	-5.306	-9.549	-1.063	2.165	.014	-2.876	-6.723	0.971	1.963	.143

Quadratic 1	1.576	0.336	2.815	0.632	.013	1.050	0.102	1.997	0.483	.030
Slope 2	3.031	-2.560	8.623	2.853	.288	3.721	-0.436	7.877	2.121	.079
Quadratic 2	-0.480	-2.404	1.444	0.982	.625	-0.656	-1.975	0.663	0.673	.330
Event – high school	2.074	-0.850	4.997	1.492	.165	3.228	0.127	6.329	1.582	.041
C5 High-decreasing (<i>n</i>=46; 6.56%)										
Intercept	14.681	10.309	19.053	2.231	<.001	13.841	11.391	16.291	1.250	<.001
Slope 1	2.089	-2.326	6.504	2.253	.354	1.082	-2.277	4.441	1.714	.528
Quadratic 1	-1.080	-2.342	0.182	0.644	.093	-0.646	-1.590	0.298	0.482	.180
Slope 2	-3.100	-7.157	0.958	2.070	.134	-0.787	-4.422	2.848	1.855	.671
Quadratic 2	0.698	-0.440	1.835	0.580	.229	0.258	-0.704	1.219	0.491	.599
Event – high school	-5.390	-12.883	2.103	3.823	.159	-3.127	-9.291	3.038	3.145	.320
C6 Moderate-increasing/High DEP recovery (<i>n</i>=32; 4.57%)										
Intercept	9.274	4.279	14.270	2.549	<.001	10.574	7.397	13.750	1.621	<.001
Slope 1	-1.120	-10.261	8.021	4.664	.810	1.002	-4.191	6.194	2.649	.705
Quadratic 1	0.770	-2.191	3.730	1.510	.610	0.377	-1.252	2.007	0.831	.650
Slope 2	5.178	-2.714	13.070	4.027	.198	3.648	-0.386	7.683	2.058	.076
Quadratic 2	-2.387	-5.161	0.387	1.415	.092	-1.094	-2.197	0.008	0.563	.052
Event – high school	6.765	0.599	12.931	3.146	.032	8.627	5.375	11.879	1.659	<.001

Note: DEP=depression symptoms; ANX=Anxiety symptoms

Table 6. *GBMTM Class Associations*

Individual, relational, and contextual factors	Percentage/Mean (standard error)											
	χ^2 / F	<i>df</i>	<i>p</i>	Phi /Eta-squared	No. of Participants with data ^a	Overall Prevalence <i>n</i> (%)	C1 Low	C2 Low DEP moderate ANX	C3 Low DEP-moderate increasing ANX-stable HS	C4 Low DEP-moderate increasing ANX	C5 High-decreasing	C6 Moderate increasing/ High
Sex (% girls) ^b	87.317	5	<.001	0.353	701	371 (52.9%)	33.33% (2.8)a	55.50% (3.7)b	75.01% (4.5)c,d	68.49% (5.4)b,d	67.39% (6.9)b,d	87.50% (5.8)c
Child maltreatment (% maltreated) ^b	34.350	5	<.001	0.283	429	91 (21.2%)	9.15% (2.3)a	22.67% (3.8)b	20.97% (5.2)b	36.17% (7.0)b,c	33.33% (9.1)b,c	52.38% (10.9)c
Ethnicity (% non-White) ^b	6.022	5	.304	0.097	646	114 (17.6%)	-	-	-	-	-	-
Middle school (% new school) ^b	2.676	5	.750	0.062	690	337 (48.8%)	-	-	-	-	-	-
Household income (Grade 5)	4.147	5	.001	0.031	651	-	6.44 (0.14)a	6.29 (0.18)a	6.23 (0.23)ab	5.55 (0.28)bc	5.19 (0.38)c	5.39 (0.47)bc
Parental education (Grade 5)	4.857	5	<.001	0.035	676	-	3.20 (0.06)a	3.33 (0.08)a	3.14 (0.11)ab	2.89 (0.11)bc	2.71 (0.14)c	2.78 (0.19)c
Family functioning (Grade 5-8)	3.392	5	.005	0.024	694	-	3.60 (0.02)a	3.58 (0.02)ab	3.64 (0.03)a	3.51 (0.04)b	3.47 (0.04)b	3.50 (0.06)ab
Family functioning (Grade 9-12)	3.542	5	.004	0.031	554	-	3.55 (0.02)a	3.47 (0.03)ab	3.51 (0.04)a	3.36 (0.05)b	3.37 (0.06)b	3.43 (0.06)ab
School climate (Grade 5-6)	13.033	5	<.001	0.087	692	-	2.56 (0.04)a	2.51 (0.05)a	2.41 (0.08)ab	2.27 (0.09)b	1.74 (0.11)c	2.10 (0.12)b
Bullying victimization (Grades 5-8)	36.291	5	<.001	0.207	700	-	0.47 (0.03)a	0.64 (0.04)b	0.79 (0.05)c	0.92 (0.07)c	1.45 (0.13)d	0.99 (0.08)c
Bullying victimization (Grades 9-12)	28.524	5	<.001	0.210	543	-	0.18 (0.02)a	0.34 (0.03)b	0.44 (0.04)bd	0.63 (0.07)c	0.50 (0.10)cd	0.81 (0.07)e
Transition to high school experiences (Grade 9)	21.636	5	<.001	0.185	484	-	1.54 (0.04)a	1.94 (0.07)b	2.10 (0.10)b	2.40 (0.13)c	2.27 (0.18)bc	2.83 (0.21)d
School bonding (Grades 9-12)	24.099	5	<.001	0.183	544	-	2.14 (0.03)a	2.02 (0.04)b	1.84 (0.05)c	1.54 (0.06)de	1.74 (0.10)cd	1.44 (0.09)e
Group integration (Grades 9-12)	44.251	5	<.001	0.291	544	-	3.30 (0.04)a	3.06 (0.05)b	2.69 (0.08)c	2.36 (0.10)de	2.47 (0.12)cd	1.97 (0.13)e
Personal intimacy (Grades 9-12)	8.077	5	<.001	0.070	544	-	3.44 (0.04)a	3.34 (0.05)ab	3.20 (0.08)bc	3.01 (0.09)cd	3.14 (0.013)bcd	2.84 (0.13)d

Note: DEP=depression; ANX=anxiety; HS=High school; pair-wise comparisons not examined for non-significant tests

^a Number of participants across time is variable due to participants opting in or out at specific time points, assessments (i.e., survey, interviews), or skipping questions and/or measures.

^b chi-square, all other results are ANOVA

Table 7. GBMTM Class Outcomes – Bivariate Tests of Early Adulthood Functional Outcomes, Mental Health Problems, and Prevalence

Early adulthood outcome	X^2	df	p	Phi	No. of Participants with data ^a	Overall Prevalence n (%)	Prevalence within GBMTM class					
							C1 Low	C2 Low DEP moderate ANX	C3 Low DEP /moderate increasing ANX- stable HS	C4 Low DEP/ Moderate increasing ANX	C5 High- decreasing	C6 Moderate- increasing /High
Job risk ^b	22.623	5	<.001	0.221	463	150 (32.4%)	22.9%	34.4%	25.8%	50.0%	42.9%	53.8%
No postsecondary education ^b	14.463	5	.013	0.176	465	66 (14.2%)	11.4%	13.5%	6.1%	25.0%	27.6%	19.2%
Current depressive episode ^c	46.465	5	<.001	0.357	364	18 (4.9%)	0.8%	2.8%	3.7%	10.3%	4.8%	35.0%
Current generalized anxiety disorder ^c	85.661	5	<.001	0.484	365	47 (12.9%)	1.6%	5.6%	22.2%	28.2%	9.5%	66.7%
Obsessive compulsive disorder ^c	52.909	5	<.001	0.381	365	41 (11.2%)	2.4%	6.5%	14.8%	20.5%	19.0%	52.4%
Current social anxiety ^c	50.657	5	<.001	0.373	365	35 (9.6%)	1.6%	7.5%	11.1%	20.5%	4.8%	47.6%
Panic disorder ^c	35.419	5	<.001	0.312	365	31 (8.5%)	1.6%	3.7%	14.8%	17.9%	14.3%	33.3%
Agoraphobia ^c	93.118	5	<.001	0.506	364	38 (10.4%)	0.8%	6.6%	9.3%	30.8%	0.0%	61.9%
SR Anxiety clinical status ^b (clinical)	171.460	10	<.001	0.608	464	106 (22.8%)	4.2%	16.7%	39.4%	50.0%	20.7%	76.9%
(sub-clinical)						98 (21.1%)	11.5%	18.3%	33.3%	36.5%	31.0%	23.1%
SR Depression clinical status ^b (clinical)	109.275	10	<.001	0.486	462	71 (15.4%)	4.8%	10.3%	12.1%	48.0%	17.2%	50.0%
(sub-clinical)						59 (12.8%)	6.1%	15.9%	10.6%	16.0%	24.1%	26.9%

Note: SR=self-reported. Sub-clinical and clinical case were combined in analyses. DEP=Depression; ANX=Anxiety; HS=High school.

^a Number of participants across time is variable due to participants opting in or out at specific time points, assessments (i.e., survey, interviews), or skipping questions and/or measures.

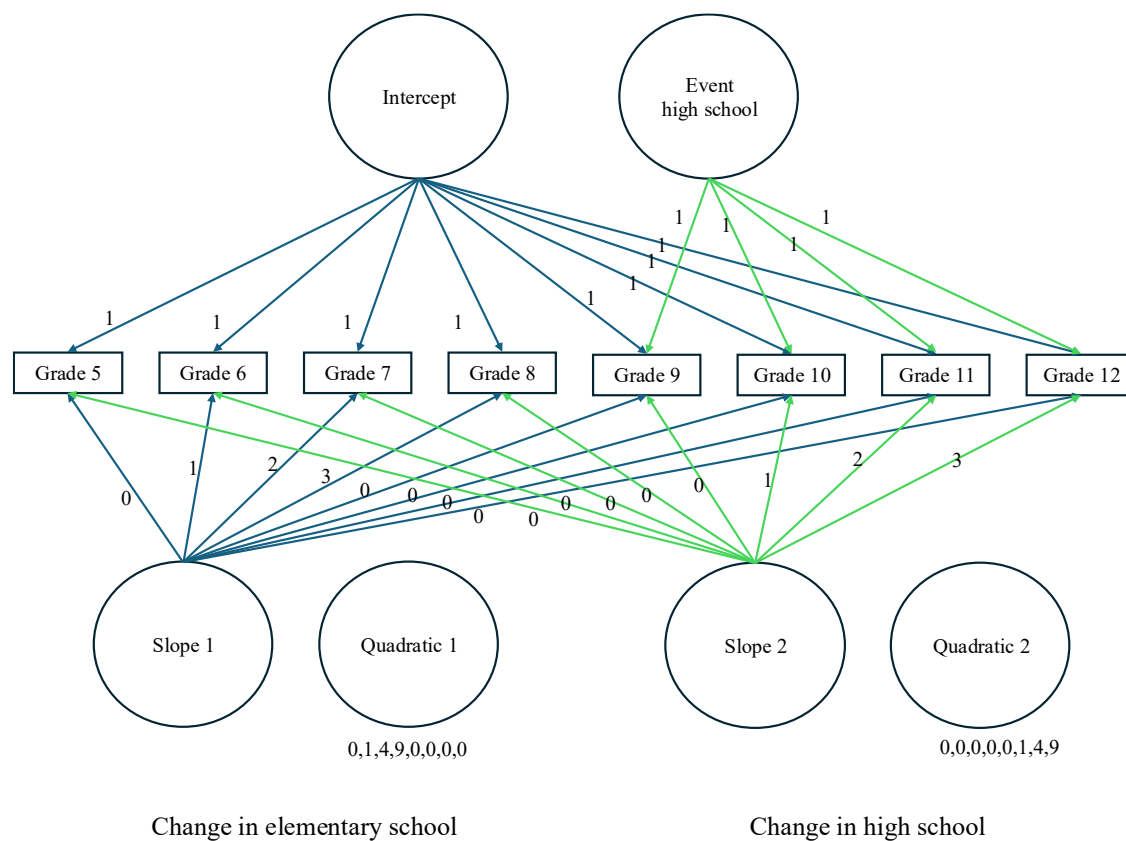
^b assessed via survey

^c assessed via clinical interview

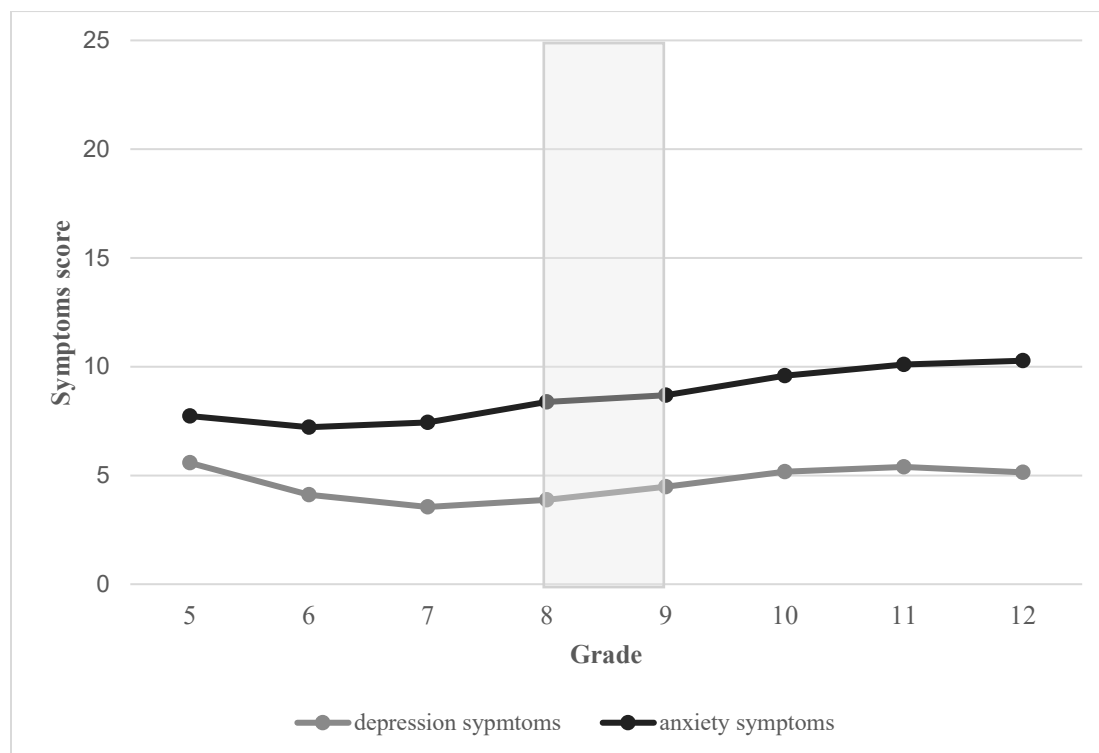
Table 8. Odds Ratios for GBMTM Depression/Anxiety Symptoms Classes – Early Adulthood Functional Outcomes and Mental Health Problems

Comparison	Reference	Job risk	No post-secondary	Current Depression	Current General Anxiety	OCD	Current Social Anxiety	Panic disorder	Agoraphobia	SR depression (sub)clinical	SR anxiety (sub)clinical
C2. Low DEP/Moderate ANX - 25.96%	vs C1 low - 39.37%	1.675 (0.997, 2.837)	1.34 (0.646, 2.813)	0.926 (0.155, 4.165)	1.485 (0.462, 5.301)	1.447 (0.442, 4.606)	2.516 (0.783, 8.515)	0.949 (0.227, 3.591)	2.749 (0.76, 10.516)	2.643 (1.425, 4.958)	2.27 (1.311, 4.024)
C3. Low DEP/Moderate-Increasing ANX - stable HS - 13.12%		1.027 (0.515, 2.02)	0.535 (0.155, 1.643)	0.967 (0.138, 5.069)	7.501 (2.59, 24.422)	3.887 (1.154, 12.425)	3.888 (1.108, 14.014)	4.837 (1.406, 16.153)	3.36 (0.748, 13.393)	2.152 (0.990, 4.688)	10.642 (5.381, 21.734)
C4. Low DEP/Moderate ANX /Increasing - 10.41%		2.866 (1.451, 5.663)	2.391 (1.02, 5.569)	3.07 (0.667, 14.241)	7.961 (2.672, 25.581)	4.788 (1.529, 15.08)	7.785 (2.255, 28.033)	5.502 (1.496, 19.305)	13.504 (4.044, 51.608)	12.408 (5.922, 26.585)	25.564 (11.355, 63.365)
C5. High-decreasing - 6.56%		1.878 (0.764, 4.396)	1.887 (0.624, 5.184)	0.961 (0.077, 7.299)	1.605 (0.223, 7.882)	3.722 (0.785, 15.732)	1.182 (0.099, 7.914)	3.517 (0.66, 16.505)	0.219 (0.006, 3.569)	4.31 (1.738, 10.797)	3.72 (1.557, 8.812)
C6. Moderate-increasing/High - 4.57%		2.843 (1.148, 6.976)	1.12 (0.304, 3.616)	10.185 (1.934, 47.117)	34.939 (9.724, 135.727)	17.374 (4.802, 64.897)	29.896 (7.495, 121.854)	10.491 (2.54, 43.431)	42.635 (10.267, 176.194)	20.336 (7.225, 64.082)	130.873 (23.187, 1634)
C3. Low DEP/Moderate-Increasing ANX - stable HS - 13.12%	C2. Low DEP/Moderate ANX - 25.96%	0.616 (0.305, 1.179)	0.384 (0.11, 1.109)	0.81 (0.110, 3.766)	3.958 (1.472, 10.724)	2.094 (0.76, 5.961)	1.438 (0.48, 4.046)	3.188 (1.072, 10.453)	1.209 (0.331, 3.85)	0.812 (0.387, 1.602)	4.436 (2.34, 8.744)
C4. Low DEP/Moderate ANX /Increasing - 10.41%		1.708 (0.88, 3.243)	1.798 (0.775, 4.069)	2.269 (0.518, 9.542)	4.194 (1.459, 11.758)	2.637 (0.933, 7.568)	2.931 (1.014, 8.46)	3.924 (1.182, 12.21)	4.59 (1.688, 12.574)	4.614 (2.304, 9.566)	10.685 (4.669, 26.956)
C5. High-decreasing - 6.56%		1.108 (0.456, 2.631)	1.406 (0.454, 3.676)	0.728 (0.053, 5.015)	0.899 (0.143, 4.034)	2.088 (0.484, 7.577)	0.539 (0.05, 2.948)	2.462 (0.496, 10.718)	0.119 (0.004, 1.100)	1.632 (0.656, 3.965)	1.579 (0.693, 3.67)
C6. Moderate-increasing/High-4.57%		1.678 (0.700, 4.064)	0.849 (0.230, 2.555)	7.738 (1.93, 32.88)	19.263 (5.759, 68.006)	10.099 (3.359, 32.656)	11.75 (3.752, 40.213)	7.661 (2.195, 28.032)	15.031 (4.443, 49.508)	7.903 (3.112, 22.718)	64.11 (10.685, 873.445)
C4. Low DEP/Moderate ANX /Increasing - 10.41%	C3. Low DEP/Moderate-Increasing ANX - stable HS - 13.12%	2.630 (1.238, 5.502)	3.403 (1.204, 10.65)	1.774 (0.393, 7.779)	1.12 (0.437, 2.831)	1.246 (0.421, 3.617)	1.935 (0.647, 6.001)	1.259 (0.412, 3.619)	3.706 (1.277, 11.918)	5.282 (2.467, 12.207)	2.543 (1.000, 6.766)
C5. High-decreasing - 6.56%		1.707 (0.674, 4.264)	2.732 (0.819, 9.258)	0.603 (0.044, 4.07)	0.276 (0.049, 1.1)	1.016 (0.237, 3.646)	0.374 (0.037, 1.953)	0.860 (0.177, 3.336)	0.088 (0.003, 0.881)	1.852 (0.729, 4.487)	0.368 (0.144, 0.933)
C6. Moderate-increasing/High - 4.57%		2.578 (1.029, 6.565)	1.588 (0.412, 5.896)	6.288 (1.502, 27.898)	5.304 (1.665, 16.239)	4.802 (1.57, 15.537)	7.895 (2.368, 26.781)	2.518 (0.761, 8.608)	12.072 (3.706, 44.172)	8.813 (3.193, 27.067)	21.635 (2.911, 347.333)
C5. High-decreasing - 6.56%	C4. Low DEP/Moderate ANX /Increasing - 10.41%	0.69 (0.275, 1.758)	0.857 (0.273, 2.528)	0.352 (0.032, 2.39)	0.263 (0.043, 1.116)	0.857 (0.215, 2.995)	0.223 (0.021, 1.26)	0.720 (0.155, 2.883)	0.046 (0.001, 0.392)	0.407 (0.163, 1.043)	0.177 (0.064, 0.471)
C6. Moderate-increasing/High - 4.57%		1.041 (0.409, 2.65)	0.513 (0.145, 1.719)	3.334 (0.918, 13.764)	5.080 (1.697, 16.997)	3.909 (1.204, 12.176)	4.411 (1.362, 15.174)	2.148 (0.59, 7.482)	3.890 (1.25, 12.58)	1.979 (0.731, 6.161)	12.119 (1.512, 280.851)
C6. Moderate-increasing/High - 4.57%	C5. High-decreasing - 6.56%	1.495 (0.535, 4.49)	0.631 (0.156, 2.237)	5.906 (1.24, 29.684)	13.507 (3.491, 61.344)	4.518 (1.268, 16.986)	11.325 (2.658, 52.722)	2.777 (0.685, 11.204)	23.110 (5.861, 116.058)	4.814 (1.587, 15.797)	41.054 (5.709, 736.379)

Note: Odds ratios and 95% credible intervals estimated using the bayes estimator, controlling for sex, parental education, and household income.

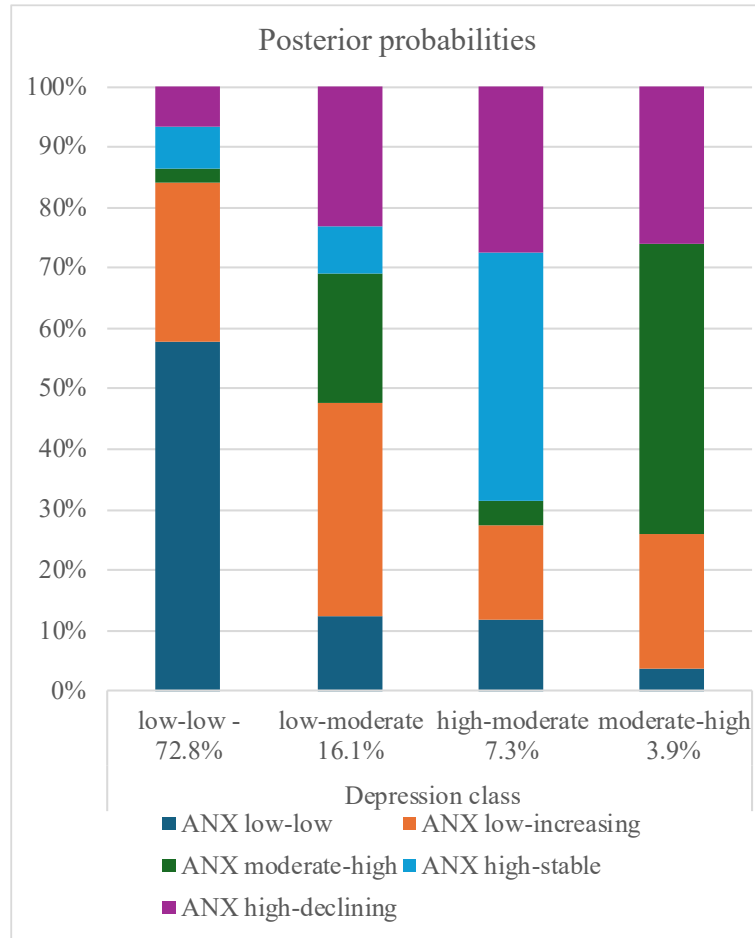
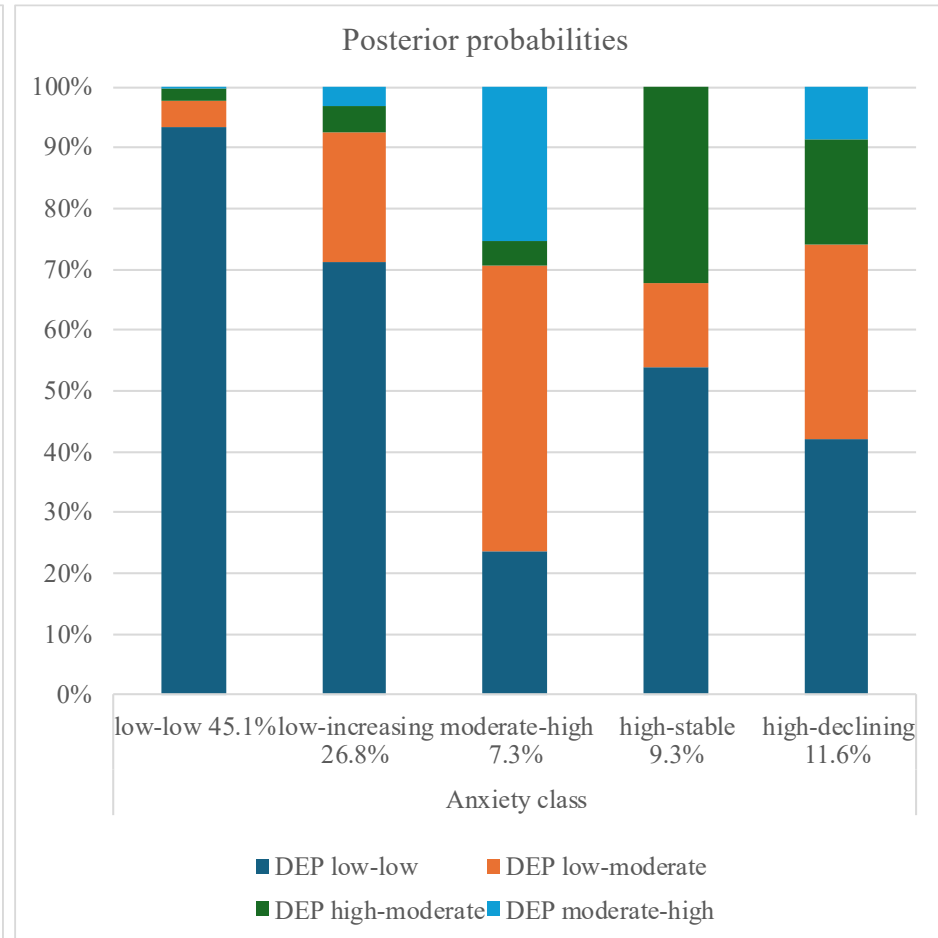
Figure 1

Conceptual Model of Discontinuity Latent Growth Models for Depression Symptoms and Anxiety Symptoms Before and After Transition to High School. Correlations between latent variables (i.e., intercept, event, slopes, and quadratic parameters) are present in the latent growth curve models but omitted from the figure for ease of interpretation.

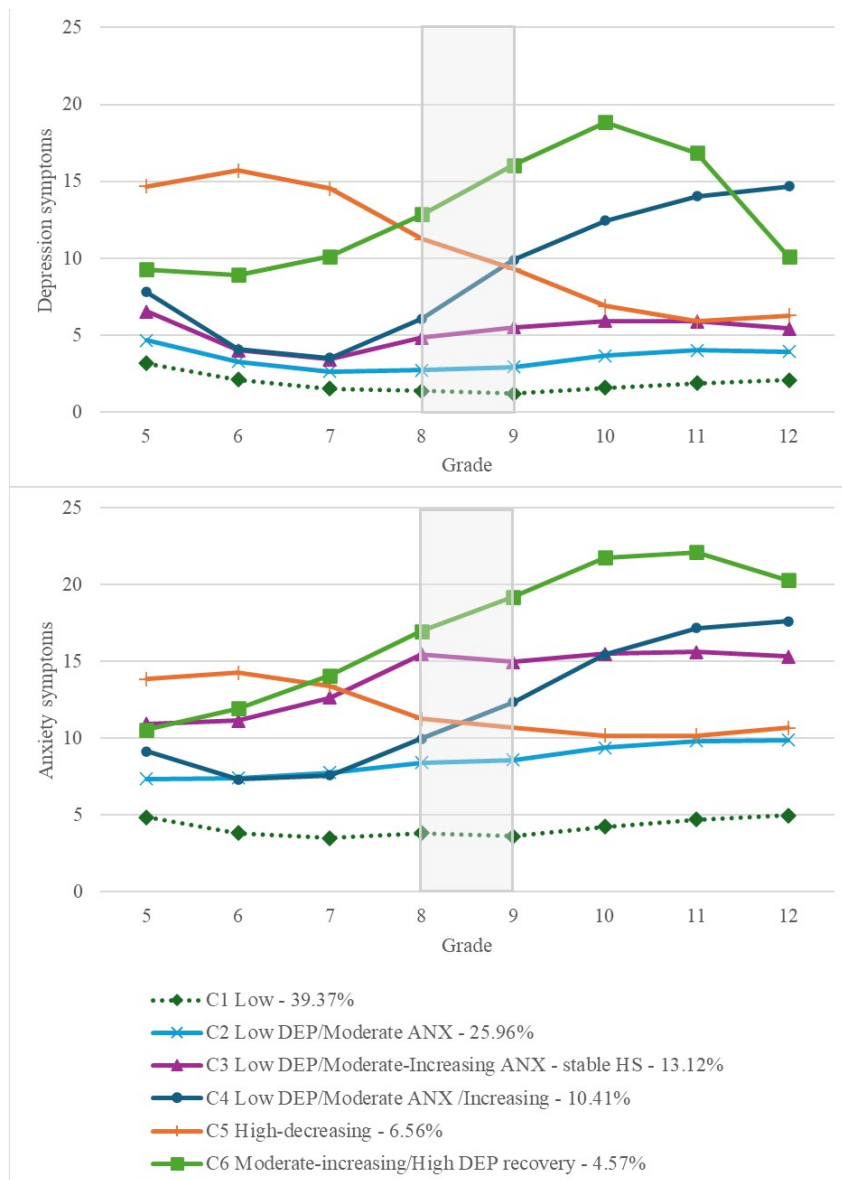
Figure 2

Depression and Anxiety Symptoms Latent Trajectory Models with Level and Slope Discontinuity.

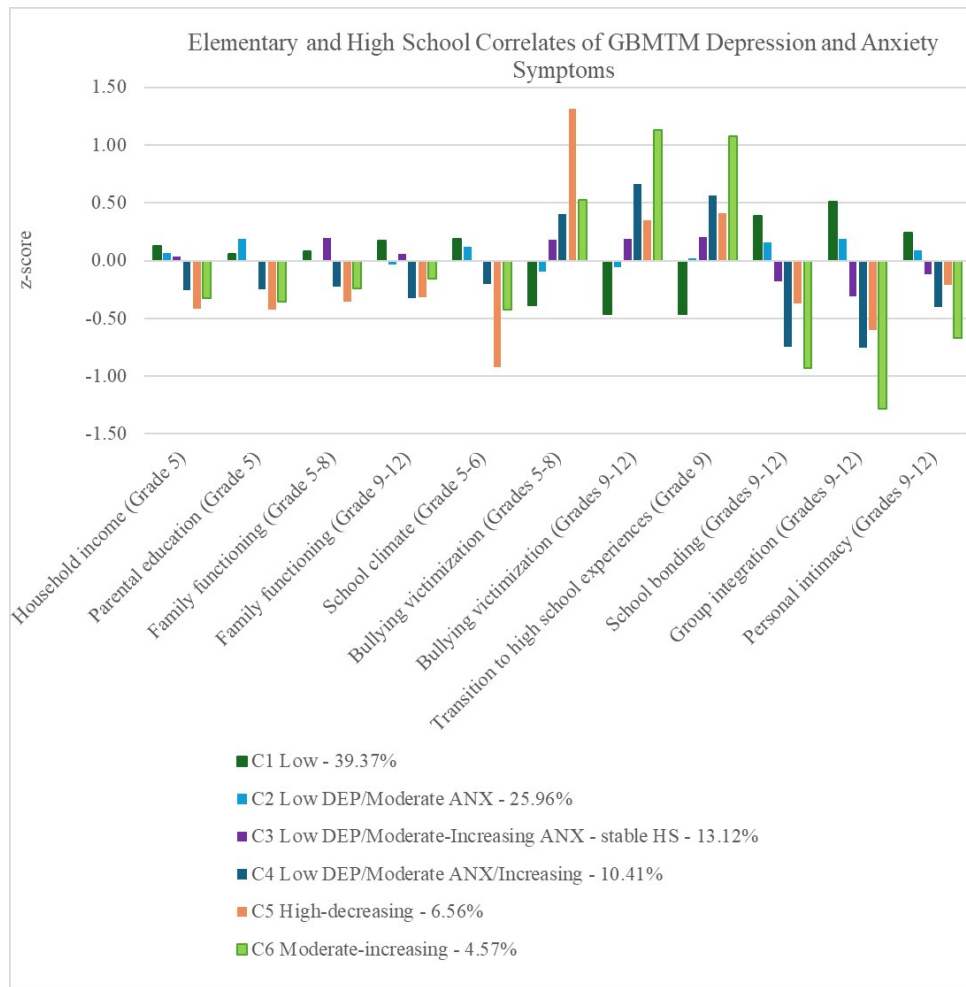
Vertical shaded region between Grade 8 and Grade 9 represents the level discontinuity in the trajectories. Grades 5 to 8 are elementary school and Grades 9 to 12 are high school.

Figure 3**A****B**

Posterior Probabilities. (a) probability of anxiety symptoms trajectory class based on depression symptoms trajectory class (b) probability of depression symptoms trajectory class based on anxiety symptoms trajectory class

Figure 4.

Depression and Anxiety Symptoms Group-Based Multi-Trajectory Models with Level and Slope Discontinuity. Discontinuity level and slope group-based trajectory models for depression and anxiety symptoms around the high school transition. Each colour represents one class of the GBMTM displaying the depression and anxiety symptoms. Vertical shaded region between Grade 8 and Grade 9 represents the level discontinuity in the trajectories. Grades 5 to 8 are elementary school and Grades 9 to 12 are high school.

Figure 5

Elementary and High School Correlates of GBMTM Depression and Anxiety Symptoms. For ease of visual comparison across GBMTM classes and correlates, values have been standardized for presentation.

Paper 2: Supplementary materials

Co-Occurring Trajectories of Depression and Anxiety Symptoms from Childhood Through Adolescence as Predictors of Mental Health and Functional Outcomes in Early Adulthood:

The Role of School Transitions

Brittain, H. & Vaillancourt, T. (2025)

Supplementary Table 1. *Parameter Estimates for Depression and Anxiety Symptoms Discontinuity Latent Growth Curve Models*

	<i>b</i>	<i>s.e.</i>	<i>95%CI</i>		<i>p</i>	<i>Var</i>	<i>s.e.</i>	<i>95%CI</i>		<i>p</i>
			<i>Lower</i>	<i>Upper</i>				<i>Lower</i>	<i>Upper</i>	
Depression Symptoms										
Intercept	5.577	0.229	5.134	6.019	<.001	16.684	4.383	8.093	25.274	<.001
Slope 1	-1.904	0.270	-2.431	-1.378	<.001	12.263	5.11	2.247	22.279	.017
Quadratic 1	0.446	0.083	0.284	0.608	<.001	1.141	0.433	0.293	1.989	.008
Slope 2	0.917	0.292	0.337	1.497	.002	21.261	6.494	8.532	33.99	.001
Quadratic 2	-0.232	0.094	-0.417	-0.046	.014	1.781	0.587	0.631	2.931	.002
Event – high school	-1.094	0.287	-1.657	-0.530	<.001	24.800	7.019	11.042	38.557	<.001
Anxiety Symptoms										
Intercept	7.727	0.215	7.312	8.170	<.001	17.945	3.625	10.817	25.821	<.001
Slope 1	-0.875	0.244	-1.357	-0.403	<.001	8.807	4.490	-0.118	17.904	.050
Quadratic 1	0.365	0.075	0.225	0.519	<.001	0.801	0.350	0.031	1.565	.022
Slope 2	1.066	0.273	0.557	1.601	<.001	15.139	4.096	7.152	23.656	<.001
Quadratic 2	-0.180	0.082	-0.344	-0.019	.029	1.028	0.362	0.306	1.793	.005
Event – high school	0.964	0.282	0.386	1.548	.001	24.672	5.262	13.816	35.925	<.001

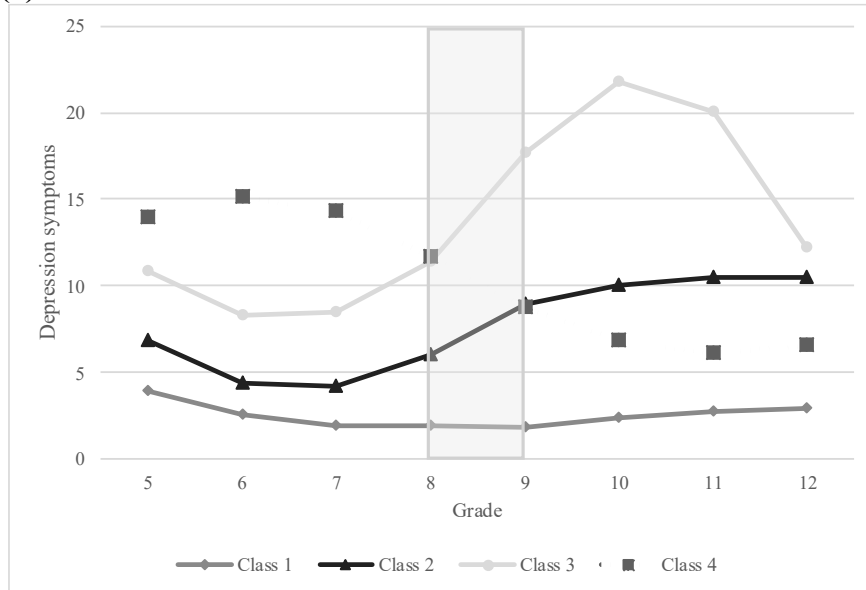
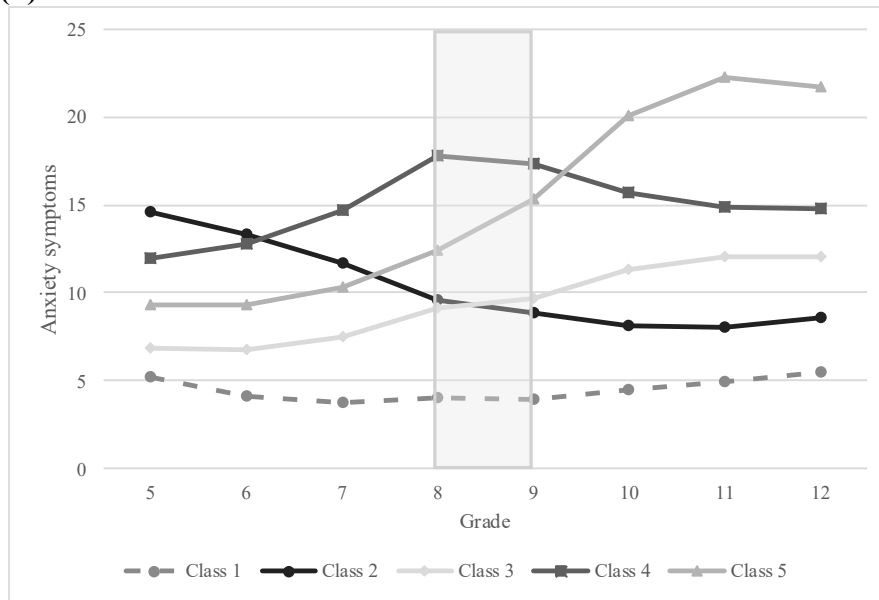
Note: Level and slope discontinuity latent growth curve models. Slope 1 and quadratic 1 are parameter estimates representing the average elementary school curve and slope 2 and quadratic 2 are parameter estimates representing the average high school curve. Event is for the additional level change associated with high school. Covariance terms between latent curve factors also estimated in the models.

Supplementary Table 2. Group Based Trajectory Model Parameter Estimates for Univariate Depression Symptoms and Anxiety Symptoms Classes

	<i>n</i> / %	<i>b</i>	<i>95%CI</i>		<i>s.e.</i>	<i>P</i>
			<i>Lower</i>	<i>Upper</i>		
Depression Symptoms						
Class 1 - low	510/72.8%					
Intercept		3.959	3.438	4.479	0.265	<.001
Slope 1		-1.718	-2.249	-1.187	0.271	<.001
Quadratic 1		0.345	0.195	0.495	0.076	<.001
Slope 2		0.644	0.229	1.058	0.211	.002
Quadratic 2		-0.092	-0.227	0.043	0.069	.183
Event – high school		-2.168	-2.700	-1.636	0.271	<.001
Class 2 - low-moderate	113/16.1%					
Intercept		6.800	5.175	8.424	0.829	<.001
Slope 1		-3.444	-5.85	-1.039	1.227	.005
Quadratic 1		1.060	0.309	1.811	0.383	.006
Slope 2		1.402	-1.011	3.815	1.231	.255
Quadratic 2		-0.294	-1.062	0.474	0.392	.452
Event – high school		2.086	-0.444	4.616	1.291	.106
Class 3 - high-moderate	51/7.3%					
Intercept		13.958	9.923	17.994	2.059	<.001
Slope 1		2.123	-2.619	6.865	2.419	.380
Quadratic 1		-0.964	-2.319	0.391	0.691	.163
Slope 2		-2.535	-5.834	0.764	1.683	.132
Quadratic 2		0.600	-0.272	1.471	0.445	.177
Event – high school		-5.223	-11.086	0.64	2.991	.081
Class 4 - moderate-high	27/3.9%					
Intercept		10.836	7.661	14.012	1.62	<.001
Slope 1		-3.887	-9.426	1.652	2.826	.169
Quadratic 1		1.361	-0.172	2.893	0.782	.082
Slope 2		7.144	2.006	12.282	2.622	.006
Quadratic 2		-2.986	-4.510	-1.461	0.778	<.001
Event – high school		6.836	2.357	11.315	2.285	.003

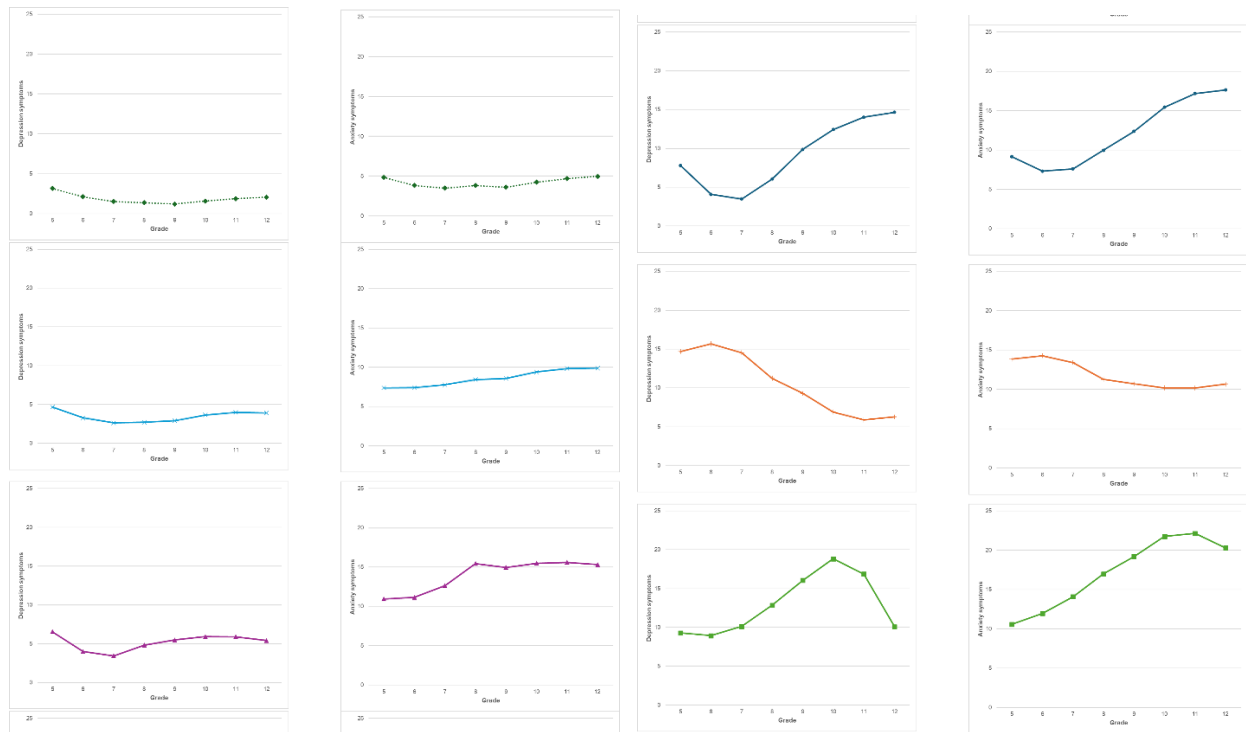
Anxiety Symptoms

Class 1 - low	316/45.1%					
Intercept		5.171	4.526	5.816	0.329	<.001
Slope 1		-1.416	-2.045	-0.787	0.321	<.001
Quadratic 1		0.345	0.164	0.525	0.092	<.001
Slope 2		0.541	-0.056	1.139	0.305	.076
Quadratic 2		-0.012	-0.197	0.173	0.095	.899
Event – high school		-1.245	-1.992	-0.499	0.381	.001
Class 2 - low-increasing	188/26.8%					
Intercept		6.864	5.822	7.906	0.532	<.001
Slope 1		-0.535	-1.711	0.641	0.600	.373
Quadratic 1		0.431	0.070	0.791	0.184	.019
Slope 2		2.066	0.615	3.517	0.740	.005
Quadratic 2		-0.421	-0.831	-0.011	0.209	.044
Event – high school		2.772	1.636	3.908	0.579	<.001
Class 3-moderate-high	51/7.3%					
Intercept		9.333	7.699	10.968	0.834	<.001
Slope 1		-0.516	-3.421	2.39	1.482	.728
Quadratic 1		0.510	-0.348	1.368	0.438	.244
Slope 2		6.079	3.029	9.128	1.556	<.001
Quadratic 2		-1.312	-2.138	-0.487	0.421	.002
Event – high school		5.982	3.731	8.233	1.149	<.001
Class 4 - high	81/ 11.6%					
Intercept		11.941	10.071	13.811	0.954	<.001
Slope 1		0.234	-2.048	2.516	1.164	.841
Quadratic 1		0.577	-0.078	1.232	0.334	.084
Slope 2		-1.964	-4.067	0.139	1.073	.067
Quadratic 2		0.371	-0.249	0.991	0.316	.241
Event – high school		5.360	3.103	7.616	1.151	<.001
Class 5 - high-declining	65/9.3%					
Intercept		14.611	11.189	18.033	1.746	<.001
Slope 1		-1.049	-4.545	2.448	1.784	.557
Quadratic 1		-0.205	-1.301	0.890	0.559	.713
Slope 2		-1.112	-3.321	1.097	1.127	.324
Quadratic 2		0.337	-0.301	0.975	0.326	.301
Event – high school		-5.730	-10.604	-0.855	2.487	.021

Supplementary Figure 1.**(a)****(b)**

Univariate Depression and Anxiety Symptoms Group-Based Trajectory Models with Level and Slope Discontinuity. Discontinuity level and slope group-based trajectory models for depression and anxiety symptoms around the high school transition. (a) Depression symptoms before and after the high school transition. (b) Anxiety symptoms before and after the high school transition. Vertical shaded region between Grade 8 and Grade 9 represents the level discontinuity in the trajectories. Grades 5 to 8 are elementary school and Grades 9 to 12 are high school.

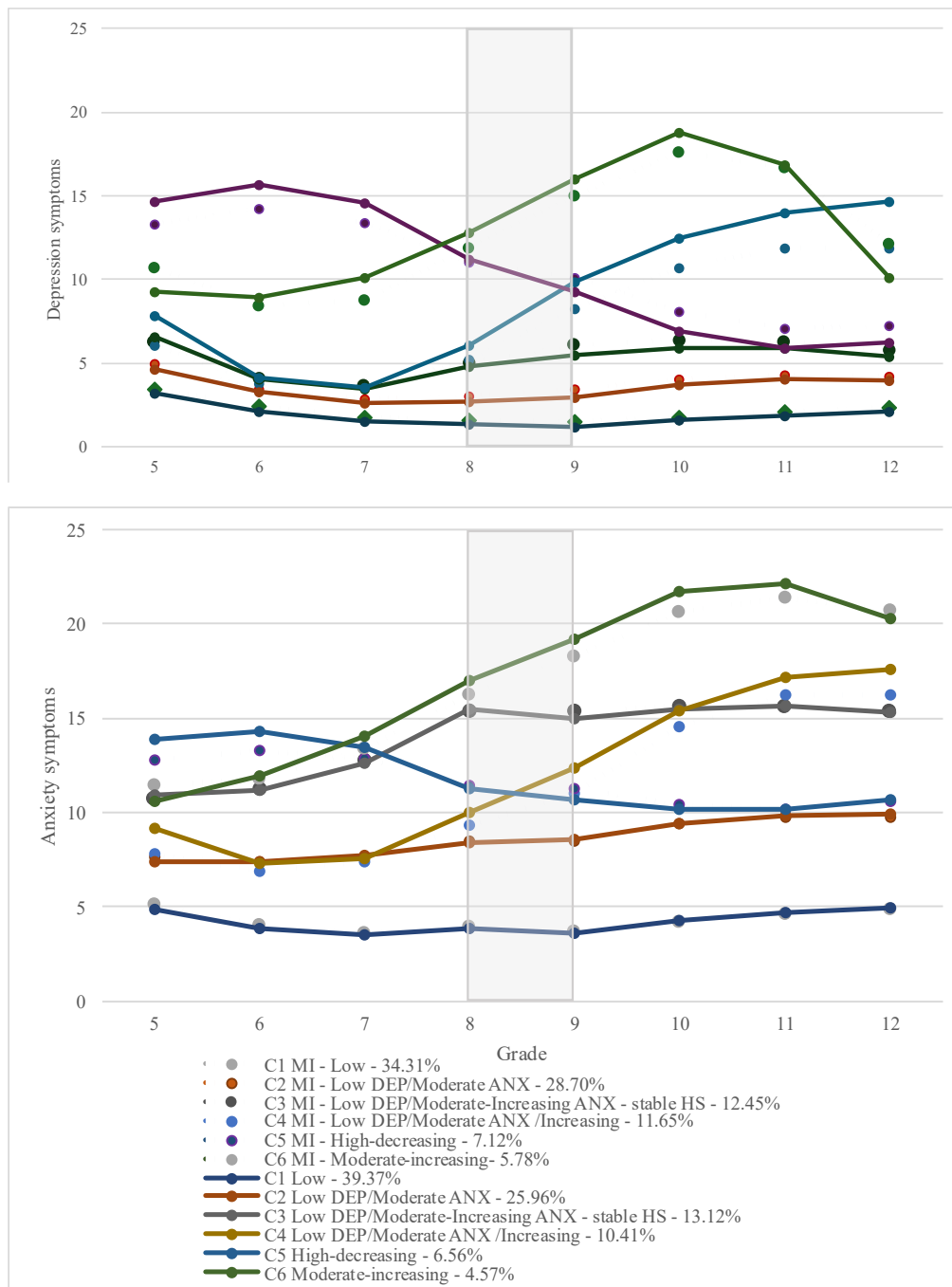
Supplementary Figure 2.



- ...◆... C1 Low - 39.37%
- ×— C2 Low DEP/Moderate ANX - 25.96%
- ▲— C3 Low DEP/Moderate-Increasing ANX - stable HS - 13.12%
- C4 Low DEP/Moderate ANX /Increasing - 10.41%
- +— C5 High-decreasing - 6.56%
- C6 Moderate-increasing - 4.57%

Alternative Presentation of Figure 5: Depression and anxiety symptoms group-based multi-trajectory models with level and slope discontinuity. Discontinuity level and slope group-based trajectory models for depression and anxiety symptoms around the high school transition. Each colour represents one class of the GBMTM displaying the depression and anxiety symptoms. Vertical shaded region between Grade 8 and Grade 9 represents the level discontinuity in the trajectories. Grades 5 to 8 are elementary school and Grades 9 to 12 are high school.

Supplementary Figure 3.



Sensitivity analysis with multiple imputation. Depression and anxiety symptoms group-based multi-trajectory models with level and slope discontinuity using multiple imputation.

Chapter 4 – Paper 3: Temporal Associations Between Bullying Victimization, Mental Health, Academic Achievement, and School Absences Across Elementary and Secondary School

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Abstract

Bullying victimization, internalizing symptoms, and academic functioning are closely linked across adolescence, yet little is known about how these domains interact over extended developmental periods or across key school transitions. Using eight annual waves of data from a community cohort followed from Grade 5 to Grade 12 ($N = 701$; $M_{age} = 10.91$ years), we applied an auto-regressive latent trajectory model with structured residuals to separate between-person differences in developmental trajectories from within-person fluctuations. At the between-person level, higher bullying victimization was associated with higher internalizing symptoms and lower GPA. At the within-person level, bullying victimization and internalizing symptoms were tightly coupled across development, with internalizing symptoms predicting bullying victimization across the transition to secondary school. In secondary school, higher internalizing symptoms were associated with lower GPA and higher absences within-time. Across time, higher internalizing symptoms were associated with lower GPA, which in turn was related to higher absences. Findings indicate transactional cascades, with interconnections among peer, emotional, and academic domains and suggest that the transition to secondary school marks a period of heightened vulnerability. Results underscore the importance of early and sustained interventions that integrate bullying prevention, mental health support, and school engagement.

Keywords: bullying victimization, internalizing symptoms, academic achievement, school absences, adolescents, school transition

Introduction

Bullying occurs when an individual is repeatedly and intentionally abused by a peer, or multiple peers, who hold more power ¹. Global estimates indicate that approximately one-third of youth report being bullied ². This prevalence is concerning given the wide range of impairments associated with bullying victimization, including elevated depression, anxiety, substance use, suicidal ideation, and academic difficulties such as lower grades and school disengagement ^{3–5}. These effects can compound over time, because mental health problems and academic functioning are tightly interconnected ⁶.

From a dynamic systems theory (DST) perspective ^{7,8}, bullying victimization can be conceptualized as a salient contextual experience that interacts with multiple subsystems within the individual, including mental health and academic functioning. Development unfolds through fluctuations within and between these domains, such that short-term deviations may have cross-domain influences or contribute to associations that accumulate across longer developmental periods. Such time-dependent coupling among subsystems can be viewed as developmental cascades where changes in one domain can trigger changes in others that accumulate over time ⁹. Several explanatory pathways have been proposed to explain how these cascades unfold across adolescence: bullying victimization may undermine mental health and contribute to academic difficulties (interpersonal risk); internalizing problems may increase risk for victimization and reduce academic competence (symptoms-driven); academic problems may heighten vulnerability to bullying and internalizing problems (academic incompetence/failure); and multiple pathways may operate reciprocally (transactional) ^{4,10–14}.

Few studies have examined all three domains simultaneously ^{12,15,16}, and none have done so using repeated assessments over an extended period of adolescence, limiting insight into how cross-domain associations evolve across developmental periods. Importantly, dynamic systems theory emphasizes change on multiple time scales, such that short-term associations between domains may translate into nonlinear change within specific domains over time ^{7,8}. Failure to examine extended periods of adolescence also limits the examination of how salient contextual perturbations, such as the shift from elementary to secondary school, may reorganize system dynamics by modifying the magnitude or direction of time-dependent associations between domains. Identifying both long-term developmental trajectories as well as specific developmental periods when domains demonstrate enhanced short-term associations is critical.

Such knowledge clarifies how problematic functioning in one area can lead to problems in other areas, which can help to identify sensitive periods when and where interventions may be most effective.

Understanding these interdependent associations also depends on how academic functioning is measured. Academic performance indicators such as grades may not capture behavioural manifestations of distress, whereas absenteeism often reflects avoidance, disengagement, and escalating school-related strain ¹⁷, making school absences a theoretically meaningful mechanism linking bullying victimization and mental health to academic trajectories. Because domains of bullying victimization, internalizing symptoms, and academic functioning reflect both longer-term between-person differences and shorter-term within-person fluctuations ¹², careful modeling is needed to distinguish individual developmental patterns from time-specific fluctuations that reflect dynamic processes, which are often obscured in traditional analytic approaches.

Bullying Victimization and Internalizing Symptoms

Meta-analytic evidence consistently links bullying victimization with internalizing problems like depression and anxiety ^{18–24}. Although some findings support a causal association from bullying victimization to internalizing symptoms ^{5,21}, others have found evidence of both interpersonal and symptoms-driven pathways, indicating bi-directional processes ^{19,20,24}. Others have examined associations between latent growth curves of bullying victimization and internalizing symptoms within middle ²⁵ and secondary school ²⁶, finding that, over these limited periods, declining slopes in bullying were associated with declining slopes in social anxiety ²⁶ and depression symptoms ^{25,26}. These findings highlight the long-term changes in individual development that is often not accounted for when examining short term temporal associations. Traditional cross-lagged panel models (CLPMs) have been used to assess how bullying victimization and internalizing problems are prospectively associated over time, but such models cannot separate between- and within-person variation, failing to account for underlying long-term change in domains. This limitation is important because estimates derived from CLPMs can reflect stable differences between individuals rather than true temporal change. Newer approaches to the CLPM are used to decompose variance into long-term between-person effects and time-dependent within-person fluctuations, providing clearer tests of temporal processes. This decomposition allows researchers to examine associations in domains between people, as

well as how short-term changes in individuals' functioning in multiple domains are associated over time, accounting for their stable trait-like averages (random intercept CLPM; RI-CLPM)²⁷ or average trajectories (latent curve model with structured residuals/auto-regressive latent trajectory model with structured residuals; LCM-SR/ALT-SR)^{28,29}.

Studies using these models show robust between-person associations between high levels of peer/bullying victimization and high depression^{30,31}, internalizing^{32–34}, or social anxiety symptoms³⁵. After accounting for these stable trait-like differences, within-person effects are more mixed, varying by form of victimization and gender. Some researchers have found time-dependent reciprocal associations between deviations in peer victimization and depression symptoms³², internalizing symptoms (boys only³²; relational victimization³⁴), and social anxiety (physical victimization³⁵), while others have found support for the interpersonal-risk model from victimization to social anxiety (relational victimization³⁵) and emotional problems³⁶ (for girls^{32,33}). Most studies include only a few waves of data (i.e., 3 to 5) and are limited to a portion of a single developmental period, such as childhood or adolescence, which precludes examining whether different pathways operate across distinct stages of development. These findings underscore the need to consider whether similar temporal processes are consistent across multiple developmental periods, as well as extend beyond mental health to academic functioning, a domain that may follow parallel pathways with bullying victimization and internalizing symptoms.

Bullying and Academic Functioning

Relative to mental health, fewer meta-analytic studies have been conducted on bullying victimization and academic functioning. Although some have reported null findings^{37,38}, several have shown a small but significant association between higher bullying victimization with lower academic functioning, including grades and standardized test scores^{5,11,21,39–41}. There is also inconsistency in meta-analytic findings between bullying victimization and school engagement, with some yielding non-significant effects⁴² and others showing associations between being bullied and higher risk of school absence and dropout and lower likelihood of school graduation and being engaged, albeit few studies were included³⁹. In a recent study of over 1 million Finnish students (Grades 8 and 9; age 14–17), Alanko et al.⁴³ examined cross-sectional associations between bullying victimization and absences using data over two decades and found that bullying victimization at any frequency was associated with absences due to illness, while

being bullied “several times a week” was associated with truancy. In addition to the interpersonal risk paths, researchers have also found support for academic incompetence paths, for example, early low achievement can precede bullying victimization¹⁵. Several researchers also advocate for bidirectional associations^{4,13}. However, longitudinal research examining the co-development of bullying victimization and academic functioning remains limited, with academic functioning often being treated as an outcome of bullying victimization⁴⁴ rather than a dynamically interacting process over time.

Comparable evidence is found in the literature on academic functioning and internalizing symptoms, where symptoms-driven, academic-incompetence, and bidirectional processes also emerge^{10,45,46}. Using growth-curve approaches to examine change over time, Keles et al.⁴⁷ found that linear growth in internalizing symptoms and academic achievement were both on average stable, but negatively associated, such that students with higher initial academic achievement showed declines in internalizing symptoms. Results suggest that academic problems may serve as precursors to and consequences of emotional difficulties, though traditional analytic approaches may overestimate these temporal effects^{10,48,49}.

Examining absenteeism may be particularly informative because it captures behavioural withdrawal, school avoidance, and distress¹⁷, serving as a critical link between bullying, internalizing symptoms, and academic achievement. Absences also show cumulative academic consequences, with even modest increases predicting later declines in achievement. For example, Meehan et al.⁵⁰ found that peer-reported peer victimization at the start of Grades 4 and 5 predicted both later school absences and in-class avoidant behaviour, which in turn were associated with lower end-of-year GPA and standardized test scores. Despite these associations, most studies draw on short time frames or narrow developmental windows, limiting tests of whether academic pathways differ across developmental periods or shift during key school transitions. This lack of longitudinal breadth constrains our understanding of how academic functioning fits into broader cascades linking bullying victimization and mental health, highlighting the need to consider all three domains together rather than in isolated dyads.

Bullying Victimization, Internalizing Symptoms, and Academic Functioning

Bullying victimization is often proposed as a catalyst for both mental health problems and academic difficulties; however, it is possible that these domains interact to form a cascade^{4,11}. For example, students who are bullied may experience internalizing problems because of

their abuse, which in turn may impact their cognitive functioning and school grades, and having low grades may cause students to withdraw. Alternatively, students who are bullied may withdraw from school, experiencing higher absenteeism, which puts them at risk for grade decline, which may amplify the emotional difficulties experienced by students who are victimized by bullying. Higher absenteeism and internalizing symptoms may also put students at risk for increased bullying victimization, creating a dynamic cycle. Although several authors have theoretically proposed such pathways ^{4,11,13}, relatively few have empirically examined all three domains jointly within a longitudinal framework, limiting examinations of such proposed pathways. Using a 3-wave CLPM, Liu et al. ¹⁶ found transactional effects between peer victimization, depression symptoms, and achievement. In a rare example including attendance, Vaillancourt et al. ¹⁵ examined bullying victimization, GPA, absences, and internalizing and externalizing symptoms yearly from Grade 5 to 8, with Grade 3 standardized test scores also included. They found symptom-driven pathways from internalizing symptoms to bullying victimization and to absences. Evidence of academic incompetence was also found; lower scores in Grade 3 writing were associated with Grade 5 victimization, internalizing symptoms, and GPA. Although comprehensive, the study relied on a traditional CLPM. New modeling advances may yield different results ²⁷⁻²⁹. Using one such model (i.e., ALT-SR), Davis et al. ¹² examined pathways linking bullying victimization, depression, self-reported grades, and problematic drinking among a cohort of middle school students (Grades 5 to 8) assessed at 4 timepoints over 2 years. Using this disaggregated approach, they found that at the between-person level, students who started with higher rates of bullying victimization than others also reported higher initial levels of depression and lower grades, and those with higher initial depression reported lower grades. At the within-person level, they found transactional effects between higher-than-expected bullying victimization and lower-than-expected grades, as well as evidence of academic incompetence from lower-than-expected grades to higher-than-expected depression scores, although shared method variance may have biased this latter association, as children with high depression symptoms tend to underestimate their academic competence ⁵¹. Further, because youth in this study began in Grades 5 to 8, some would have transferred to a secondary school; a discernible change in context was not accounted for and may have altered the findings.

Secondary School Transition

School transitions correspond with shifts across many areas of functioning⁵³ and, may represent normative contextual perturbations that can lead to reorganization of ongoing developmental processes. For many students, bullying victimization declines over the transition from elementary to secondary school, yet for others, the abuse does not remit⁵². At the same time, some students show declines in grades, involvement, and engagement and increases in internalizing symptoms⁵³. Bowes et al.⁵⁴ examined the mental health and academic outcomes (age 12) of youth bullied in elementary school (age 7 or 10) only, or secondary school (at age 12), or both before and after the transition. They found that students who experienced ongoing bullying had the highest levels of internalizing problems. Students bullied only in elementary school had higher symptoms relative to nonbullied peers. Although the reprieve from abuse did not fully mitigate later mental health problems, those with victimization limited to elementary school scored similarly in academic performance as those not bullied in either phase. Students who were newly victimized had comparable achievement to those who experienced ongoing victimization. The findings suggest the impact of bullying victimization on mental health may carry across the school transition whereas effects on academic functioning may be concurrently associated; however, the dynamic associations in the years before and after transition remain unclear.

In addition to the stress induced by bullying victimization, the stress of the school transition itself may initiate a symptoms-driven cascade, such that students who develop heightened sensitivity to stress may react negatively to school transitions compared to peers without such emotional distress. This increased reactivity, a feature of both depression and anxiety disorders⁵⁵, may create vulnerability to interpersonal problems and academic difficulties. Pre-transition mental health problems have been associated with post-transition peer rejection and bullying victimization¹⁴, as well as academic challenges, diminished school liking⁵⁶, and lower grades⁵⁷. Because school transitions can lead to reorganization of peer networks, academic expectations, and school environments⁵³, they may interrupt ongoing maladaptive cascades or intensify vulnerabilities. Despite this, little is known about whether the strength or direction of associations among bullying victimization, internalizing symptoms, grades, and absences shifts during this transition, or whether the transition itself functions as a catalyst for developmental cascades that unfold across secondary school. Clarifying how these processes behave across this key transition is essential for understanding the broader developmental pathways that link

bullying victimization, internalizing symptoms, academic achievement, and absences across development.

Knowledge Gap

Ample evidence supports concurrent and temporal associations between bullying victimization and internalizing symptoms, and to a lesser extent, between bullying victimization and academic functioning, with even fewer studies incorporating absences. Although researchers have proposed multiple causal pathways linking peer abuse, internalizing problems, academic achievement, and absenteeism⁴, most prior work has examined these processes in isolation or through pairwise associations, limiting understanding of how difficulties across domains may interact and accumulate over time. Few studies have examined competing pathways, and those that have been conducted have not included absences¹², focused on only upper elementary/middle school students^{12,15}, or failed to separate between- and within-person effects¹⁵. As a result, it remains unclear whether observed associations reflect stable individual differences, time-specific developmental dynamics, or cascading processes that unfold across long spans adolescence. Further, little is known about whether and how associations among bullying victimization, internalizing symptoms, and academic functioning shift across critical school transitions, limiting what is known about when developmental cascades are most likely to emerge. Addressing these gaps is necessary for clarifying how bullying victimization, mental health, and academic functioning become linked over time and for identifying periods when intervention may be most effective.

Current Study

Guided by a dynamic systems perspective, our objective was to examine associations among bullying victimization, internalizing symptoms, grades, and school absences across adolescence, capturing both longer-term patterns and time-dependent coupling and temporal priority. By including assessments over two schooling periods (i.e., elementary (Grades 5 to 8) and secondary school (Grades 9 to 12)) in a single cohort, we also examine the transition to secondary school as a contextual perturbation that may disrupt and reorganize system dynamics. Bullying victimization, internalizing symptoms, and academic functioning reflect both interpersonal (between-person) differences and intrapersonal (within-person) processes in adolescence¹², and failure to distinguish such effects can lead to substantially different conclusions about cross-domain associations and temporal dynamics^{28,36}. Accordingly, we

applied analytic methods that disaggregate longer-term between-person patterns from within-person fluctuations, permitting an examination of time-specific intra-individual change over time. This approach acknowledges that associations among domains may operate across different time scales and addresses limitations of prior work by clarifying whether associations reflect longer-term individual differences, time-specific deviations, or reorganization in developmental dynamics surrounding the school transition. In doing so, we controlled for shared risk factors including gender, parental income and education, and race/ethnicity, similar to prior studies^{12,15}. We anticipated strong associations between bullying victimization and internalizing symptoms, given extensive prior evidence, and smaller associations with academic functioning, consistent with typical effect sizes. However, because few studies have parsed within-person temporal pathways across such a long developmental span in two different schooling contexts, we did not specify directional hypotheses for within-person effects.

Methods

Participants

Data were from the McMaster Teen Study, a comprehensive multi-informant, multi-method, longitudinal study of randomly selected youth, with a focus on interpersonal relationships, mental health, and academic achievement. In Time 1, Grade 5 students were recruited from 51 randomly selected schools from one Ontario School Board. A total of 1023 students took part in the first year, and 875 families agreed to take part in the longitudinal study; 703 participants took part in at least one follow-up between Time 2 and Time 8 (Grade 12), and 701 had data on variables of interest at any timepoint and were considered the analytic sample. In the first year of the study, students were on average 10.91 years old ($SD=0.36$; $min=9.39$, $max=12.40$), half were girls (53%), and most were White (76%; 16% students from racial/ethnic minority groups; 8% missing). In the final year of the study, students were on average 18.01 years old ($SD=0.35$; $min=17.10$, $max=19.38$).

Procedure

Annual approval for this study was obtained from the corresponding author's primary affiliation's research ethics board (i.e., Time 1 to 4: McMaster University Research Ethics Board; Time 5 to 8: University of Ottawa, Social Sciences and Humanities Research Ethics Board). Informed parental/guardian consent and student assent/consent were obtained annually. All methods were carried out in accordance with guidelines and regulations under the Canadian Tri-

Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS/TCPS 2). In Year 1, survey data were collected from students in schools and subsequently through participants' homes (paper/pencil or online) every spring (approximately 12 months between assessments). Each year, parents/guardians completed a telephone interview with trained research assistants, and school records were obtained from the participating school board.

Measures

Bullying Victimization. Reports of bullying victimization were collected annually. Participants completed a modified version of the Olweus Bully/Victim Questionnaire⁵⁸, which includes a definition of bullying before asking youth to report how often in the last 3 months that they have experienced bullying. The scale consists of five questions, including a general question¹ and questions on physical, verbal, social, and cyber bullying, which include several examples of what the targeted behavior entailed. Youth responded using a 5-point frequency scale (0 = *never*, 1 = *only once or twice*, 2 = *2 or 3 times a month*, 3 = *once a week*, 4 = *several times a week*) with composites created by averaging all items at each time point (possible range: 0-4). This survey has been validated against the Olweus Bully/Victim Questionnaire⁵⁸ and, in the current sample, demonstrated excellent internal consistency reliability (Cronbach's α min = .79, max = .82).

Internalizing Symptoms. Participants completed the Behavior Assessment System for Children-Second Edition Self-Report of Personality (BASC-2 SRP⁵⁹; T1-T2 Child version; T3-T8 Adolescent version). Two subscales within the internalizing domain (i.e., depression and generalized anxiety) were assessed each year of the study. To ensure consistent measurement over time, items that did not overlap between the child (T1 and T2) and adolescent (T3 to T8) versions were removed from the composites, as has been done previously¹⁴. The 12 items measuring depression symptoms and 10 items measuring general anxiety symptoms were rated on a four-point scale (0 = *never*, 1 = *sometimes*, 2 = *often*, 3 = *almost always*; 4 depression items; 8 anxiety items) or dichotomous response (0 = *false*, 2 = *true*; 8 depression items; 2 anxiety items) according to the standardized coding scheme⁵⁹. Items were summed for depression symptoms (possible response range: 0-28) and anxiety symptoms (possible response range: 0-28) to create symptom total composites, respectively, with higher scores indicating greater symptom severity. The BASC-2 SRP's psychometric properties have been thoroughly investigated⁵⁹. In the current sample the depression (Cronbach's α min = .87, max = .91) and anxiety symptoms

(Cronbach's α min = .85, max = .91) subscales demonstrated excellent reliability and were correlated within time (r min = .50, max = .66), reflecting the high comorbidity of the disorders⁵⁵. At each time point the depression and anxiety composites were added to create an internalizing symptoms composite score (possible response range: 0-56).

Academic Functioning. Elementary and secondary school grades and absences from Grades 5 to 12 were obtained from the participating school board.

Grades. In elementary school, letter grades (< D- = 0 to A+ = 12) were obtained for each term for courses in English, French, math, science (Grades 5-8/age 11-14), social studies (Grades 5-6/age 11-12), and history (Grades 7-8/age 13-14). During Time 4 (Grade 8/age 14) of data collection, the Ministry of Education of Ontario changed provincial report card requirements, where students went from receiving three term reports to receiving a preliminary report and two official term assessments. The school board provided the research team with three official reports in Times 1 to 3 and two official reports in Time 4. When participants had more than one grade within a subject, grades were averaged prior to computing term averages. For example, English reading, writing, and oral grades were averaged into a single English score.

In secondary school (Grades 9-12/ages 15-18), courses were diverse in the type of classes and the academic stream students could take. For consistency with elementary school data, percentage scores were obtained for each course and were converted to letter grades using the letter grade percentage conversion provided by the participating school board. Grades ranged from < D- = 0 to A+ = 12 (D- = 50–52%; D = 53–56%; D+ = 57–59%; C- = 60–62%; C = 63–66%; C+ = 67–69%; B- = 70–72%; B = 73–75%; B+ = 76–79%; A- = 80–84%; A = 85–89%; A+ = 90–100%). All available course grades were averaged to form annual grade point average (GPA) scores. Correlations between term GPAs within a given year (Grades 5 to 8/ages 11-14) were high, $r_s = .86-.93$, as were GPAs across years, $r_s = .65-.88$. Since students took a variety of courses in secondary school, a traditional reliability coefficient could not be computed.

Days Absent. School absence data were obtained from school records. In elementary school, days absent were provided. In secondary school, the number of absences was provided by class; within term, class absences were averaged, and term absences were summed for a total score. Days absent per year were converted to a percentage score of the total instructional days absent.

Covariates. In the first year of the study, student participants reported on their gender using binary options (coded *boy* = 0, *girl* = 1); data on gender diversity were not available. Participants and their parents reported their racial/ethnic background (i.e., White, Middle Eastern-Canadian, African/West-Indian-Canadian, South-Asian-Canadian, Asian-Canadian, Native-Canadian, South/Latin-American-Canadian, and Other). Race/ethnicity was re-coded as White (coded 0) and students from racial/ethnic minority groups (coded 1) due to low sample sizes. Parents reported their household income and parental education in the parent interview in Year 1 (and Year 2 if not reported in Year 1). Income was reported in Canadian dollars on an 8-point scale (1 = < \$20,000 to 8 = > \$80,000) and the highest level of education attained was reported on a 5-point scale (1 = Did not complete high school, 2 = Completed secondary school, 3 = College diploma or trades certificate, 4 = University undergraduate degree, 5 = University graduate degree).

Analytic Plan

The analytic sample was selected based on having any data available. Using SPSS v30, a series of *t*-tests and chi-square tests were used to examine differences between the analytic sample and those not included. Little's Missing Value Analysis (MVA) was used to examine mean differences across time due to attrition. Mplus v8.11, with full Maximum Likelihood Robust estimation, was used to handle possible deviations from normality and missing data. Mplus was used to estimate unbiased means and bivariate correlations as well as for all subsequent models.

A series of auto-regressive latent trajectory models with structured residuals (ALT-SR) (also called latent curve models with structured residuals (LCM-SR) ^{28,29}) were estimated to isolate longer-term between-person and shorter-term within-person effects in the longitudinal pathways among bullying victimization, internalizing symptoms, GPA, and percent days absent from Grade 5 to Grade 12, allowing examination of how time-dependent coupling among domains unfolds across development. Analyses followed steps and code as provided in Curran et al. ²⁸. Model fit was assessed using a combination of indices including the chi-square test of model fit, comparative fit index (CFI; acceptable fit > .90), Tucker-Lewis Index (TLI; acceptable fit > .90), and root mean square error of approximation (RMSEA; acceptable fit ≤ .08) ⁶⁰. Univariate growth models were estimated for each construct to determine the best-fitting growth trajectory over the eight time points. To aid in estimation, the residual variances in elementary

(Grades 6 to 8) and secondary school (Grades 9 to 12) were fixed. Growth parameters modeled each person's baseline and trajectory, while structured residuals (i.e., latent variables with a single observed item at each time point) captured unique, time-specific deviations. Intercept-only (model 1), linear (model 2), and quadratic (model 3) growth models were estimated and compared using the Satorra-Bentler scaled chi-square difference test. Autoregressive paths between structured residuals were added to account for year-to-year stability within each construct (model 4). Paths in elementary (Grades 6 to 8) and secondary school (Grades 9 to 12) were fixed and because of our interest in the transition, the path from Grade 8 to 9 was free. We sought the most parsimonious univariate models to prepare for the multivariate model; because the addition of autoregressive effects can account for variance in the curve factors, we tested a model where the quadratic factor variance (and thus covariance with intercept and slope) were fixed to zero (model 5).

The optimal single-variable models were merged into a multivariate model including bullying victimization, internalizing symptoms, GPA, and absences. Growth factors were regressed on centered covariates of household income, parental education, gender, and race/ethnicity. Mean-centered covariates yield intercepts and growth parameters that reflect the average composition of the sample rather than a specific reference group, without affecting interpretation. The models captured associations between growth parameters and between concurrent deviations (i.e., structured residuals) in all domains as well as cross-lagged paths between annual deviations. Concurrent associations between pairs of variables were set equal in elementary (Grades 6–8) and secondary school (Grades 9–12), as were autoregressive and cross-lagged paths, with parameters at the transition free to vary. Concurrent associations at Grade 5 (Time 1) were not constrained²⁸. Differences in the magnitude of autoregressive and cross-lagged effects across periods (i.e., elementary, transition, secondary) and within time covariances (i.e., elementary, secondary) were assessed with the Wald chi-square test. Indirect effects were examined using MODEL INDIRECT, which computes indirect effects as the product of relevant path coefficients, with bootstrapped confidence intervals ($N = 5000$ draws). For comparability, we report results for preliminary ALT-SR models for (1) bullying victimization and internalizing symptoms, and (2) bullying victimization, GPA, and absences in the accompanying Supplemental file.

Results

Missing Data

Compared to those without longitudinal data ($n = 174$), participants in the analytic sample ($n = 701$) were more likely to be White (82.4% vs. 64.3%; $\chi^2(1, 787) = 22.785, p < .001$), and had higher household income ($t[770] = 6.060, p < .001$) and more educated parents ($t[805] = 6.261, p < .001$). There were no significant gender differences between samples ($\chi^2(1, 875) = 0.037, p = .848$). In Grade 5, the samples did not differ on bullying victimization, $t(801) = 0.507, p = .612$, or internalizing problems, $t(792) = -1.320, p = .187$. The analytic sample had lower number days absent ($t[801] = -3.997, p < .001$) and higher GPA ($t[829] = 6.303, p < .001$) than those not included, indicating that those with higher academic risk were more likely not to take part in the longitudinal study.

Within the analytic sample, Little's MCAR test was statistically significant, $\chi^2(6173) = 7639.443, p < .001$, rejecting the assumption that data were missing completely at random. Later-wave missingness was non-random. Participants with missing data were more likely to have higher prior scores on bullying victimization, internalizing symptoms, and absences, and lower GPA compared to those with data in later waves, indicating that those with elevated risk were more likely to dropout or miss assessments. Since the probability of missingness was systematically associated with observed scores, the missing data mechanism was consistent with a missing at random process. Full information maximum likelihood estimation (FIML) yields unbiased parameter estimates when variables associated with missingness are included in estimation. Accordingly, we proceeded using FIML for descriptive statistics, correlations, and in analyses.

Descriptive Statistics

Supplemental Table 1 presents estimated means and standard deviations as well as the correlation among the main study variables. Annual assessments of each construct were statistically significantly positively associated. Within time, bullying victimization was positively associated with internalizing symptoms and absences and negatively associated with GPA. Specifically, higher levels of bullying victimization were statistically significantly linked to increased internalizing symptoms (r min = .360, max = .606) and a higher percentage of days absent (r min = .100, max = .200; exception Grade 9, $r = .087, p = .192$). Higher bullying victimization was associated with lower GPA across elementary school (r min = -.237, max = -.129) and in Grade 10, $r = -.208$.

Auto-regressive Latent Trajectory Models with Structured Residuals (ALT-SR)

Univariate Trajectories

Beginning with intercept only models, the successive addition of slope and quadratic factors resulted in a statistically significant improvement in model fit for each of the four constructs in the study (see Supplemental Table 2). For bullying victimization, the addition of autoregressive paths improved model fit and resulted in non-significant quadratic (co)variances. Fixing the quadratic variance to zero resulted in a non-significant change and was selected as the final bullying victimization univariate model (intercept $M=0.82$, $p<.001$, $Var=0.17$, $p<.001$; slope $M=-0.13$, $p<.001$, $Var=0.01$, $p=.143$; quadratic $M=0.01$, $p<.001$, $Var=0$ [fixed]). For internalizing symptoms, the addition of autoregressive paths to the quadratic model yielded negative non-significant residual variance in slope and quadratic effects. To aid in estimation, the variance of the quadratic was fixed to zero. Compared to the slope model, the fixed variance model had significantly better fit. It also had better relative fit than the quadratic model ($\Delta AIC=61.69$; $\Delta CFI=.029$). The fixed quadratic variance model was selected as the final internalizing symptoms univariate model (intercept $M=12.36$, $p<.001$, $Var=36.03$, $p<.001$; slope $M=-0.56$, $p=.004$, $Var=0.96$, $p=.063$; quadratic $M=0.16$, $p<.001$, $Var=0$ [fixed]). For GPA, the addition of autoregressive paths improved model fit and resulted in non-significant quadratic (co)variances. Fixing the quadratic (co)variances resulted in a significant change in model fit; however, other fit indices were comparable between the two models. For parsimony, the quadratic fixed variance model was selected (intercept $M=8.09$, $p<.001$, $Var=1.70$, $p<.001$; slope $M=0.17$, $p<.001$, $Var=0.05$, $p<.001$; quadratic $M=-0.03$, $p<.001$, $Var=0$ [fixed]). Although some global fit indices were elevated, diagnostics indicated localized rather than pervasive model misfit, and relative fit indices were within an acceptable range. Given the goal of estimating a parsimonious and time-comparable growth structure, the model was retained for subsequent analyses. For percent days absent, the addition of autoregressive paths significantly improved model fit; although the quadratic variance was attenuated, it was still significant. Fixing (co)variance to zero resulted in significant degradation in fit. Model 4 (AR free quadratic variance) was retained (intercept $M=3.87$, $p<.001$, $Var=9.79$, $p<.001$; slope $M=0.08$, $p=.486$, $Var=4.06$, $p=.001$; quadratic $M=0.21$, $p<.001$, $Var=0.14$, $p<.001$).

Combined Model

The univariate growth models were combined with added between-person covariance terms between growth factors and within-person covariance and cross-lagged paths. Growth factors were regressed on covariates. Results for preliminary models including bullying victimization and internalizing symptoms are presented in Supplemental Figure 1 and bullying victimization, absences, and GPA are presented in Supplemental Figure 2. The full model including all four constructs had an acceptable fit to the data, $\chi^2(505) = 1190.633$, CFI = .928, TLI = .911, RMSEA = .044, 90% CI [.041, .047], $p = .999$. Figure 1 includes trajectories for each construct, Figure 2 includes between-person associations, Figure 3 includes within-time associations, and Figure 4 includes all within-time standardized parameter estimates with confidence intervals.

Between-Person Associations with Covariates. Gender was associated with the intercept and slopes of internalizing symptoms (intercept $b=2.00$, $p=.006$; slope: $b=1.30$, $p=.001$) and GPA (intercept $b=0.54$, $p<.001$; slope: $b=0.17$, $p=.002$), but not quadratic factors, $p>.05$. Girls had higher initial values and steeper upward trend with boys having a lower, shallower downward trend. Race/ethnicity was associated with slopes of GPA, $b=0.20$, $p=.014$, and absences, $b=-0.96$, $p=.001$, but not intercept or quadratic factors, $p>.05$; students from racial/ethnic minority groups had steeper upward curves in GPA and shallower curves in absences. Higher income and parent education predicted lower initial victimization (income: $b=-0.04$, $p=.018$; education: $b=-0.08$, $p=.009$), internalizing (income: $b=-0.50$, $p=.008$; education: $b=-0.90$, $p=.020$), and absences (education only, $b=-0.50$, $p=.001$), and higher GPA (income: $b=0.15$, $p<.001$; education: $b=0.46$, $p<.001$), with parent education also linked to GPA slope, $b=0.08$, $p=.009$, but no quadratic effects, $p>.05$.

Associations Among Between-Person Factors. Means and variances of curve factors are reported in Table 1. Higher initial bullying victimization was associated with higher internalizing symptoms, $cov=1.37$, $p<.001$, $r=.61$, and lower GPA, $cov=-0.10$, $p=.015$, $r=-.23$. Bullying victimization intercept was negatively associated with victimization slope (significant standardized only), $cov=-0.01$, $p=.051$, $r=-.66$, $p<.001$. Due to the average declining slope, the association indicated that students with higher initial levels had steeper declines and those with lower levels had flatter trajectories. Bullying victimization intercept was also negatively associated with GPA slope, $cov=-0.03$, $p=.016$, $r=-.32$. Because the GPA slope was positive, this indicated that students with lower initial bullying victimization had higher increasing GPAs.

Higher initial internalizing symptoms were negatively linked to lower GPA intercept, $cov=-1.62$, $p=.002$, $r=-.26$. Initial internalizing symptoms were also negatively associated with bullying victimization slope (standardized only, $cov=-0.10$, $p=.117$, $r=-.45$, $p=.022$). This finding is likely due to students with higher initial internalizing symptoms also reporting higher initial bullying victimization, which was associated with steeper declining slopes. Internalizing and GPA slopes were positively related ($cov=.08$, $p=.044$, $r=.42$, significant unstandardized only). Additionally, higher GPA intercepts corresponded with steeper GPA slopes, $cov=0.11$, $p<.001$, $r=.49$, and a slower rate of increase in absences, $cov=-.10$, $p=.004$, $r=-.26$. See Figure 2.

Within-Person Associations

Within-Time Correlations. Constraining covariance terms in elementary and secondary school to be equal resulted in a statistically significant Wald test, $\chi^2(6)=32.584$, $p<.001$, indicating that within-time associations differed by academic period. Higher-than-usual bullying victimization was consistently associated with higher-than-usual internalizing symptoms at every wave, while bullying victimization was significantly related to GPA at the first time point. Higher-than-usual internalizing was linked with higher concurrent absences in secondary school and lower GPA in the first year and in secondary school. Higher-than-average absences correspond with lower GPA (exception Grade 5), especially in secondary school. See Figures 3 and 4.

Autoregressive Paths. Equality constraints on autoregressive paths across elementary, transition, and secondary school periods yielded a statistically significant Wald test, $\chi^2(8)=24.349$, $p=.002$, indicating that autoregressive paths differed across time. Statistically significant autoregressive paths were identified in elementary school bullying victimization, $b=0.29$, $p<.001$, $\beta=.29-.33$, secondary school absences, $b=0.21$, $p=.021$, $\beta=.19-.21$, and across each year for GPA (elementary: $b=0.45$, $p<.001$, $\beta=.39-.44$; transition: $b=0.32$, $p=.014$, $\beta=.21$; secondary: $b=0.56$, $p<.001$, $\beta=.48-.55$) and internalizing symptoms (elementary: $b=0.21$, $p=.001$, $\beta=.21-.27$; transition: $b=0.42$, $p<.001$, $\beta=.35$; secondary: $b=0.41$, $p<.001$, $\beta=.41$). That is, even after accounting for students' average trajectories, time dependent deviations from their average trajectories were positively associated with deviations from expected at the following time point.

Cross-Lagged Paths. Constraining elementary, transition, and secondary school repeated cross-lagged paths resulted in a statistically significant Wald test, $\chi^2(24)=92.264$, $p<.001$, indicating that cross-lagged paths differed by academic period. No statistically significant cross-

lagged effects emerged in elementary school. At the secondary school transition, higher-than-expected internalizing symptoms in Grade 8 were associated with higher-than-expected bullying victimization in Grade 9, $b=0.01$, $p=.004$, $\beta=.23$, and higher-than-expected absences at the end of elementary school was associated with lower-than-expected internalizing symptoms in the first year of secondary school, $b=-0.66$, $p=.002$, $\beta=-.26$. In secondary school, higher-than-expected internalizing symptoms were associated with lower-than-expected GPA the following year, $b=-0.03$, $p=.016$, $\beta=-.11$ - $-.12$. Lower-than-expected GPA was associated with higher-than-expected absences the following year, $b=1.45$, $p<.001$, $\beta=-.33$ - $-.39$. See Figures 3 and 4.

Exploratory Analysis. The negative effect of absences on internalizing symptoms across the transition was unexpected and examined following methods for testing cross-level interactions⁷⁷. The effect of Grade 8 absences on Grade 9 internalizing symptoms was moderated by the between-person intercept of internalizing symptoms, $b = -0.185$, $p < .001$, $\beta = -.395$. The interaction was probed at high (+1 standard deviation) and low (-1 standard deviation) levels of the internalizing intercept using the MODEL CONSTRAINT option. At high starting levels of internalizing problems, higher-than-expected Grade 8 absences was associated with lower-than-expected Grade 9 internalizing symptoms, $b = -1.996$, $p < .001$, but not at low starting levels of internalizing problems, $b = 0.084$, $p = .666$ (standardized values for new parameters are not estimated in Mplus).

Indirect Effects. A significant indirect effect emerged in secondary school: higher internalizing symptoms to lower GPA to higher absences, $b = 0.039$ [0.001, 0.071], $\beta = .042$ [.001, .008]. No other cascade effects were statistically significant.

Discussion

Through a dynamic systems perspective, we examined how bullying victimization, internalizing symptoms, academic achievement, and school absences functioned as interconnected developmental processes across adolescence. Rather than treating these domains as isolated predictors or outcomes of one another, our focus was to examine short-term deviations and reciprocal interactions among these subsystems as well as the long-term trajectories of each domain, that emerge from the accumulation of short-term interactions over time. We further examined the context of schooling period by framing the transition to secondary school as a perturbation that may modify the short-term temporal associations among subsystems. By modeling between-person developmental patterns and within-person temporal

associations across the transition to secondary school, the present study extends prior work by clarifying *when* and *how* associations among these domains emerge and reorganize across adolescence.

At the between-person level, changes over time were consistent with prior research: over time, bullying victimization declined ⁴⁴, internalizing symptoms increased ⁶¹, GPA was slightly curvilinear, rising in elementary and declining in secondary ⁶², and percent days absent increased ⁶³. Also aligned with meta-analytic results, we found a positive association between initial bullying victimization and internalizing symptoms ^{5,19-23} and a negative association with GPA ^{5,11,21,39-41}. The smaller correlation between bullying victimization and percent days absent was not statistically significant. This finding is consistent with research showing that the association between bullying victimization is more consistent for academic achievement ⁴⁰ than absences ³⁹ and may also be due to shared associations with internalizing problems, which are robustly associated with bullying victimization ^{5,19,21,64}.

Supporting the validity of our findings, associations with covariates and between-person factors were also consistent with prior studies. Compared to boys, girls were more likely to report higher initial internalizing problems ⁵⁵ and GPA ⁶⁵, and steeper increases for internalizing symptoms ⁶⁶. Girls were also more likely to have steeper increasing GPA slopes whereas boys were more likely to have shallower downward curves, a finding that is inconsistent in the literature. Students from racial/ethnic minority groups had steeper slopes in GPA and lower absences slopes, though the processes driving these differences remain unclear and could reflect broader contextual or structural factors. Higher SES was associated with higher initial GPA and lower initial absences, internalizing symptoms, and bullying victimization, reflecting relative advantage ^{54,67}. Accounting for these between-person factors, we examined the temporal priority between constructs.

Unlike traditional CLPMs that blend within- and between-person variation into a single estimate, the ALT-SR model enabled us to account for individuals' typical trajectories while examining associations among temporal deviations. Except for elementary school absences and secondary school bullying victimization, each construct demonstrated significant autoregressive paths, indicating that when an individual experienced higher-than-expected levels at one time point, they were also more likely to experience higher-than-expected levels one year later. There were also significant associations between constructs. When individuals experienced higher

bullying victimization than was typical for them, they also reported higher-than-typical internalizing symptoms. This coupling was strong in elementary school and persisted across secondary school. In Grade 5, deviations in bullying victimization were also associated with deviations in GPA, but the residual deviations (accounting for prior deviations) were not significant through the remainder of elementary school or in secondary school. Although none of the interpersonal-risk paths were statistically significant, some of the paths were of medium to large effect size (relative to benchmarks for RI-CLPMs; .03 = small, .07 = medium, .12 = large⁶⁸); specifically, higher-than-typical victimization predicted higher-than-typical internalizing symptoms in elementary school, and in secondary school, higher-than-typical bullying victimization led to higher-than-typical school absences, both findings were statistically significant in the preliminary models.

We did, however, find strong support for symptoms-driven pathways. Across the school transition, higher-than-typical internalizing symptoms were associated with higher-than-typical bullying victimization, replicating evidence from Krygsman and Vaillancourt¹⁴ showing that depression symptoms predict bullying victimization and peer rejection across this same period. The school transition may amplify internalizing problems and place students at risk for peer abuse, while also heightening sensitivity to social threat and lowering the threshold for interpreting interactions as hurtful. Such processes are consistent with rejection sensitivity frameworks, which propose that internalizing symptoms heighten vigilance to social threat and may bias interpretations of ambiguous peer interactions⁶⁹. In secondary school, higher-than-typical internalizing symptoms were concurrently associated with higher-than-typical absences and lower-than-typical GPA, a relation also observed longitudinally. The activation of within-person pathways involving internalizing symptoms after the transition aligns with theories proposing that secondary school introduces increased academic demands, greater social complexity, and heightened autonomy⁵³, each of which may amplify sensitivity to stress. From a systems perspective, these contextual changes may temporarily destabilize emotional and academic subsystems, strengthening time-specific coupling between internalizing symptoms, peer experiences, and academic functioning.

Contrasting findings from Liu et al.¹⁶ and Davis et al.¹², we did not find reciprocal effects between bullying victimization and grades. Although Liu et al. used a traditional CLPM, Davis et al. used similar modeling techniques. Divergent findings may be due to the timing of

assessments; we used annual reports, whereas Davis et al. assessed students twice per year. This may also be due to differences in reporting method; we used report card data, whereas Davis et al. used students' self-reported grades, which are known to be imprecise and prone to inflation ⁷⁰.

We also found that GPA and school absences were concurrently associated in elementary school, with large concurrent associations in secondary school. Longitudinally, there was a clear pathway from lower-than-usual GPA to later increases in absences. These results suggest that when students miss school, they cannot learn, but also that when they achieve below their typical levels, this may contribute to subsequent attendance problems. In secondary school, students tend to have weaker relationships with teachers than in elementary school ⁵³, and teachers may be less likely to notice when students are performing below their usual levels. Secondary settings also typically provide less individualized support, as teachers expect students to be more autonomous ⁵³.

Beyond the associations between absences and GPA, we found an additional academic incompetence pathway, though, in an unexpected direction. Upon exploration, the negative path from absences to internalizing symptoms across the transition was moderated by initial levels of internalizing symptoms; for students with elevated internalizing problems, higher-than-expected absences were associated with lower-than-expected internalizing symptoms the following year. Students with high baseline internalizing symptoms may withdraw from social settings and may temporarily benefit from avoiding exposure to stressful school contexts ⁷¹. Such negative reinforcement is consistent with avoidance-based models of anxiety, where short-term withdrawal can temporarily relieve distress, particularly during major contextual shifts such as school transitions; though, in the long run, this style of coping is associated with worse symptoms ⁷². This effect was not present among youth with low initial internalizing problems, underscoring that absenteeism may function differently depending on baseline emotional vulnerability. Systemic and targeted school transition preparation can be helpful in reducing post-transition internalizing problems ⁷³.

Overall, our results support transactional relations among multiple domains of functioning, consistent with developmental cascades and dynamic interconnected systems, as children progress through elementary and secondary school. The strong within-time associations, symptoms-driven paths, and marginal interpersonal-risk paths demonstrate just how entrenched bullying victimization and internalizing symptoms are, suggesting reciprocal and mutually

reinforcing processes, especially prior to secondary school. These patterns suggest heightened distress may coincide with and amplify poorer academic performance and later withdrawal from school. This pathway aligns with prior findings that highlight the central role of bullying victimization in developmental cascades. Vaillancourt et al.⁷⁴ found that being bullied was linked to increased depression symptoms, which in turn were associated with higher cortisol levels, and later impaired memory function. Bullying victimization and depression symptoms were also directly related to poor memory. Expanding on this research, Palamarchuk and Vaillancourt⁷⁵ recently integrated research on the underlying structural and functional neurobiological responses to bullying, suggesting that stress induced by being bullied causes a neuropsychological cascade leading to disruptions in cognition and emotion processing, which can result in psychopathology and low academic achievement. Samara et al.'s¹¹ meta-analytic findings indicated that bullying victimization and lower academic achievement were linked through cognitive-motivational factors and suggested that one specific pathway may be from peer abuse to internalizing problems, leading to absenteeism and low achievement.

Strengths and Limitations

The current study has several notable strengths, including its long developmental span covering two academic periods, the use of administrative data to capture academic functioning, the incorporation of school absences (a rarely examined academic indicator), and an analytic approach that enabled the assessment of true within-person change over time. Notwithstanding these strengths, we also had limitations. First, the participants retained in the longitudinal study had higher grades and fewer absences in Year 1 compared to those who did not take part in any follow-up waves, limiting generalizability to more academically vulnerable youth. Second, reasons for absences were unavailable, preventing us from distinguishing sickness-related absences from truancy and constraining interpretation to overall absenteeism. Third, the univariate growth model assumes homogeneity in form, which may obscure meaningful individual differences in developmental patterns; future research should use person-centered approaches (e.g., latent class or mixture growth models) to identify heterogeneous classes, particularly for GPA where global fit indices were elevated. Fourth, we did not examine protective factors, like positive friendships and parental support that may support students through the school transition into secondary school⁵³, and potentially mitigate subsequent cascades. Fifth, the complexity of our model yielded a high parameter-to-sample-size ratio,

reducing power to detect some medium-large within-person cross-lagged effects. Sample size and model complexity also precluded an analysis by gender. It is likely that girls and boys who are bullied respond differently; following being bullied, girls have been shown to seek assistance and internalize, whereas boys often experience externalizing behaviour ⁷⁶ and are at higher risk of absenteeism ³⁹. Sixth, although we accounted for individuals' long-term trajectories of victimization when estimating within-person associations, we did not test whether youth following different victimization trajectories respond differently over time (i.e., between x within interaction). Prior work shows that youth who experience victimization in both elementary and secondary school exhibit greater mental-health problems than youth whose victimization is transient ⁵⁴; adolescents who experienced ongoing victimization, may have different temporal responses than those experiencing victimization for the first time in secondary school. Future studies with larger samples may allow for analysis of different forms of absenteeism, gender-specific models, the moderating role of bullying victimization trajectories, and examination of buffering roles of social support.

Conclusion

The results of the present study indicate that bullying victimization is strongly associated with internalizing symptoms and only modestly with academic functioning. In secondary school, internalizing problems were concurrently and prospectively associated with academic functioning, highlighting the need to support adolescents' mental health during this developmental period. Addressing bullying and mental health in elementary school and particularly in secondary school may attenuate downstream academic difficulties. Coordinated efforts integrating bullying prevention, mental health support, and attendance monitoring within collaborative school transition programs may be especially effective. Clarifying how such temporal associations within long-term developmental trajectories unfold across adolescence underscores the value of longitudinal approaches that distinguish between-person differences from within-person change, allowing us to identify sensitive periods when intervention may be most effective.

References

1. Olweus, D., Bullying at School: Knowledge Base and an Effective Intervention Programme. *Ann. N. Y. Acad. Sci.* **794**, 265–276 (1996).
2. Biswas, T., et al., Global variation in the prevalence of bullying victimisation amongst adolescents: Role of peer and parental supports. *EClinicalMedicine*. **20**, 100276 (2020).
3. Halliday, S., Gregory, T., Taylor, A., Digenis, C., & Turnbull, D., The Impact of Bullying Victimization in Early Adolescence on Subsequent Psychosocial and Academic Outcomes across the Adolescent Period: A Systematic Review. *J. Sch. Violence*. **20**, 351–373 (2021).
4. Laith, R., & Vaillancourt, T., The temporal sequence of bullying victimization, academic achievement, and school attendance: A review of the literature. *Aggress. Violent. Behav.* **64**, 101722 (2022).
5. Moore, S. E., et al., Consequences of bullying victimisation in childhood and adolescence: A systematic review and meta-analysis. *World. J. Psychiatry*. **7**, 60 (2017).
6. Huang, C., Academic Achievement and Subsequent Depression: A Meta-analysis of Longitudinal Studies. *J. Child. Fam. Stud.* **24**, 434–442 (2015).
7. Granic, I., & Hollenstein, T., A Survey of Dynamic Systems Methods for Developmental Psychopathology. In *Developmental Psychopathology* (eds Cicchetti D. & Cohen D. J.) 889–930 (Wiley, 2015).
8. Thelen, E., & Smith, L. B., *A Dynamic Systems Approach to the Development of Cognition and Action* (MIT Press, 1994).
9. Masten, A. S., & Cicchetti, D., Developmental cascades. *Dev. Psychopathol.* **22**, 491–495 (2010).
10. Brittain, H., & Vaillancourt, T., Longitudinal associations between academic achievement and depressive symptoms in adolescence: Methodological considerations and analytical approaches for identifying temporal priority. In *Advances in Child Development and Behavior* **64**, 327–355 (Elsevier, 2023).
11. Samara, M., Da Silva Nascimento, B., El-Asam, A., Hammuda, S., & Khattab, N., How Can Bullying Victimisation Lead to Lower Academic Achievement? A Systematic Review and Meta-analysis of the Mediating Role of Cognitive-Motivational Factors. *Int. J. Environ. Res. Public Health*. **18**, 2209 (2021).

12. Davis, J. P., et al., Examining the pathways between bully victimization, depression, academic achievement, and problematic drinking in adolescence. *Psychol. Addict. Behav.* **32**, 605–616 (2018).
13. Chavers, A. L., & Del Tufo, S. N., A systematic literature review on the link between peer victimization and literacy during adolescence. *Front. Educ.* **9**, 1390271 (2024).
14. Krygsman, A., & Vaillancourt, T., Longitudinal associations between depression symptoms and peer experiences: Evidence of symptoms-driven pathways. *J. Appl. Dev. Psychol.* **51**, 20–34 (2017).
15. Vaillancourt, T., Brittain, H. L., McDougall, P., & Duku, E., Longitudinal Links Between Childhood Peer Victimization, Internalizing and Externalizing Problems, and Academic Functioning: Developmental Cascades. *J. Abnorm. Child. Psychol.* **41**, 1203–1215 (2013).
16. Liu, J., et al., Developmental cascade models linking peer victimization, depression, and academic achievement in Chinese children. *Br. J. Dev. Psychol.* **36**, 47–63 (2018).
17. Fiorilli, C., De Stasio, S., Di Chiacchio, C., Pepe, A., & Salmela-Aro, K., School burnout, depressive symptoms and engagement: Their combined effect on student achievement. *Int. J. Educ. Res.* **84**, 1–12 (2017).
18. Moore, G. F., et al., Socioeconomic status, mental wellbeing and transition to secondary school: Analysis of the School Health Research Network/Health Behaviour in School-aged Children survey in Wales. *Br. Educ. Res. J.* **46**, 1111–1130 (2020).
19. Christina, S., Magson, N. R., Kakar, V., & Rapee, R. M., The bidirectional relationships between peer victimization and internalizing problems in school-aged children: An updated systematic review and meta-analysis. *Clin. Psychol. Rev.* **85**, 101979 (2021).
20. Deng, J., et al., Social anxiety and bullying victimization: A three-level meta-analysis of cross-sectional and longitudinal studies. *Child. Abuse. Negl.* **157**, 107052 (2024).
21. Schoeler, T., Duncan, L., Cecil, C. M., Ploubidis, G. B., & Pingault, J.-B., Quasi-experimental evidence on short- and long-term consequences of bullying victimization: A meta-analysis. *Psychol. Bull.* **144**, 1229–1246 (2018).
22. Ttofi, M. M., Farrington, D. P., Lösel, F., & Loeber, R., Do the victims of school bullies tend to become depressed later in life? A systematic review and meta-analysis of longitudinal studies. *J. Aggress. Confl. Peace Res.* **3**, 63–73 (2011).

23. Ye, Z., et al., Meta-analysis of the relationship between bullying and depressive symptoms in children and adolescents. *BMC Psychiatry*. **23**, 215 (2023).
24. Reijntjes, A., Kamphuis, J. H., Prinzie, P., & Telch, M. J., Peer victimization and internalizing problems in children: A meta-analysis of longitudinal studies. *Child. Abuse. Negl.* **34**, 244–252 (2010).
25. León-Moreno, C., Suárez-Relinque, C., Musitu-Ferrer, D., & Herrero, J., Peer Victimization, Peer Aggression and Depressive Symptoms over Time: A Longitudinal Study with Latent Growth Curves. *Psychosoc. Interv.* **31**, 169–176 (2021).
26. Kogachi, K., Simon, C., & Graham, S., Developmental pathways of victimization from high school to early adulthood: The role of characterological self-blame and school racial/ethnic context. *J. Adolesc. Health*. **78**, 141–148 (2026).
27. Hamaker, E. L., Kuiper, R. M., & Grasman, R. A., A critique of the cross-lagged panel model. *Psychol. Methods*. **20**, 102–116 (2015).
28. Curran, P. J., Howard, A. L., Bainter, S. A., Lane, S. T., & McGinley, J. S., The separation of between-person and within-person components of individual change over time: A latent curve model with structured residuals. *J. Consult. Clin. Psychol.* **82**, 879–894 (2014).
29. Berry, D., & Willoughby, M. T., On the practical interpretability of cross-lagged panel models: Rethinking a developmental workhorse. *Child. Dev.* **88**, 1186–1206 (2017).
30. Davis, J. P., et al., Examining pathways between bully victimization, depression, & school belonging among early adolescents. *J. Child. Fam. Stud.* **28**, 2365–2378 (2019).
31. Shen, Z., Xiao, J., Su, S., Tam, C. C., & Lin, D., Reciprocal associations between peer victimization and depressive symptoms among Chinese children and adolescents: Between- and within-person effects. *Appl. Psychol. Health Well-Being*. **15**, 938–956 (2023).
32. Cheng, Q., Mills-Webb, K., Marquez, J., & Humphrey, N., Longitudinal relationships across bullying victimization, friendship and social support, and internalizing symptoms in early-to-middle adolescence: A developmental cascades investigation. *J. Youth Adolesc.* **54**, 1377–1395 (2025).
33. Turner, R., Bjereld, Y., & Augustine, L., Developmental relations between peer victimization, emotional symptoms, and disability/chronic condition in adolescence: Are within- or between-person factors driving development? *J. Youth Adolesc.* **54**, 1063–1078 (2025).

34. Kawabata, Y., Kinoshita, M., & Onishi, A., A longitudinal study of forms of peer victimization and internalizing problems in adolescence. *Res. Child Adolesc. Psychopathol.* **52**, 983–996 (2024).
35. Zhou, J., Wang, L., Zhu, D., & Gong, X., Social anxiety and peer victimization and aggression: Examining reciprocal trait-state effects among early adolescents. *J. Youth Adolesc.* **53**, 701–717 (2024).
36. Liang, Y., Cao, H., Zhou, N., Bao, R., & Li, J., Body mass index, peer victimization, and internalizing symptoms from late childhood through early adolescence: Disaggregation of within-person and between-person effects. *Psychol. Violence.* **15**, 53–65 (2025).
37. Polanin, J. R., et al., A meta-analysis of longitudinal partial correlations between school violence and mental health, school performance, and criminal or delinquent acts. *Psychol. Bull.* **147**, 115–133 (2021).
38. Kowalski, R. M., Giumetti, G. W., Schroeder, A. N., & Lattanner, M. R., Bullying in the digital age: A critical review and meta-analysis of cyberbullying research among youth. *Psychol. Bull.* **140**, 1073–1137 (2014).
39. Fry, D., et al., The relationships between violence in childhood and educational outcomes: A global systematic review and meta-analysis. *Child. Abuse. Negl.* **75**, 6–28 (2018).
40. Nakamoto, J., & Schwartz, D., Is peer victimization associated with academic achievement? A meta-analytic review. *Soc. Dev.* **19**, 221–242 (2010).
41. Ozyildirim, G., & Karadağ, E., The effect of peer bullying on academic achievement: A meta-analysis study related to results of TIMSS and PIRLS. *Psychol. Sch.* **61**, 2185–2203 (2024).
42. Gubbels, J., Van Der Put, C. E., & Assink, M., Risk factors for school absenteeism and dropout: A meta-analytic review. *J. Youth Adolesc.* **48**, 1637–1667 (2019).
43. Alanko, K., Melander, K., Ranta, K., Engblom, J., & Kosola, S., Time trends in adolescent school absences and associated bullying involvement between 2000 and 2019: A nationwide study. *Child. Psychiatry Hum. Dev.* (2023).
44. Ladd, G. W., Ettekal, I., & Kochenderfer-Ladd, B., Peer victimization trajectories from kindergarten through high school: Differential pathways for children's school engagement and achievement? *J. Educ. Psychol.* **109**, 826–841 (2017).

45. Brumariu, L. E., Waslin, S. M., Gastelle, M., Kochendorfer, L. B., & Kerns, K. A., Anxiety, academic achievement, and academic self-concept: Meta-analytic syntheses of their relations across developmental periods. *Dev. Psychopathol.* **35**, 1597–1613 (2023).
46. Wickersham, A., et al., Systematic review and meta-analysis: The association between child and adolescent depression and later educational attainment. *J. Am. Acad. Child. Adolesc. Psychiatry.* **60**, 105–118 (2021).
47. Keles, S., Olseth, A. R., Idsøe, T., & Sørli, M-A., The longitudinal association between internalising symptoms and academic achievement among immigrant and non-immigrant children in Norway. *Scand. J. Psychol.* **59**, 392–406 (2018).
48. Chen, J., Huebner, E. S., & Tian, L., Longitudinal associations among academic achievement and depressive symptoms and suicidal ideation in elementary schoolchildren: Disentangling between- and within-person associations. *Eur. Child. Adolesc. Psychiatry.* **31**, 1405–1418 (2022).
49. Zhang, W., Zhang, L., Chen, L., Ji, L., & Deater-Deckard, K., Developmental changes in longitudinal associations between academic achievement and psychopathological symptoms from late childhood to middle adolescence. *J. Child. Psychol. Psychiatry.* **60**, 178–188 (2019).
50. Meehan, Z. M., et al., School absenteeism and in-class avoidant behaviors mediate the link between peer victimization and academic outcomes. *School. Ment. Health.* **15**, 519–527 (2023).
51. McGrath, E. P., & Repetti, R. L., A longitudinal study of children's depressive symptoms, self-perceptions, and cognitive distortions about the self. *J. Abnorm. Psychol.* **111**, 77–87 (2002).
52. Vaillancourt, T., Brittain, H., Farrell, A. H., Krygsman, A., & Vitoroulis, I., Bullying involvement and the transition to high school: A brief report. *Aggress. Behav.* **49**, 409–417 (2023).
53. Evans, D., Borriello, G. A., & Field, A. P., A review of the academic and psychological impact of the transition to secondary education. *Front. Psychol.* **9**, 1482 (2018).
54. Bowes, L., et al., Chronic bullying victimisation across school transitions: The role of genetic and environmental influences. *Dev. Psychopathol.* **25**, 333–346 (2013).

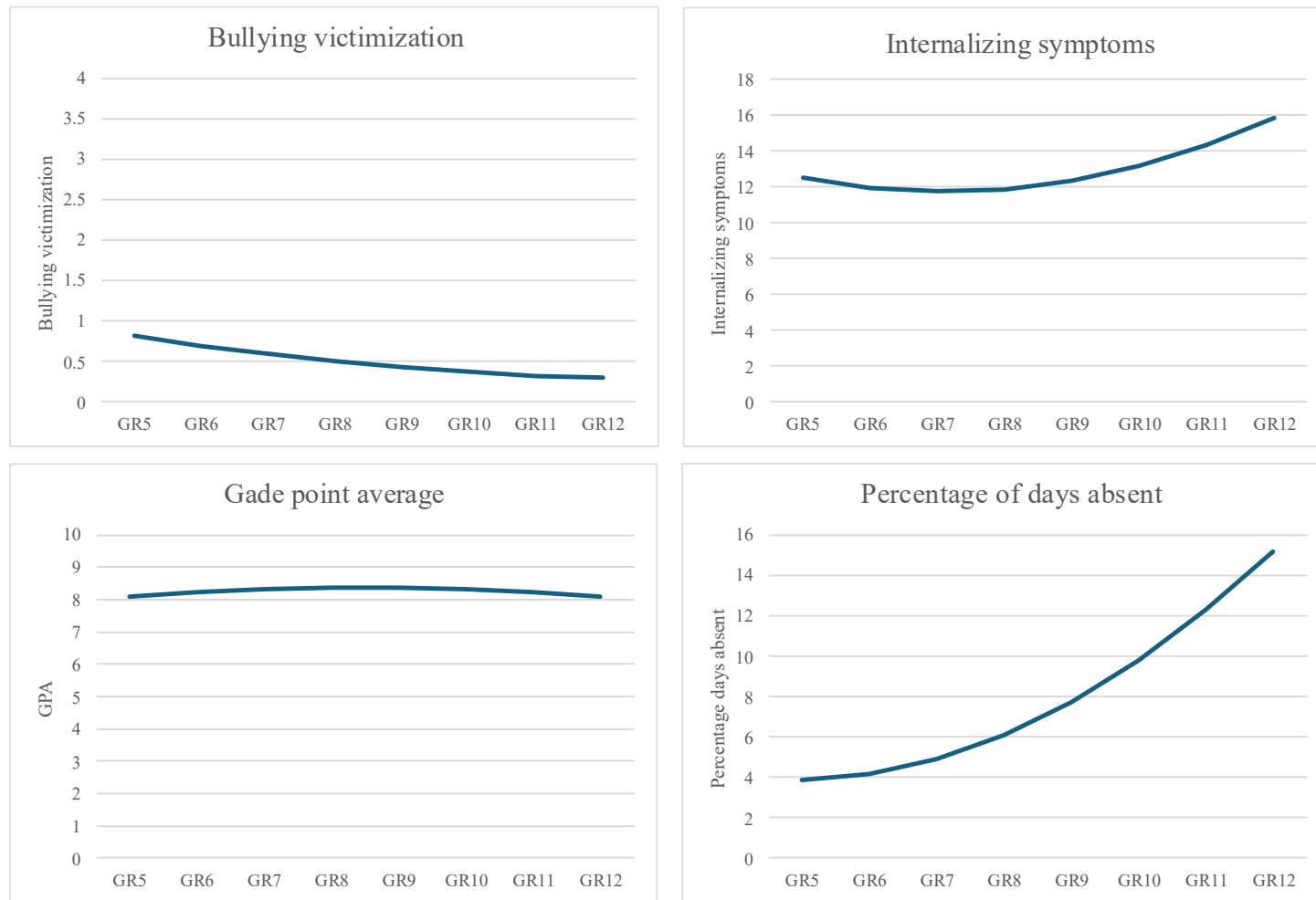
55. American Psychiatric Association., *Diagnostic and Statistical Manual of Mental Disorders: DSM-5-TR* (American Psychiatric Association, 2022).
56. Rice, F., et al., Pupil mental health, concerns and expectations about secondary school as predictors of adjustment across the transition to secondary school: A longitudinal multi-informant study. *School. Ment. Health* (2021).
57. Riglin, L., Frederickson, N., Shelton, K. H., & Rice, F., A longitudinal study of psychological functioning and academic attainment at the transition to secondary school. *J. Adolesc* (2013).
58. Vaillancourt, T., et al., Optimising population screening of bullying in school-aged children. *J. Sch. Violence*. **9**, 233–250 (2010).
59. Reynolds, C. R., & Kamphaus, R. W., *Behavior Assessment System for Children – Second Edition Manual* (Pearson, 2004).
60. Little, T. D., *Longitudinal Structural Equation Modeling* (Guilford Publications, 2024).
61. van Oort, F. V. A., et al., The developmental course of anxiety symptoms during adolescence: the TRAILS study. *J. Child. Psychol. Psychiatry*. **50**, 1209–1217 (2009).
62. Benner, A. D., & Graham, S., The transition to high school as a developmental process among multi-ethnic urban youth: The transition to high school. *Child. Dev*. **80**, 356–376 (2009).
63. Dräger, J., Klein, M., & Sosu, E. M., Trajectories of school absences across compulsory schooling and their impact on children’s academic achievement: An analysis based on linked longitudinal survey and school administrative data. *PLoS ONE*. **19**, e0306716 (2024).
64. Liao, Y., Chen, J., Zhang, Y., & Peng, C., The reciprocal relationship between peer victimization and internalising problems in children and adolescents: A meta-analysis of longitudinal studies. *Acta. Psychol. Sin*. **54**, 828–849 (2022).
65. Voyer, D., & Voyer, S., Gender differences in scholastic achievement: A meta-analysis. *Psychol. Bull*. **140** (2014).
66. Cohen, J. R., Andrews, A. R., Davis, M. M., & Rudolph, K. D., Anxiety and depression during childhood and adolescence: Testing theoretical models of continuity and discontinuity. *J. Abnorm. Child. Psychol*. **46**, 1295–1308 (2018).
67. Bradley, R. H., & Corwyn, R. F., Socioeconomic status and child development. *Annu. Rev. Psychol*. **53**, 371–399 (2002).

68. Orth, U., et al., Effect size guidelines for cross-lagged effects. *Psychol. Methods* **29**, 421–433 (2024).
69. Downey, G., Lebolt, A., Rincón, C., & Freitas, A. L., Rejection sensitivity and children's interpersonal difficulties. *Child. Dev.* **69**, 1074–1091 (1998).
70. Kuncel, N. R., Credé, M., & Thomas, L. L., The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Rev. Educ. Res.* **75**, 63–82 (2005).
71. Kearney, C. A., Integrating systemic and analytic approaches to school attendance problems: Synergistic frameworks for research and policy directions. *Child. Youth. Care. Forum* **50**, 701–742 (2021).
72. Aldao, A., Nolen-Hoeksema, S., & Schweizer, S., Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clin. Psychol. Rev.* **30**, 217–237 (2010).
73. Makover, H., et al., Indicated prevention for depression at the transition to high school: Outcomes for depression and anxiety. *Prev. Sci.* **20**, 499–509 (2019).
74. Vaillancourt, T., et al., Peer victimization, depressive symptoms, and high salivary cortisol predict poorer memory in children. *Brain. Cogn.* **77**, 191–199 (2011).
75. Palamarchuk, I. S., & Vaillancourt, T., Integrative brain dynamics in childhood bullying victimisation: Cognitive and emotional convergence associated with stress psychopathology. *Front. Integr. Neurosci.* **16**, 782154 (2022).
76. Sesar, K., Dodaj, A., Šimić, N., & Sesar, D., Coping specificities in children and adolescent dealing with bullying behaviour. *IOSR. J. Humanit. Soc. Sci.* **21**, 43–53 (2016).
77. Speyer, L. G., Ushakova, A., Blakemore, S.-J., Murray, A. L. & Kievit, R. Testing for Within $\times$ Within and Between $\times$ Within Moderation Using Random Intercept Cross-Lagged Panel Models. *Struct. Equ. Model. Multidiscip. J.* **30**, 315–327 (2023).

Table 1. Means and Variances of Trajectories in the Combined Model

	<i>M</i>	<i>p</i>	<i>Var</i>	<i>p</i>
ABS-I	3.848	<.001	9.06	<.001
ABS-S	0.077	.496	3.503	.001
ABS-Q	0.220	<.001	0.123	<.001
GPA-I	8.109	<.001	1.175	<.001
GPA-S	0.155	<.001	0.045	<.001
GPA-Q	-0.022	<.001	0 <i>fixed</i>	
INT-I	12.509	<.001	32.268	<.001
INT-S	-0.769	<.001	0.884	.046
INT-Q	0.179	<.001	0 <i>fixed</i>	
VIC-I	0.808	<.001	0.156	<.001
VIC-S	-0.125	<.001	0.002	.191
VIC-Q	0.007	<.001	0 <i>fixed</i>	

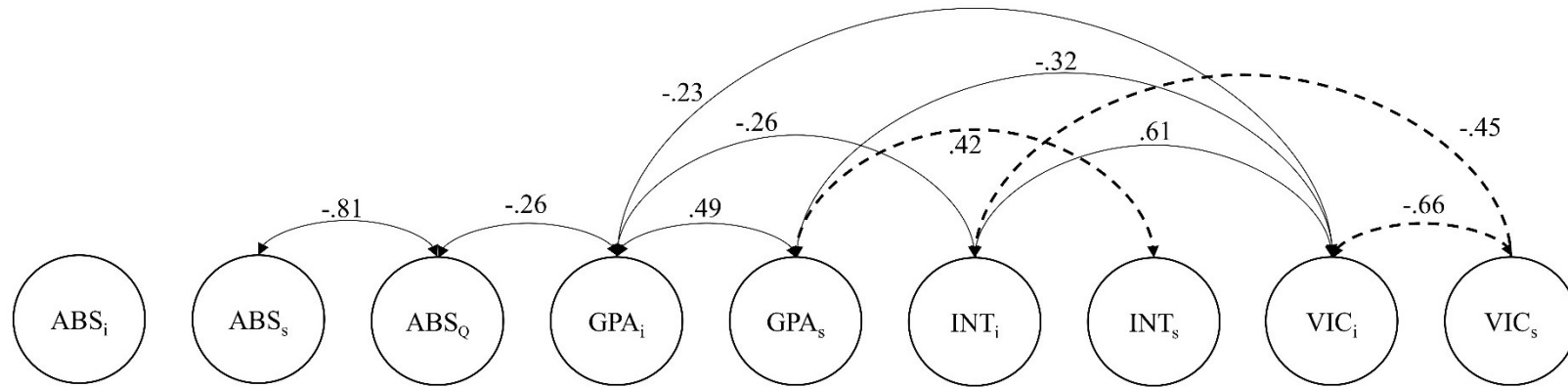
Note. VIC=Bullying victimization; INT=Internalizing symptoms; GPA=Grade point average; ABS=Percent days absent; I=intercept; S=linear slope; Q=quadratic. Variances of quadratic factors are fixed at 0 with exception of absences.

Figure 1.

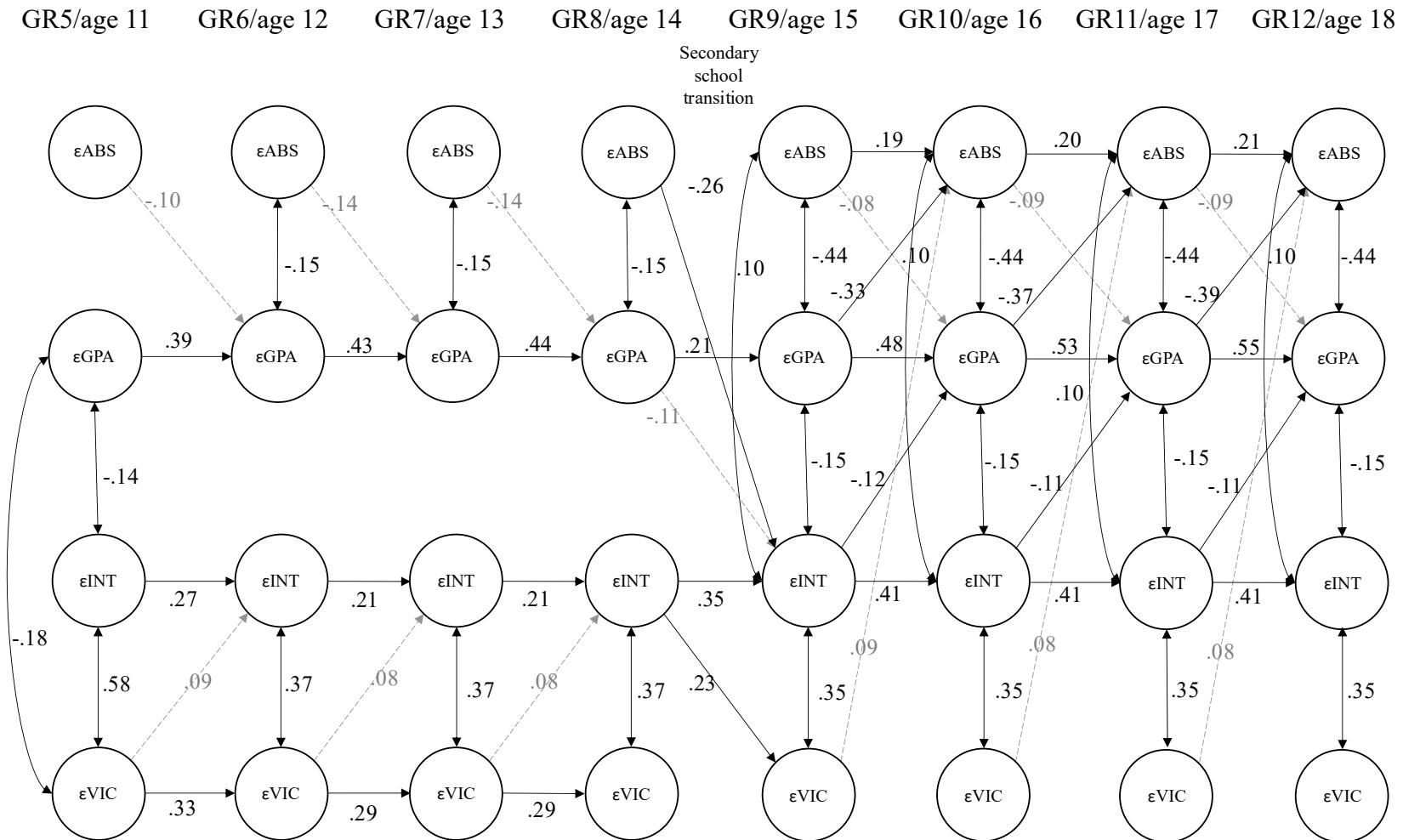
Average Trajectories for Bullying Victimization, Internalizing Symptoms, GPA, and Absences.

Note. GR=Grade. Model estimated average trajectories.

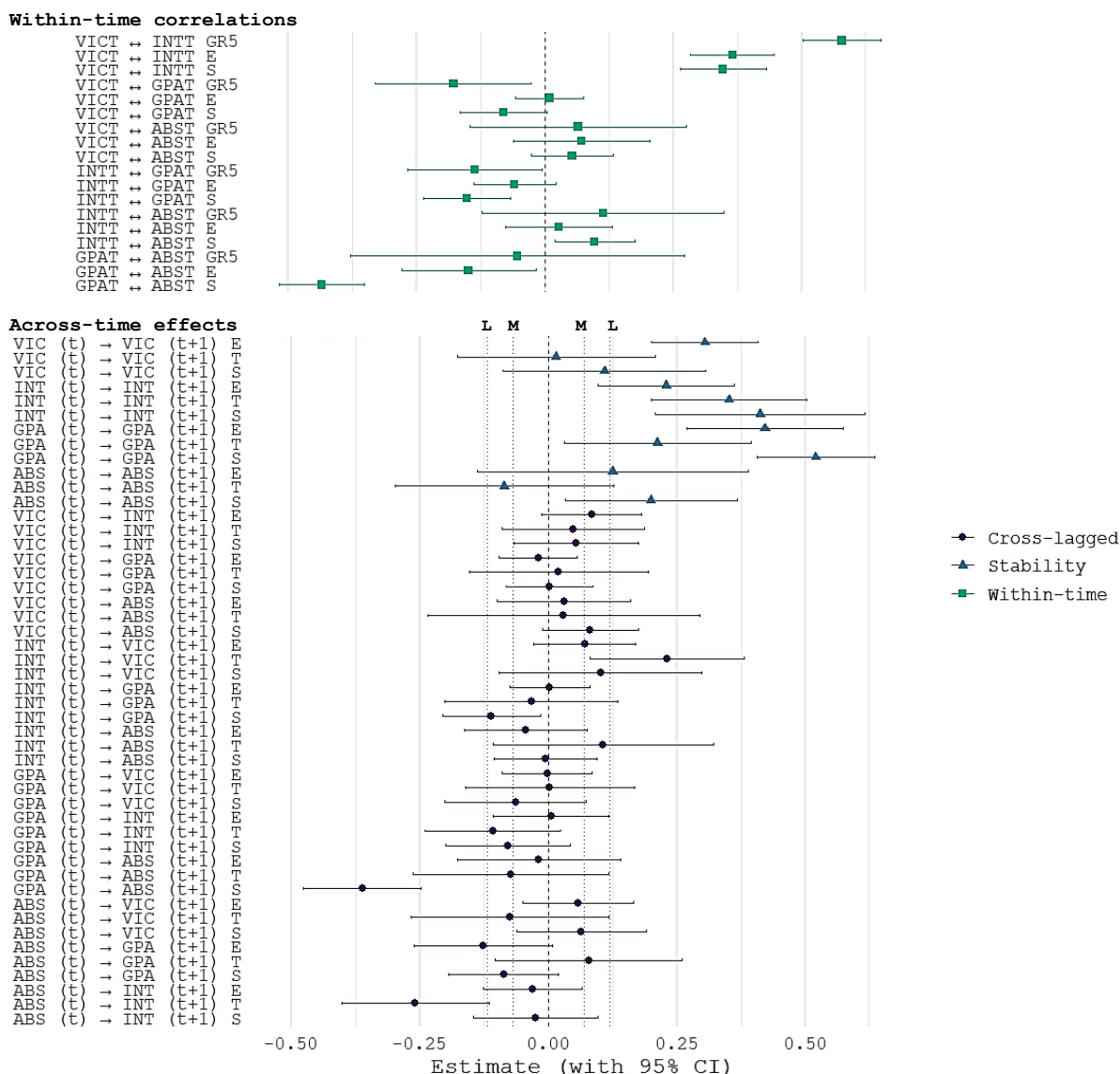
Figure 2. *Between-Person Associations.*



Note. VIC=bullying victimization, INT=internalizing symptoms, GPA=grade point average; ABS=percent days absent. Values represent standardized coefficients which are statistically significant at $p < .05$. Dotted lines indicate values that are statistically significant in either unstandardized or standardized terms (not both). Non-significant parameters remain in the model but are not displayed in the figure.

Figure 3. Within-Person Associations.

Note. GR=Grade, VIC=bullying victimization, INT=internalizing symptoms, GPA=grade point average; ABS=percent days absent. Solid lines represent standardized coefficients which are statistically significant at $p < .05$. Due to model complexity, marginally significant (i.e., $p < .10$) within-person results where parameter estimates were considered medium to large effects for models that parse within-and-between-person effects (i.e., $> .07$ for cross-lagged paths⁶⁸), are represented by dashed lines. All other non-significant parameters remain in the model but are not displayed in the figure for ease of interpretation.

Figure 4. Within-Person Parameter Estimates.

Note. VIC=bullying victimization, INT=internalizing symptoms, GPA=grade point average; ABS=percent days absent; GR5=Grade 5; E=elementary; S=secondary; T=Transition (Grade 8-9). M=dotted line for medium effect size. L=dotted line for large effects. Markers indicate estimated standardized parameter values from the full model, and bars represent the 95% confidence intervals. Unstandardized residual covariances are constrained to be equal within elementary grades (Grades 6 to 8) and within secondary grades (Grades 9 to 12), as are autoregressive paths and cross-lagged paths. Standardized estimates can vary slightly and are presented as the average across constrained parameters. For exact values per time point, see Figure 3.

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Author contributions. HB: Conceptualization, Data curation, Formal Analysis, Investigation, Writing – original draft, Writing – review & editing, Project administration. TV: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing.

Data availability. Data are available from the corresponding author upon reasonable request and are not publicly available due to privacy or ethical restrictions. Please contact the corresponding author for any data requests related to this study.

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Competing Interests. The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The author(s) declared that they were a special issue curator at the time of submission. This had no impact on the peer review process and the final decision.

Additional Information. Correspondence and requests for materials should be addressed to TV.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process: During manuscript preparation, the authors used ChatGPT to improve some of the writing clarity and verify references. The authors take full responsibility for the final manuscript.

Paper 3: Supplementary materials

**Childhood to Adolescence Co-Occurring Depression and Anxiety Trajectories Across
School Transition: Early Adulthood Mental Health and Functional Outcomes**

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Supplementary Table 1. Descriptive Statistics and Correlations Between Study Variables

	<i>M</i>	<i>SD</i>	VIC GR5	VIC GR6	VIC GR7	VIC GR8	VIC GR9	VIC GR10	VIC GR11	VIC GR12	INT GR5	INT GR6	INT GR7	INT GR8	INT GR9	INT GR10	INT GR11	INT GR12	GPA GR5	GPA GR6	GPA GR7	GPA GR8	GPA GR9	GPA GR10	GPA GR11	GPA GR12	ABS GR5	ABS GR6	ABS GR7	ABS GR8	ABS GR9	ABS GR10	ABS GR11	
VIC GR5	0.84	0.76	-																															
VIC GR6	0.66	0.69	.513	-																														
VIC GR7	0.60	0.66	.425	.590	-																													
VIC GR8	0.58	0.64	.306	.408	.561	-																												
VIC GR9	0.41	0.49	.309	.286	.352	.451	-																											
VIC GR10	0.42	0.54	.367	.284	.330	.488	.531	-																										
VIC GR11	0.30	0.44	.279	.252	.333	.428	.525	.587	-																									
VIC GR12	0.30	0.46	.287	.247	.272	.312	.353	.530	.551	-																								
INT GR5	13.50	10.39	.606	.405	.285	.202	.205	.261	.191	.200	-																							
INT GR6	11.11	8.64	.325	.491	.342	.268	.230	.166	.185	.127	.511	-																						
INT GR7	11.17	8.86	.260	.367	.444	.338	.270	.261	.236	.172	.439	.651	-																					
INT GR8	12.30	9.32	.223	.214	.326	.464	.375	.310	.270	.169	.354	.468	.632	-																				
INT GR9	13.15	10.63	.195	.128	.245	.284	.423	.344	.293	.257	.339	.372	.539	.668	-																			
INT GR10	14.99	11.12	.241	.158	.193	.275	.318	.494	.344	.318	.359	.348	.446	.569	.671	-																		
INT GR11	15.37	10.94	.173	.082	.169	.215	.317	.424	.426	.292	.278	.254	.418	.534	.604	.772	-																	
INT GR12	15.56	10.90	.126	.086	.122	.158	.165	.313	.276	.360	.251	.247	.348	.442	.576	.683	.742	-																
GPA GR5	8.10	1.59	-.237	-.144	-.123	-.104	-.053	-.102	-.006	-.022	-.231	-.141	-.074	-.140	-.075	-.054	-.047	-.033	-															
GPA GR6	8.28	1.50	-.226	-.181	-.152	-.098	-.039	-.087	.002	-.005	-.216	-.177	-.080	-.107	-.042	-.038	-.010	.001	.828	-														
GPA GR7	8.14	1.95	-.148	-.171	-.135	-.122	-.031	-.073	.044	-.053	-.186	-.151	-.088	-.098	-.044	-.023	.037	.020	.768	.828	-													
GPA GR8	8.47	2.19	-.185	-.198	-.156	-.129	-.054	-.142	-.007	-.080	-.184	-.137	-.096	-.107	-.040	-.035	.025	.021	.724	.791	.877	-												
GPA GR9	8.54	2.57	-.218	-.205	-.138	-.141	-.072	-.208	-.051	-.144	-.194	-.101	-.070	-.118	-.095	-.085	-.055	-.087	.656	.663	.726	.777	-											
GPA GR10	8.23	2.96	-.232	-.208	-.136	-.164	-.092	-.208	-.024	-.174	-.209	-.124	-.095	-.125	-.112	-.116	-.065	-.082	.654	.644	.716	.755	.887	-										
GPA GR11	7.80	3.06	-.240	-.198	-.122	-.174	-.044	-.169	-.060	-.124	-.217	-.135	-.104	-.153	-.095	-.105	-.078	-.072	.633	.628	.673	.700	.824	.835	-									
GPA GR12	8.12	3.04	-.170	-.132	-.100	-.115	-.007	-.134	-.018	-.110	-.141	-.048	-.016	-.080	-.020	-.032	-.031	-.070	.551	.563	.593	.628	.742	.767	.836	-								
ABS GR5	3.84	3.70	.100	.138	.114	.152	.041	.113	.122	.085	.095	.079	.090	.127	.072	.160	.139	.126	-.142	-.138	-.150	-.129	-.141	-.154	-.143	-.123	-							
ABS GR6	4.17	4.53	.051	.170	.182	.135	.046	.104	.069	.064	.026	.091	.069	.087	.086	.115	.083	.090	-.172	-.223	-.266	-.260	-.222	-.223	-.232	-.175	.597	-						
ABS GR7	5.17	4.99	.080	.172	.139	.111	-.006	.053	.084	.052	.042	.094	.094	.109	.053	.076	.058	.130	-.156	-.167	-.221	-.271	-.271	-.271	-.221	-.196	.506	.661	-					
ABS GR8	5.76	5.88	.049	.215	.133	.169	-.014	.034	.020	.046	.076	.140	.115	.181	.032	.065	.099	.120	-.169	-.172	-.239	-.316	-.287	-.267	-.249	-.210	.462	.626	.700	-				
ABS GR9	8.68	8.90	.149	.173	.144	.171	.087	.170	.076	.172	.119	.094	.113	.212	.178	.173	.191	.229	-.272	-.261	-.336	-.383	-.570	-.575	-.484	-.411	.327	.465	.519	.616	-			
ABS GR10	7.92	8.04	.184	.139	.126	.139	.097	.200	.117	.164	.128	.092	.156	.235	.225	.248	.219	.237	-.306	-.290	-.350	-.402	-.543	-.622	-.515	-.430	.309	.399	.454	.521	.840	-		
ABS GR11	13.72	11.85	.149	.098	.095	.149	.130	.259	.141	.120	.117	.031	.105	.174	.156	.195	.242	.175	-.343	-.310	-.356	-.396	-.521	-.569	-.601	-.513	.268	.338	.339	.422	.628	.696	-	
ABS GR12	16.16	13.64	.127	.129	.076	.156	.057	.205	.115	.159	.119	.000	.067	.159	.134	.202	.201	.215	-.298	-.294	-.336	-.394	-.511	-.550	-.585	-.588	.249	.310	.297	.416	.610	.664	.784	-

Note. VIC=bullying victimization, INT=internalizing symptoms, GPA=grade point average; ABS=percent days absent; GR=Grade. Estimated means, standard deviations, and correlations were estimated under a missing at random assumption using full information maximum likelihood estimation with robust standard errors. Correlations in bold significant at *p*<.05.

Supplemental Table 2. Model Fit and Comparisons of Univariate Trajectories.

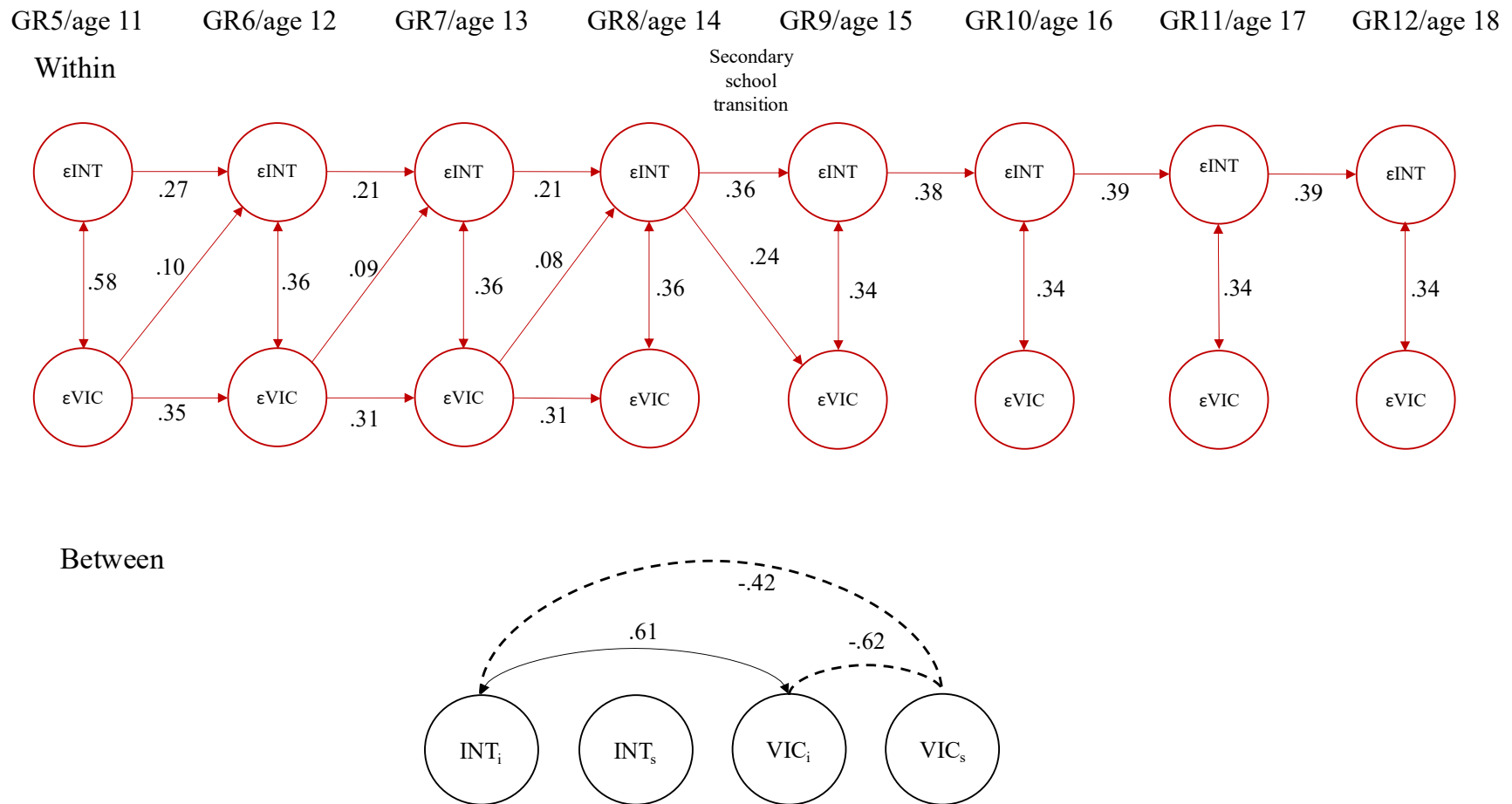
Domain	Model	χ^2	df	c	AIC	CFI	TLI	SRMR	RMSEA (90% CI)	Comparison	Δdf	SB $\Delta\chi^2$	p
VIC	1. Intercept	468.559	39	1.743	6746.388	0.410	0.577	0.171	0.126 (0.115–0.136)				
	2. Slope	131.029	36	1.782	6169.160	0.870	0.899	0.090	0.061 (0.050–0.073)	2 vs 1	3	458.238	< .001
	3. Quadratic	97.189	32	1.777	6116.333	0.911	0.922	0.069	0.054 (0.042–0.066)	3 vs 2	4	33.336	0.011
	4. AR	67.681	29	1.664	6062.203	0.947	0.949	0.063	0.044 (0.030–0.057)	4 vs 3	3	20.912	< .001
	5. AR with Q-VAR@0	74.072	32	1.704	6069.866	0.942	0.949	0.069	0.043 (0.030–0.056)	4 vs 5	3	6.506	0.089
INT	1. Intercept	565.545	39	1.372	28928.821	0.587	0.704	0.140	0.139 (0.129–0.149)				
	2. Slope	217.412	36	1.382	28459.176	0.858	0.889	0.101	0.085 (0.074–0.096)	2 vs 1	3	378.717	< .001
	3. Quadratic	151.119	32	1.393	28377.175	0.907	0.918	0.071	0.073 (0.061–0.085)	3 vs 2	4	69.423	< .001
	4. AR	-	-	-	-	-	-	-	-				
	5. AR with (Q-VAR@0)	113.653	32	1.309	28315.485	0.936	0.944	0.059	0.060 (0.049–0.073)	5 vs 2	4	77.184	< .001
GPA	1. Intercept	1193.181	39	1.297	16673.254	0.619	0.726	0.351	0.205 (0.196–0.216)				
	2. Slope	557.909	36	1.304	15858.705	0.828	0.866	0.157	0.144 (0.133–0.154)	2 vs 1	3	672.934	< .001
	3. Quadratic	345.020	32	1.319	15594.369	0.897	0.910	0.154	0.118 (0.107–1.113)	3 vs 2	3	230.349	< .001
	4. AR	268.363	29	1.170	15459.289	0.921	0.924	0.144	0.109 (0.097–0.121)	4 vs 3	4	51.143	< .001
	5. AR with Q-VAR@0	265.850	32	1.247	15470.877	0.923	0.932	0.151	0.102 (0.091–0.114)	4 vs 5	3	8.819	0.032
ABS	1. Intercept	767.948	39	2.987	28896.187	0.158	0.395	0.379	0.163 (0.153–0.173)				
	2. Slope	332.395	36	2.998	27604.975	0.658	0.734	0.147	0.108 (0.098–0.119)	2 vs 1	3	454.770	< .001
	3. Quadratic	138.860	32	2.878	27016.074	0.877	0.892	0.081	0.069 (0.057–0.081)	3 vs 2	4	150.805	< .001
	4. AR	120.992	29	2.830	26964.865	0.894	0.897	0.080	0.067 (0.055–0.080)	4 vs 3	3	17.128	< .001
	5. AR with Q-VAR@0	144.013	32	2.873	27030.121	0.871	0.887	0.130	0.071 (0.059–0.083)	4 vs 5	3	21.709	< .001

Note. VIC=Bullying victimization; INT=Internalizing symptoms; GPA=Grade point average; ABS=Percent days absent; AR=autoregressive paths; Q-VAR=Quadratic variance. c scaling correction factor for computing Satorra-Bentler (SB) scaled chi-square difference test under MLR; CFI Comparative Fit Index; RMSEA Root Mean Square Error of Approximation; SRMR Standardized Root Mean Square Residual; AIC Akaike Information Criterion; cd weighting constant for comparing difference in chi-square values using MLR. Model 5 (AR with Q-VAR@0) indicates that the variance of the quadratic factors (and thus covariance with slope and intercept factors) were set to zero. Bolded models are the final univariate models. For ease of interpretation, univariate curves were conducted without missing data indicators. Functional forms and conclusions were identical when including auxiliary variables.

^a The addition of autoregressive paths to the internalizing symptoms quadratic model yielded negative non-significant residual variance in slope and quadratic effects, and model fit is not reported. Compared to INT model 3 quadratic, INT model 5 AR with quadratic variance set to zero had better relative fit ($\Delta AIC=61.69$; $\Delta CFI=.029$).

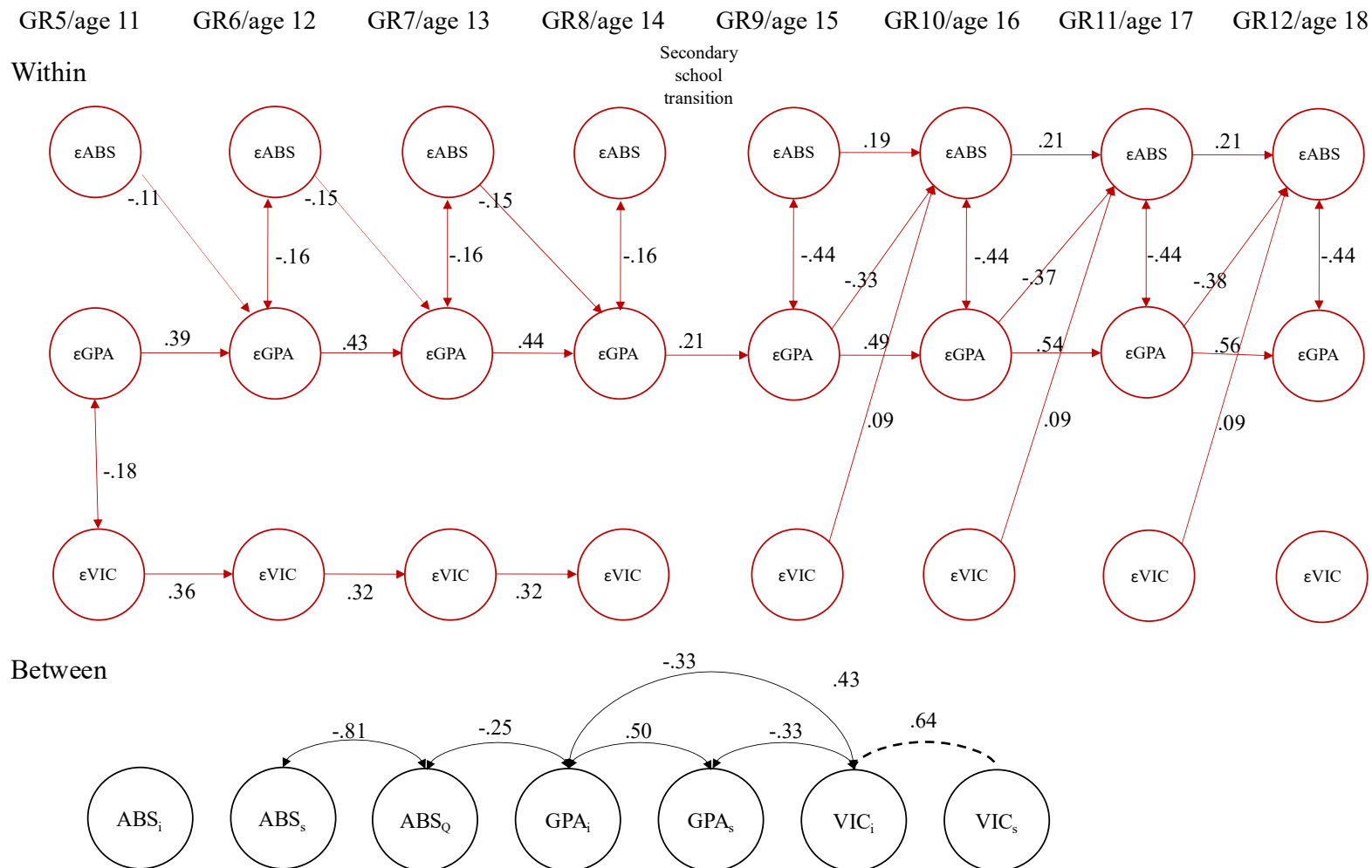
^b Although the GPA model 5 AR with quadratic variance set to zero was statistically different from model 4 AR with free variance all other fit indices were comparable and in model 4 the variance of the quadratic and covariances with intercept and slope factors were non-significant, $p>.05$. Further, retaining GPA Model 4 resulted in negative residual variance in the multivariate model.

Supplementary Figure 1. *ALT-SR Model Bullying Victimization and Internalizing Symptoms*



Note. GR=Grade, VIC=bullying victimization, INT=internalizing symptoms. Values represent standardized coefficients which are statistically significant at $p < .05$. Dotted lines indicate values that are statistically significant in standardized terms (but not unstandardized). All other non-significant parameters at $p \geq .05$ remain in the model but are not displayed in the figure. $\chi^2(155)=302.794$, CFI=.954, TLI=.945, RMSEA=.037 90%CI [.031, .043], $p=1.000$.

Supplementary Figure 2. ALT-SR Model Bullying Victimization and Academic Functioning



Note. GR=Grade, VIC=bullying victimization, GPA=grade point average, ABS=percent days absent. Values represent standardized coefficients which are statistically significant at $p < .05$. Dotted lines indicate values that are statistically significant in standardized terms (but not unstandardized). All other non-significant parameters at $p \geq .05$ remain in the model but are not displayed in the figure. $\chi^2(302)=862.665$, CFI=.920, TLI=.901, RMSEA=.051 90%CI [.047, .056], $p=.270$.

Chapter 5 – General Discussion

The transition from elementary to secondary school is a common educational milestone (OECD, 2023). Students often move from a smaller, more structured environment to a larger, more complex setting, marked by changes in peer groups and increases in autonomy and academic expectations (Benner, 2011; Eccles et al., 1991; Evans et al., 2018; Spernes, 2022). This event overlaps with adolescence, a period of instability and rapid changes in cognition, social-emotional functioning, and biological maturation (Best & Ban, 2021). The intersection of the secondary school transition, a significant life event, and adolescence, a developmental process, is called a *transition-linked turning point*, which can impact immediate and long-term psychosocial functioning (Graber & Brooks-Gunn, 1996). Such turning points can modify developmental paths by interacting with risks and protective factors, producing continuity for some students, discontinuity for others, and may modify links between domains (Cicchetti & Rogosch, 2002).

My goal was to understand developmental patterns and associations among academic functioning, mental health, and peer relations relative to the secondary school transition. And, in doing so, identify vulnerable and resilient subgroups of students and illustrate how developmental processes unfold across adolescence relative to this transition-linked turning point. Specifically, in Study 1, I documented co-occurring academic achievement and school absences trajectories from Grade 5 to 12 using a group-based modelling approach, examining differential risk associated with anxiety and depression symptoms and bullying victimization. In Study 2, I used similar analytic techniques to document co-occurring anxiety and depression symptoms trajectories across this same period. Elaborating on Study 1, the set of correlates was expanded to include protective factors such as social support. Outcomes including early adulthood functioning and mental health problems were also included. In Study 3, I examined the between- and within-person associations among grades, absences, internalizing symptoms, and bullying victimization using an advanced cross-lagged panel modelling technique to identify temporal relations before, during, and after the school transition.

Summary of Research Findings

Study 1

Study 1 examined long-term joint trajectories of academic achievement (grade point average [GPA]) and school absences from Grades 5 to 12 using piecewise multi-trajectory group-

based modelling. Six distinct subgroups emerged, showing heterogeneity in developmental pathways. Some groups showed continuity in absences and academic achievement. Their low absences in elementary school gradually increased, especially in secondary school, and their grades remained relatively stable, with average achievement scores differing between groups (i.e., As (32.2%), Bs (29.1%), and B/Cs (17.6%)). Three higher-risk groups showed rising or persistently high absences and declining academic performance. One group had high and increasing absences in both elementary and secondary, with a moderate GPA that declined in secondary school (8.2%). Another had low absences in elementary school that rose sharply at the transition, with rates continuing to rise in secondary school. This group also had low–mid-range declining GPA from elementary into secondary (9.6%). The final group had chronic absences that worsened during the transition and a mid-range declining GPA (3.3%). Group differences were more associated with gender and socioeconomic factors than with psychosocial factors. High household income and parental education were associated with the two highest-performing groups. Girls were more likely to be top achievers. Effect sizes were small for group differences in bullying victimization and mental health correlates. There were few significant comparisons, but a general pattern emerged with students with highly variable, chronically increasing absences and decreasing GPAs having the highest scores in elementary bullying victimization, depression symptoms across time, and secondary school anxiety. The findings show that attendance and achievement are closely linked. For most, functioning in these domains moved together, but for some, declines in GPA began in elementary school before a marked shift in absences at the transition. These results point to the need for early, targeted monitoring of both indicators.

Link to Study 2 and 3. The small effect sizes found for psychosocial factors may have been due to variation in victimization, depression, and anxiety. Such annual variations could have been obscured when using average scores across elementary and secondary schools, highlighting the need for a more refined year-by-year analysis. Alternatively, other factors, such as certain types of support, may be associated with changes in adolescent functioning. To examine these patterns, it is essential to first understand how internalizing symptoms change across elementary and secondary school.

Study 2

Building on Study 1, Study 2 used similar modelling techniques to investigate heterogeneity in the co-development of depression and anxiety symptoms across Grades 5 to 12,

with a focus on how the transition from elementary to secondary school corresponded with changes in symptom trajectories. Over half of students followed continuously stable low (Low symptoms, 39.4%) or moderate symptoms (Low depression/Moderate anxiety, 26.0%) pathways across schooling phases. For some, the transition marked a disruption in increasing elementary school anxious symptoms, resulting in symptoms stabilizing in secondary school (Low depression/Moderate-Increasing-stable anxiety, 13.1%). Others began rising in symptoms in early adolescence, which shifted more sharply during the transition year, then continued to increase through secondary school (Low depression/Moderate anxiety/Increasing, 10.4%; Moderate-Increasing/High, 4.6%). A small subset experienced high anxiety and depression symptoms in elementary school that began declining just before the transition to secondary school (High-Decreasing, 6.6%).

The six depression-anxiety symptom trajectories were linked to varying individual and contextual factors. Higher-risk trajectories included more girls, students with a history of child maltreatment, and those with lower socioeconomic background. Higher bullying victimization in both elementary and secondary school corresponded to high- or increasing-symptom trajectories. Perceived school climate and peer relationship quality also differed by trajectory groups, with low- and moderate-symptom groups reporting more supportive climates and better peer relations. In early adulthood, results showed a graded pattern in which higher, persistently elevated internalizing trajectories predicted greater impairment. Students in increasing or chronically high internalizing trajectories were more likely to meet diagnostic criteria for mental disorders and to face job issues or not attend post-secondary education. Students whose high symptoms declined in secondary school had early adulthood risks similar to those with consistently low or moderate symptoms, suggesting discontinuity and resilience.

Link to Study 3. Several findings from Study 2 guided the analysis for Study 3. Generally, within groups, symptoms of depression and anxiety tended to move in tandem, albeit at different levels, indicating synchrony in their developmental course and reinforcing that internalizing processes are tightly coupled across adolescence. Because of this, in Study 3, I used an internalizing composite. In addition, the differential associations between symptom classes and bullying victimization indicated that changing peer experiences may be tied with internalizing symptoms, indicating the need for nuanced analyses of temporal associations. Study 3 shifted from modelling long-term patterns in one domain to examining within-person temporal

dynamics between internalizing symptoms, GPA, absences, and bullying victimization across Grades 5 to 12.

Study 3

Study 3 built on the academic and internalizing trajectories (Study 1 and 2) to investigate temporal relations among bullying victimization, internalizing symptoms, GPA, and school absences across Grades 5 to 12. It used an autoregressive latent trajectory model with structured residuals. This approach separates between-person differences from within-person deviations. Between-person associations replicated findings in the literature. Students who experienced higher victimization also tended to report higher internalizing symptoms and lower GPAs than their less victimized peers. Students with higher initial bullying victimization levels showed lower slopes for GPA. Moreover, students with higher GPAs demonstrated a slower rate of change in absences. Accounting for between-person effects, that is each student's underlying trajectory in each domain, the within-person effects represented each student's deviation from their own expected trajectory. Throughout elementary and secondary school, higher-than-expected bullying victimization was concurrently associated with internalizing symptoms. Across the transition to secondary school, higher-than-expected internalizing symptoms were related to subsequently higher-than-expected bullying victimization. In secondary school, higher-than-expected internalizing symptoms were concurrently associated with lower-than-expected GPA and higher-than-expected absences. The effect of higher-than-expected secondary school internalizing symptoms spread across domains, leading to lower-than-expected GPA and then higher-than-expected absences. The model also highlighted that, for students with high baseline internalizing symptoms, higher-than-expected absences in Grade 8 was associated with lower-than-expected internalizing symptoms in Grade 9. The results demonstrate reciprocal influences among peer experiences, internalizing symptoms, and academic functioning. Secondary school represents a particularly sensitive period. These patterns highlight the need for early prevention and intervention for bullying and support for emotional well-being before these relations become entrenched and lead to detrimental effects in grades and attendance.

Integration of Findings

Collectively, the three studies in my dissertation document how subgroups of students develop academically and emotionally across adolescence, adapting to the transition to secondary school, as well as how these systems are interconnected to one another and to a

common adversity, bullying victimization. Across domains, I found that development was characterized by substantial heterogeneity. Academic functioning and internalizing symptoms each displayed distinct subgroups of co-occurring functioning. Most students followed pathways of stable functioning or gradual shifts within a single domain over time, reflecting homotypic continuity (Cicchetti & Rogosch, 2002). For example, subgroups of students following similarly low trajectories of depression symptoms who had differing patterns of anxiety demonstrated differential risk for anxiety disorders and subclinical anxiety symptoms.

Other students showed heterotypic continuity in which early patterns in one domain predicted later manifestations that differed in form (Cicchetti & Rogosch, 2002). For example, one academic functioning class (i.e., increasing absences/declining Cs) showed stable elementary absences with declines in GPA in late elementary school that precipitated marked increases in absences at, and after, the secondary school transition, as well as a decline in GPA, illustrating continuity of underlying academic risk, expressed in different academic domains. Another class showed stable grades and increasing absences in elementary school (i.e., increasing absences/elementary Bs-High school decline) with secondary school absences that increased at a high rate paired with declining grades, again reflecting heterotypic continuity in behavioural patterns.

Other subgroups displayed discontinuity in their developmental patterns. For example, the “Chronic absences/elementary Cs/transition decline-rebound” subgroup immediately worsened at the secondary transition, more than doubling their absences and dropping nearly a full letter grade between Grade 8 and Grade 9, but then partially recovered by Grade 12. In Study 2, one subgroup started with low depression but elevated increasing elementary anxiety symptoms, with anxiety decreasing after the secondary transition and remaining stable, showing adaptive discontinuity. Another subgroup who was exposed to socioeconomic risk started with high depression and anxiety symptoms, but experienced consistent declines, ultimately reducing their risk of adult disorders to the level of the lowest-risk group, demonstrating resilience. These discontinuities in development highlight patterns of equifinality, students starting at different symptoms levels converged with similar risk in adulthood, as well as multifinality, students with similar functioning in elementary school diverged into different outcomes, with some stabilizing, some recovering, and others escalating (Cicchetti & Rogosch, 2002, 1996).

The heterogeneous trajectory group findings from Studies 1 and 2 demonstrate that, for some students, the transition to secondary school can be a transition-linked turning point, leading to adaptive and maladaptive functioning. For example, Study 3 demonstrated that for students with pre-existing elevated internalizing symptoms, higher-than-expected absences led to lower-than-expected internalizing symptoms across the transition, demonstrating short-term adaptive avoidance, coping that can exacerbate symptoms, having maladaptive long term consequences (Aldao et al., 2010). Differential responses may also depend upon sources of risk and resilience. Indeed, several of the correlates assessed in Studies 1 and 2 showed different levels across the trajectory groups. Across all three studies, sex emerged as a significant predictor of functioning, but with divergent patterns of vulnerability; being a boy was associated with greater academic risk, whereas being a girl was associated with elevated risk for internalizing problems. Results also indicate that socioeconomic disadvantage was associated with academic and mental health risk, as was bullying victimization (Study 3). Although effect sizes were quite small for differences between academic functioning trajectories in psychosocial correlates, the pattern was graded. Effects of correlates were more pronounced for trajectories of internalizing symptoms. Specifically, groups with lower or improving symptoms reported better school climate and peer relationship quality. Students with low symptoms or those who improved after the transition reported more positive perceptions of their school transition than the elevated and increasing groups.

Bullying victimization was a key factor associated with subgroup trajectories. Subgroups with rising internalizing symptoms from elementary to secondary school also reported higher bullying victimization in secondary school compared to other groups. By contrast, subgroups whose symptoms improved experienced the largest declines in bullying victimization. Study 3 showed that students with higher bullying victimization had lower grades and higher internalizing symptoms. In addition, over time, bullying victimization was strongly associated with internalizing symptoms concurrently, which in turn influenced academic functioning in secondary school.

Combining person-centred trajectory analyses with variable-centered panel modelling approaches provided a more nuanced view of development than either method alone. Trajectory analyses reveal how different developmental patterns unfold across adolescence and how some students are unaffected, some improve, and others get worse at the secondary school transition.

The within-person shows how the burden of bullying victimization unfolds across domains, becoming closely tied with mental health difficulties, leading to academic problems in secondary school. Findings highlight that, for some, the transition marks a period of adaptation in multiple domains, with associations between domains changing over time.

Contributions to Knowledge

The three studies in my dissertation advance knowledge of adolescent development in the areas of academic functioning and mental health, especially regarding associations with bullying victimization during the transition to secondary school. Study 1 extends prior research on univariate group-based trajectories of absences (e.g., Benner & Wang, 2014; Dräger et al., 2024; Simon et al., 2020; Tunkkari et al., 2025) and grades (e.g., Alhadabi & Li, 2020; R. Fu et al., 2016; Y. C. Fu et al., 2022; Lu, 2016) by jointly modelling school absences and academic achievement from Grades 5 to 12. Findings show that these two academic indicators are dynamically interconnected, and that risk in one domain may emerge before the other. The study also identifies the school transition as a critical developmental juncture, especially for students with lower GPAs, reduced attendance, and socioeconomic disadvantage. The study also attends to notable gaps in Canadian research on school absenteeism (Whitley et al., 2025). Study 2 expands on current research on co-occurring adolescent internalizing problems (Lallukka et al., 2019; Liang et al., 2023; Olino et al., 2010, 2014) and those examining school transition (e.g., anxiety in middle school (Nelemans et al., 2018); depression in secondary (Olivier et al., 2023)). It provides a comprehensive account of distinct co-occurring trajectories of depression and anxiety across the secondary school transition, and by documenting individual and contextual correlates of risk, resilience, and early adulthood outcomes. The results add to the literature by demonstrating that different patterns of co-occurrence are associated with unique risk profiles and adult outcomes. Study 3 addresses outstanding questions about the longitudinal associations among absences, grades, internalizing symptoms, and bullying victimization (Laith & Vaillancourt, 2022). The results highlight differences in associations before, during, and after the transition to secondary school, with bullying victimization being closely linked with internalizing symptoms, and internalizing symptoms leading to lower grades, resulting in higher absenteeism.

My dissertation also provides theoretical and methodological contributions within a developmental psychopathology framework. By documenting both homotypic and heterotypic continuity, as well as adaptive and maladaptive discontinuity, the studies show that school

transitions function as a transition-linked turning point. It also highlights how multiple areas of functioning are interrelated and form developmental cascades, notably in secondary school. The comprehensive methodology, including population-based, multi-informant, multi-method, annual data spanning adolescence to early adulthood, addresses a significant gap in the school transitions literature, which has often focused on shorter time frames and narrower outcomes (Jindal-Snape et al., 2020). Since most data in this field comes from American, European, and Asian contexts, this research contributes to Canadian literature base and can inform Canadian policy.

Implications

The study findings have several implications for practice and policy in educational settings. First, the identification of distinct academic trajectories underscores the importance of moving beyond cross-sectional indicators of achievement and absences, such as meeting benchmarks or reaching chronic absenteeism, to instead take a developmental view by monitoring changes over time in multiple areas of academic functioning. Identifying any downward trends in grades or increasing absences, beyond the typical trend for all students, would allow school personnel to intervene early on as soon as problems arise, before students reach critical lows in GPA or chronic attendance problems. Although the results indicate that adults should similarly attend to students with elevated or increasing internalizing symptoms, several difficulties arise in such a task. Symptoms are often hidden, with youth suffering in silence and not seeking support (Doan et al., 2020). For teachers, identifying problematic levels of internalizing symptoms is hindered by a lack of mental health training (Whitley et al., 2013) and by the perception that internalizing problems are less serious than externalizing symptoms (Splett et al., 2019). Difficulties in closely monitoring students over time is further compounded by teacher shortages and retention problems faced by many Canadian provinces in recent years (Council of Ontario Directors of Education, 2025; McDonald & Miah, 2024), making it less likely that students will interact with the same teacher year by year, even in non-transitional times.

The results indicate that school transitions mark a time when students need support to prevent maladaptive outcomes; they may also be an opportune time for intervention programs to redirect pathways toward adaptive academic and emotional functioning. Both systemic and targeted school transition programs can reduce post-transition internalizing problems (Makover

et al., 2019). Positive transition experiences can be further supported by several contextual factors, including continuity of perceived support from parents and peers, the establishment of caring student-teacher relationships, a sense of school belongingness and safety (Bharara, 2020; Van Rens et al., 2018). Programs aimed at reducing school bullying can support positive views of school safety and belonging (Goldweber et al., 2013). Results further highlight that students at socioeconomic disadvantage may benefit from additional targeted supports, especially at transitions. Anti-bullying prevention and intervention programs should be a focus throughout students' educational careers, and particularly during elementary school, before the association with poor internalizing symptoms becomes entrenched. Secondary schools should continue elementary schools' anti-bullying prevention efforts in developmentally appropriate ways, as the expression of aggression toward peers changes over time. Providing additional targeted supports to secondary school students who are victimized by peers may lessen the long-term impact on academics.

Overall Limitations

Although the three studies have several strengths, limitations should be considered when interpreting these findings. Although participants were randomly sampled and represented the population from which they were drawn, data were drawn from a single public-school board, which may limit generalizability to other municipalities, particularly those with different school structures or transition practices. For example, some Canadian schoolboards have K-12 schools where students remain together, particularly in rural areas. Examining the heterogeneous pathways across numerous functioning domains in these two contexts would further test whether the transition to secondary school marks a developmentally specific turning point or a normative developmental change. I did not include school-level variables that may function as important contextual moderators of individual functioning. For example, different schools may offer different transition programs between elementary feeder schools and secondary schools. Other school factors, such as school size or number of same-group peers may differentially impact certain groups (e.g., sexual/gender or racial/ethnic minority students). The attrition pattern found in the current study was not random. Those who continued to participate after Year 1 were from families with higher socioeconomic backgrounds and had higher grades and attendance than those who did not participate in the longitudinal study. This pattern of systematic attrition may limit generalizability, particularly for youth with higher levels of early adversity who were more

likely to be lost to follow-up. As a result, the trajectories identified in this study may underestimate the severity or prevalence of the highest-risk academic pathways, and the full range of maladaptive patterns may not be fully represented. Although the sample size in the current study was generally large, especially for a study of this length, it precluded me from examining heterogeneous trajectories by gender and from examining how the associations between variables over time differed by gender. Methodologically, newer CLPMs, such as the ALT-SR used in Study 3, improve upon traditional longitudinal approaches but cannot establish causality. Finally, in Study 2, early adulthood functioning was assessed as a single follow-up, it is possible that functioning immediate after secondary school does not represent how individuals adapted to early adulthood.

Future Directions

Future research should extend this work in several directions. Integration of group-based trajectories of academics (Study 1), mental health (Study 2), and bullying victimization (Vaillancourt et al., 2023) by simultaneously modelling the co-development of these domains would clarify the degree of subgroup overlap. Identifying distinct joint developmental profiles complements the temporal analysis in Study 3, and more precisely captures the potential long-term patterns between bullying victimization and academic and mental health outcomes for certain groups of students. Short-term longitudinal studies have explored co-occurring internalizing, externalizing, and peer problems at the school transition (Donaldson et al., 2025), but longer studies are needed to fully understand these associations (Bagnall et al., 2023; Jindal-Snape et al., 2020). In further examining the association between being bullied and school absenteeism, studies may include forms of absenteeism. It is possible that students who are more severely bullied become chronically absent (Alanko et al., 2023) and may show differential trajectories over time. Larger studies would allow for the investigation of more complex research questions. For example, gender could be examined as a moderator rather than a covariate. Girls and boys may react differently to bullying; evidence suggests that girls are more likely to seek support and exhibit internalizing responses, whereas boys tend to display externalizing behaviours (Sesar et al., 2016) and show an elevated risk of school absenteeism (Fry et al., 2018). Additional complex models may involve interactions between individual trajectories and their time-dependent experiences. It is possible that students who follow high chronic victimization pathways have different time-specific responses to being bullied more than usual

compared to those who follow low or variable victimization pathways. Further, person-environment interactions may also be informative in identifying how students adapt over time. For example, the level of bullying at secondary school might interact with the individuals' experiences and, in turn, influence the internalizing problems more strongly in lower bullying environments (e.g., healthy context paradox; Garandeau & Salmivalli, 2019; Salmivalli, 2018). Other transition-specific contextual variables, such as differences in feeder patterns (e.g., one elementary to one secondary vs. multiple elementary to one secondary), have been shown to influence academic outcomes, with the transitions to multi-feeder secondary schools leaving students at higher risk of not achieving high grades (Felmlee et al., 2018). The transition into secondary school is only one of many possible transition-linked turning points. Additional work should examine developmental trajectories spanning multiple transition-linked turning points to determine whether responses to one are predictive of future behaviour. For example, students with maladaptive responses to the secondary school transition may be primed to respond similarly to disruptions in early adulthood induced by the COVID-19 pandemic.

Conclusion

My dissertation underscores the complexity of adolescent development in several domains. Academic and emotional functioning is marked by heterogeneity, and, for some students, these patterns are influenced by the transition to secondary school, providing evidence that this salient event during adolescence functions as a transition-linked turning point. Although many students demonstrated continuity in positive functioning over time in academic and mental health areas, others had consistently compromised functioning. Still, others demonstrated discontinuity. Change in academic functioning was most evident among those with existing vulnerability in absences or grades. They showed large declines at the transition, with a minority demonstrating partial recovery. In the internalizing symptoms domain, some showed worsening symptoms, but others demonstrated positive responses at the transition. Some students with high symptom levels improved, while others with escalating symptoms plateaued. Across studies, bullying victimization emerged as a risk factor, with notable concurrent associations with internalizing problems across all years. In secondary school, high internalizing symptoms initiated a cross-domain cascade to lower GPA and higher absences. Together, the findings highlight the need for integrated programs that monitor and support students academically, emotionally, and interpersonally throughout schooling periods, before marked declines occur. Targeted transition

programs may also support vulnerable students across the school transition and can be used to leverage the transition to support continuity in maladaptive functioning.

References for General Introduction and Discussion

- Alanko, K., Melander, K., Ranta, K., Engblom, J., & Kosola, S. (2023). Time trends in adolescent school absences and associated bullying involvement between 2000 and 2019: A nationwide study. *Child Psychiatry & Human Development*.
<https://doi.org/10.1007/s10578-023-01601-1>
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, 30(2), 217–237.
<https://doi.org/10.1016/j.cpr.2009.11.004>
- Alhadabi, A., & Li, J. (2020). Trajectories of academic achievement in high schools: Growth mixture model. *Journal of Educational Issues*, 6(1), 140.
<https://doi.org/10.5296/jei.v6i1.16775>
- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders: DSM-5-TR* (5th ed.). American Psychiatric Association.
- Anfara, V. A., & Schmid, J. B. (2007). School transitions: Jeopardy or wheel of fortune? *Middle School Journal*, 39(1), 60–67. <https://doi.org/10.1080/00940771.2007.11461616>
- Angold, A., & Costello, E. J. (1993). Depressive comorbidity in children and adolescents: Empirical, theoretical, and methodological issues. *American Journal of Psychiatry*, 150(12), 1779–1791. <https://doi.org/10.1176/ajp.150.12.1779>
- Arseneault, L. (2017). The long-term impact of bullying victimization on mental health. *World Psychiatry*, 16(1), 27–28. <https://doi.org/10.1002/wps.20399>
- Attendance Works. (2025). *Chronic absence*. Attendance Works.
<https://www.attendanceworks.org/chronic-absence/the-problem/>
- Bagnall, C. L., & Jindal-Snape, D. (2023). Child self-report measures of primary-secondary transition experiences and emotional wellbeing: An international systematic literature review. *International Journal of Educational and Life Transitions*, 2(1), 1–31.
<https://doi.org/10.5334/IJELT.35>
- Beatson, R., Quach, J., Canterford, L., Farrow, P., Bagnall, C., Hockey, P., Phillips, E., Patton, G. C., Olsson, C. A., Ride, J., McKay Brown, L., Roy, A., & Mundy, L. K. (2023). Improving primary to secondary school transitions: A systematic review of school-based

- interventions to prepare and support student social-emotional and educational outcomes. *Educational Research Review*, 40, 100553. <https://doi.org/10.1016/j.edurev.2023.100553>
- Benner, A. D. (2011). The transition to high school: Current knowledge, future directions. *Educational Psychology Review*, 23(3), 299–328. <https://doi.org/10.1007/s10648-011-9152-0>
- Benner, A. D., Boyle, A. E., & Bakhtiari, F. (2017). Understanding students' transition to high school: Demographic variation and the role of supportive relationships. *Journal of Youth and Adolescence*, 46(10), 2129–2142. <https://doi.org/10.1007/s10964-017-0716-2>
- Benner, A. D., & Graham, S. (2009). The transition to high school as a developmental process among multiethnic urban youth. *Child Development*, 80(2), 356–376. <https://doi.org/10.1111/j.1467-8624.2009.01265.x>
- Benner, A. D., & Wang, Y. (2014). Shifting attendance trajectories from middle to high school: Influences of school transitions and changing school contexts. *Developmental Psychology*, 50(4), 1288–1301. <https://doi.org/10.1037/a0035366>
- Best, O., & Ban, S. (2021). Adolescence: Physical changes and neurological development. *British Journal of Nursing*, 30(5), 272–275. <https://doi.org/10.12968/bjon.2021.30.5.272>
- Bharara, G. (2020). Factors facilitating a positive transition to secondary school: A systematic literature review. *International Journal of School & Educational Psychology*, 8(Suppl. 1), 104–123. <https://doi.org/10.1080/21683603.2019.1572552>
- Biswas, T., Scott, J. G., Munir, K., Thomas, H. J., Huda, M. M., Hasan, M. M., De Vries, T. D., Baxter, J., & Mamun, A. A. (2020). Global variation in the prevalence of bullying victimisation amongst adolescents: Role of peer and parental supports. *EClinicalMedicine*, 20, 100276. <https://doi.org/10.1016/j.eclinm.2020.100276>
- Bowes, L., Maughan, B., Ball, H., Shakoor, S., Ouellet-Morin, I., Caspi, A., Moffitt, T. E., & Arseneault, L. (2013). Chronic bullying victimization across school transitions: The role of genetic and environmental influences. *Development and Psychopathology*, 25(2), 333–346. <https://doi.org/10.1017/S0954579412001095>
- Brimblecombe, N., Evans-Lacko, S., Knapp, M., King, D., Takizawa, R., Maughan, B., & Arseneault, L. (2018). Long term economic impact associated with childhood bullying victimisation. *Social Science & Medicine*, 208, 134–141. <https://doi.org/10.1016/j.socscimed.2018.05.014>

- Brown, B. B., & Larson, J. (2009). Peer relationships in adolescence. In *Handbook of adolescent psychology*. John Wiley & Sons, Ltd.
<https://doi.org/10.1002/9780470479193.adlpsy002004>
- Cicchetti, D., & Rogosch, F. (2002). A developmental psychology perspective on adolescence. *Journal of Consulting and Clinical Psychology*, 70, 6–20. <https://doi.org/10.1037/0022-006X.70.1.6>
- Cicchetti, D., & Rogosch, F. A. (1996). Equifinality and multifinality in developmental psychopathology. *Development and Psychopathology*, 8(4), 597–600.
<https://doi.org/10.1017/S0954579400007318>
- Costello, E. J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and development of psychiatric disorders in childhood and adolescence. *Archives of General Psychiatry*, 60(8), 837–844. <https://doi.org/10.1001/archpsyc.60.8.837>
- Council of Ontario Directors of Education. (2025). *Ontario education staffing crisis: Addressing the storage of certified teacher in Ontario classrooms*.
https://ontariodirectors.ca/application/files/4417/4647/3537/CODE_ON_Education_Staffing_Crisis_April_2025.pdf
- Curran, P. J., Howard, A. L., Bainter, S. A., Lane, S. T., & McGinley, J. S. (2014). The separation of between-person and within-person components of individual change over time: A latent curve model with structured residuals. *Journal of Consulting and Clinical Psychology*, 82(5), 879–894. <https://doi.org/10.1037/a0035297>
- De La Torre-Luque, A., Fiol-Veny, A., Balle, M., Nelemans, S. A., & Bornas, X. (2020). Anxiety in early adolescence: Heterogeneous developmental trajectories, associations with risk factors and depressive symptoms. *Child Psychiatry & Human Development*, 51(4), 527–541. <https://doi.org/10.1007/s10578-019-00936-y>
- Doan, N., Patte, K. A., Ferro, M. A., & Leatherdale, S. T. (2020). Reluctancy towards help-seeking for mental health concerns at secondary school among students in the COMPASS study. *International Journal of Environmental Research and Public Health*, 17(19), 7128. <https://doi.org/10.3390/ijerph17197128>
- Donaldson, C., Hawkins, J., Rice, F., & Moore, G. (2025). Trajectories of mental health across the primary to secondary school transition. *JCPP Advances*, 5(1), e12244.
<https://doi.org/10.1002/jcv2.12244>

- Dräger, J., Klein, M., & Sosu, E. M. (2024). Trajectories of school absences across compulsory schooling and their impact on children's academic achievement: An analysis based on linked longitudinal survey and school administrative data. *PLOS ONE*, 19(8), e0306716. <https://doi.org/10.1371/journal.pone.0306716>
- Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & MacIver, D. (1993). Development during adolescence: The impact of stage-environment fit on young adolescents' experiences in schools and in families. *American Psychologist*, 48(2), 90–101. <https://doi.org/10.1037/0003-066X.48.2.90>
- Eccles, J. S., Lord, S., & Midgley, C. (1991). What are we doing to early adolescents? The impact of educational contexts on early adolescents. *American Journal of Education*, 99(4), 521–542. <https://doi.org/10.1086/443996>
- Evans, D., Borriello, G. A., & Field, A. P. (2018). A review of the academic and psychological impact of the transition to secondary education. *Frontiers in Psychology*, 9, Article 1482. <https://doi.org/10.3389/fpsyg.2018.01482>
- Felmlee, D. H., McMillan, C., Rodis, P. d. C. I., & Osgood, D. (2018). Falling behind: Lingered costs of the high school transition for youth friendships and grades. *Sociology of Education*, 91(3), 209–226. <https://doi.org/10.1177/0038040718762136>
- Finning, K., Ukoumunne, O. C., Ford, T., Danielsson-Waters, E., Shaw, L., Romero De Jager, I., Stentiford, L., & Moore, D. A. (2019). Review: The association between anxiety and poor attendance at school – a systematic review. *Child and Adolescent Mental Health*, 24(3), 205–216. <https://doi.org/10.1111/camh.12322>
- Finning, K., Ukoumunne, O. C., Ford, T., Danielsson-Waters, E., Shaw, L., Romero De Jager, I., Stentiford, L., & Moore, D. A. (2019). The association between child and adolescent depression and poor attendance at school: A systematic review and meta-analysis. *Journal of Affective Disorders*, 245, 928–938. <https://doi.org/10.1016/j.jad.2018.11.055>
- Fry, D., Fang, X., Elliott, S., Casey, T., Zheng, X., Li, J., Florian, L., & McCluskey, G. (2018). The relationships between violence in childhood and educational outcomes: A global systematic review and meta-analysis. *Child Abuse & Neglect*, 75, 6–28. <https://doi.org/10.1016/j.chiabu.2017.06.021>
- Fu, R., Chen, X., Wang, L., & Yang, F. (2016). Developmental trajectories of academic achievement in Chinese children: Contributions of early social-behavioral functioning.

- Journal of Educational Psychology*, 108(7), 1001–1012.
<https://doi.org/10.1037/edu0000100>
- Fu, Y. C., Chen, S. L., Quetzal, A. S., Lee, H. M., & Lin, Y. H. (2022). Group-based trajectory model to analyze the growth of students' academic performance: A longitudinal investigation at one Taiwanese high school. *Asia Pacific Education Review*, 23(3), 515–526. <https://doi.org/10.1007/s12564-022-09792-3>
- Garandeau, C. F., & Salmivalli, C. (2019). Can healthier contexts be harmful? A new perspective on the plight of victims of bullying. *Child Development Perspectives*, 13(3), 147–152.
<https://doi.org/10.1111/cdep.12331>
- Georgiades, K., Duncan, L., Wang, L., Comeau, J., Boyle, M. H., & 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. *The Canadian Journal of Psychiatry*, 64(4), 246–255.
<https://doi.org/10.1177/0706743719830024>
- Goldweber, A., Waasdorp, T. E., & Bradshaw, C. P. (2013). Examining the link between forms of bullying behaviors and perceptions of safety and belonging among secondary school students. *Journal of School Psychology*, 51(4), 469–485.
<https://doi.org/10.1016/j.jsp.2013.04.004>
- Graber, J. A., & Brooks-Gunn, J. (1996). Transitions and turning points: Navigating the passage from childhood through adolescence. *Developmental Psychology*, 32(4), 768.
- Gubbels, J., Van Der Put, C. E., & Assink, M. (2019). Risk factors for school absenteeism and dropout: A meta-analytic review. *Journal of Youth and Adolescence*, 48(9), 1637–1667.
<https://doi.org/10.1007/s10964-019-01072-5>
- Halliday, S., Gregory, T., Taylor, A., Digenis, C., & Turnbull, D. (2021). The impact of bullying victimization in early adolescence on subsequent psychosocial and academic outcomes across the adolescent period: A systematic review. *Journal of School Violence*, 20(3), 351–373. <https://doi.org/10.1080/15388220.2021.1913598>
- Hamaker, E. L., Kuiper, R. M., & Grasman, R. P. P. P. (2015). A critique of the cross-lagged panel model. *Psychological Methods*, 20(1), 102–116. <https://doi.org/10.1037/a0038889>
- Henderson, C. M., & Fantuzzo, J. W. (2023). Challenging the core assumption of chronic absenteeism: Are excused and unexcused absences equally useful in determining

- academic risk status? *Journal of Education for Students Placed at Risk*, 28(3), 259–293.
<https://doi.org/10.1080/10824669.2022.2065636>
- Högberg, B., Strandh, M., Petersen, S., & Nilsson, K. (2025). Associations between academic achievement and internalizing disorders in Swedish students aged 16 years between 1990 and 2018. *European Child & Adolescent Psychiatry*, 34(5), 1661–1671.
<https://doi.org/10.1007/s00787-024-02597-2>
- Jindal-Snape, D., Hannah, E. F. S., Cantali, D., Barlow, W., & MacGillivray, S. (2020). Systematic literature review of primary–secondary transitions: International research. *Review of Education*, 8(2), 526–566. <https://doi.org/10.1002/rev3.3197>
- Kearney, C. A. (2008). School absenteeism and school refusal behavior in youth: A contemporary review. *Clinical Psychology Review*, 28(3), 451–471.
<https://doi.org/10.1016/j.cpr.2007.07.012>
- Kearney, C. A., González, C., Graczyk, P. A., & Fornander, M. J. (2019). Reconciling contemporary approaches to school attendance and school absenteeism: Toward promotion and nimble response, global policy review and implementation, and future adaptability (Part 2). *Frontiers in Psychology*, 10, Article 2605.
<https://doi.org/10.3389/fpsyg.2019.02605>
- Keyes, K. M., & Platt, J. M. (2024). Annual research review: Sex, gender, and internalizing conditions among adolescents in the 21st century – trends, causes, consequences. *Journal of Child Psychology and Psychiatry*, 65(4), 384–407. <https://doi.org/10.1111/jcpp.13864>
- Kieling, C., Buchweitz, C., Caye, A., Silvani, J., Ameis, S. H., Brunoni, A. R., Cost, K. T., Courtney, D. B., Georgiades, K., Merikangas, K. R., Henderson, J. L., Polanczyk, G. V., Rohde, L. A., Salum, G. A., & Szatmari, P. (2024). Worldwide prevalence and disability from mental disorders across childhood and adolescence: Evidence from the global burden of disease study. *JAMA Psychiatry*, 81(4), 347.
<https://doi.org/10.1001/jamapsychiatry.2023.5051>
- Krygsman, A., & Vaillancourt, T. (2017). Longitudinal associations between depression symptoms and peer experiences: Evidence of symptoms-driven pathways. *Journal of Applied Developmental Psychology*, 51, 20–34.
<https://doi.org/10.1016/j.appdev.2017.05.003>

- Krygsman, A., & Vaillancourt, T. (2022). Elevated social anxiety symptoms across childhood and adolescence predict adult mental disorders and cannabis use. *Comprehensive Psychiatry*, 115, 152302. <https://doi.org/10.1016/j.comppsy.2022.152302>
- Laith, R., & Vaillancourt, T. (2022). The temporal sequence of bullying victimization, academic achievement, and school attendance: A review of the literature. *Aggression and Violent Behavior*, 64, 101722. <https://doi.org/10.1016/j.avb.2022.101722>
- Lallukka, T., Mekuria, G. B., Nummi, T., Virtanen, P., Virtanen, M., & Hammarström, A. (2019). Co-occurrence of depressive, anxiety, and somatic symptoms: Trajectories from adolescence to midlife using group-based joint trajectory analysis. *BMC Psychiatry*, 19(1). <https://doi.org/10.1186/s12888-019-2203-7>
- Lee, J. (2010). Tripartite growth trajectories of reading and math achievement: Tracking national academic progress at primary, middle, and high school levels. *American Educational Research Journal*, 47(4), 800–832. <https://doi.org/10.3102/0002831210365009>
- Liang, Y., Huebner, E. S., & Tian, L. (2023). Joint trajectories of loneliness, depressive symptoms, and social anxiety from middle childhood to early adolescence: Associations with suicidal ideation. *European Child & Adolescent Psychiatry*, 32(9), 1733–1744. <https://doi.org/10.1007/s00787-022-01993-w>
- Lu, Y. (2016). Modeling math growth trajectory—An application of conventional growth curve model and growth mixture model to ECLS K-5 data. *Journal of Educational Issues*, 2(1), 166. <https://doi.org/10.5296/jei.v2i1.9197>
- Makover, H., Adrian, M., Wilks, C., Read, K., Stoep, A. V., & McCauley, E. (2019). Indicated prevention for depression at the transition to high school: Outcomes for depression and anxiety. *Prevention Science*, 20(4), 499–509. <https://doi.org/10.1007/s11121-019-01005-5>
- Masten, A. S., & Cicchetti, D. (2010). Developmental cascades. *Development and Psychopathology*, 22(3), 491–495. <https://doi.org/10.1017/S0954579410000222>
- Melton, T. H., Croarkin, P. E., Strawn, J. R., & McClintock, S. M. (2016). Comorbid anxiety and depressive symptoms in children and adolescents: A systematic review and analysis. *Journal of Psychiatric Practice*, 22(2), 84. <https://doi.org/10.1097/PRA.0000000000000132>
- Moore, S. E., Norman, R. E., Suetani, S., Thomas, H. J., Sly, P. D., & Scott, J. G. (2017). Consequences of bullying victimization in childhood and adolescence: A systematic

- review and meta-analysis. *World Journal of Psychiatry*, 7(1), 60.
<https://doi.org/10.5498/wjp.v7.i1.60>
- Nakamoto, J., & Schwartz, D. (2010). Is peer victimization associated with academic achievement? A meta-analytic review. *Social Development*, 19(2), 221–242.
<https://doi.org/10.1111/j.1467-9507.2009.00539.x>
- Nelemans, S. A., Hale, W. W., Branje, S. J. T., Meeus, W. H. J., & Rudolph, K. D. (2018). Individual differences in anxiety trajectories from Grades 2 to 8: Impact of the middle school transition. *Development and Psychopathology*, 30(4), 1487–1501.
<https://doi.org/10.1017/S0954579417001584>
- Nelemans, S. A., Hale, W. W., Branje, S. J. T., Raaijmakers, Q. A. W., Frijns, T., Van Lier, P. A. C., & Meeus, W. H. J. (2014). Heterogeneity in development of adolescent anxiety disorder symptoms in an 8-year longitudinal community study. *Development and Psychopathology*, 26(1), 181–202. <https://doi.org/10.1017/S0954579413000503>
- Ng-Knight, T. (2015). *A prospective longitudinal study of the transition to secondary school: Exploring risk and protective factors* [Doctoral thesis, UCL (University College London)]. UCL Discovery. <https://discovery.ucl.ac.uk/id/eprint/1472008/>
- Organisation for Economic Co-operation and Development. (2023). *Education GPS*.
<https://gpseducation.oecd.org/CountryProfile?primaryCountry=CAN>
- Organisation for Economic Co-operation and Development. (2023). *Education GPS - Canada*.
<https://gpseducation.oecd.org/CountryProfile?primaryCountry=CAN>
- Olino, T. M., Klein, D. N., Lewinsohn, P. M., Rohde, P., & Seeley, J. R. (2010). Latent trajectory classes of depressive and anxiety disorders from adolescence to adulthood: Descriptions of classes and associations with risk factors. *Comprehensive Psychiatry*, 51(3), 224–235.
<https://doi.org/10.1016/j.comppsy.2009.07.002>
- Olino, T. M., Stepp, S. D., Keenan, K., Loeber, R., & Hipwell, A. (2014). Trajectories of depression and anxiety symptoms in adolescent girls: A comparison of parallel trajectory approaches. *Journal of Personality Assessment*, 96(3), 316–326.
<https://doi.org/10.1080/00223891.2013.866570>
- Olivier, E., Morin, A. J. S., Leo, V., & Salmela-Aro, K. (2023). The interconnected development of depressive symptoms and school functioning from mid-adolescence to early adulthood:

- A piecewise growth mixture analysis. *Journal of Educational Psychology*, 115(3), 427–445. <https://doi.org/10.1037/edu0000761>
- Olweus, D. (1996). Bullying at school: Knowledge base and an effective intervention program. *Annals of the New York Academy of Sciences*, 794(1), 265–276. <https://doi.org/10.1111/j.1749-6632.1996.tb32527.x>
- Reyes, O., Gillock, K. L., Kobus, K., & Sanchez, B. (2000). A longitudinal examination of the transition into senior high school for adolescents from urban, low-income status, and predominantly minority backgrounds. *American Journal of Community Psychology*, 28(4), 519–544. <https://doi.org/10.1023/A:1005140631988>
- Rice, F., Ng-Knight, T., Riglin, L., Powell, V., Moore, G., McManus, I. C., Shelton, K. H., & Frederickson, N. (2021). Pupil mental health, concerns and expectations about secondary school as predictors of adjustment across the transition to secondary school: A longitudinal multi-informant study. *School Mental Health*. <https://doi.org/10.1007/S12310-021-09415-Z>
- Salmivalli, C. (2018). Peer victimization and adjustment in young adulthood: Commentary on the special section. *Journal of Abnormal Child Psychology*, 46(1), 67–72. <https://doi.org/10.1007/s10802-017-0372-8>
- Sesar, K., Dodaj, A., Šimić, N., & Sesar, D. (2016). Coping specificities in children and adolescent dealing with bullying behaviour. *IOSR Journal of Humanities and Social Science*, 21(11), 43–53. <https://doi.org/10.9790/0837-2111040106>
- Shore, L., Toumbourou, J. W., Lewis, A. J., & Kremer, P. (2018). Review: Longitudinal trajectories of child and adolescent depressive symptoms and their predictors—A systematic review and meta-analysis. *Child and Adolescent Mental Health*, 23(2), 107–120. <https://doi.org/10.1111/camh.12220>
- Simmons, R. G. (1987). Social transition and adolescent development. *New Directions for Child and Adolescent Development*, 1987(37), 33–61. <https://doi.org/10.1002/cd.23219873704>
- Simon, O., Nylund-Gibson, K., Gottfried, M., & Mireles-Rios, R. (2020). Elementary absenteeism over time: A latent class growth analysis predicting fifth and eighth grade outcomes. *Learning and Individual Differences*, 78, 101822. <https://doi.org/10.1016/j.lindif.2020.101822>

- Spernes, K. (2022). The transition between primary and secondary school: A thematic review emphasising social and emotional issues. *Research Papers in Education*, 37(3), 303–320. <https://doi.org/10.1080/02671522.2020.1849366>
- Splett, J. W., Garzona, M., Gibson, N., Wojtalewicz, D., Raborn, A., & Reinke, W. M. (2019). Teacher recognition, concern, and referral of children's internalizing and externalizing behavior problems. *School Mental Health*, 11(2), 228–239. <https://doi.org/10.1007/s12310-018-09303-z>
- Sroufe, L. A., & Rutter, M. (1984). The domain of developmental psychopathology. *Child Development*, 55(1), 17–29. <https://doi.org/10.2307/1129832>
- Steinmayr, R., Meißner, A., Weidinger, A. F., & Wirthwein, L. (2014). Academic achievement. In *Education*. Oxford University Press. <https://doi.org/10.1093/obo/9780199756810-0108>
- Tunkkari, M., Kiuru, N., Virtanen, T., & Vasalampi, K. (2025). Antecedents of developmental trajectories of school absences among adolescents. *Scandinavian Journal of Educational Research*, 1–14. <https://doi.org/10.1080/00313831.2025.2506380>
- UNESCO. (2019). *Behind the numbers: Ending school violence and bullying*. <https://doi.org/10.54675/TRVR4270>
- Vaillancourt, T., Brittain, H., Farrell, A. H., Krygsman, A., & Vitoroulis, I. (2023). Bullying involvement and the transition to high school: A brief report. *Aggressive Behavior*, 49(4), 409–417. <https://doi.org/10.1002/ab.22082>
- Van Rens, M., Haelermans, C., Groot, W., & Maassen Van Den Brink, H. (2018). Facilitating a successful transition to secondary school: (How) does it work? A systematic literature review. *Adolescent Research Review*, 3(1), 43–56. <https://doi.org/10.1007/s40894-017-0063-2>
- Vasquez-Salgado, Y., & Chavira, G. (2014). The transition from middle school to high school as a developmental process among Latino youth. *Hispanic Journal of Behavioral Sciences*, 36(1), 79–94. <https://doi.org/10.1177/0739986313513718>
- Wang, Y.-C. L., Chan, H.-Y., & Chen, P.-C. (2018). Transitions of developmental trajectories of depressive symptoms between junior and senior high school among youths in Taiwan: Linkages to symptoms in young adulthood. *Journal of Abnormal Child Psychology*, 46(8), 1687–1704. <https://doi.org/10.1007/s10802-018-0408-8>

- Whitley, J., McBrearty, N., Rogers, M. A., & Smith, J. D. (2025). The current state of school attendance research and data in Canada. *Education Sciences*, 15(8), 964. <https://doi.org/10.3390/educsci15080964>
- Whitley, J., Smith, J. D., & Vaillancourt, T. (2013). Promoting mental health literacy among educators: Critical in school-based prevention and intervention. *Canadian Journal of School Psychology*, 28(1), 56–70. <https://doi.org/10.1177/0829573512468852>
- Xu, X., Huebner, E. S., & Tian, L. (2021). Co-developmental trajectories of specific anxiety symptoms from middle childhood to early adolescence: Associations with psychological well-being and academic achievement. *Journal of Youth and Adolescence*, 50(6), 1140–1156. <https://doi.org/10.1007/s10964-021-01411-5>