

# Exploring the Role of the School in the Development and Course of Problem Behaviour in Adolescence

by

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## Abstract

Problem behaviour during adolescence is a pressing societal concern. While extensive work has been conducted to identify relevant risk and protective factors, comparatively little attention has been paid to the role the school may play in protecting against maladaptive outcomes.

Employing a socio-ecological framework, this dissertation began by exploring trajectories of problem behaviour and school connectedness across the early to mid-adolescent period in a sample of 2,396 youth drawn from the National Longitudinal Survey of Children and Youth.

Three trajectories of problem behaviour were identified, with the large majority of youth showing little to no problem behaviour over time. Two trajectories of school connectedness were also identified as well as a general downward trend in connectedness across the study period.

Multivariate analysis was used to explore the impact of risk and protective factors on trajectory group membership. Results were generally consistent with existing literature though importantly this study established a strong association between school connectedness and problem behaviour.

Specifically, youth on the decreasing trajectory of school connectedness were between 2.2 and 4.5 times more likely to fall onto either of the concerning problem behaviour trajectories. The second paper followed a sample of 139 youth with matching teacher- and principal-report data to examine factors at the level of student, classroom, and school that predicted change in school

connectedness two years later. While much of the variance in connectedness at time two was accounted for by individual-level variables, several classroom and school factors emerged. Specifically, teacher support for managing discipline problems within the classroom was found to predict improved connectedness whereas low school socioeconomic status was associated with worse connectedness by time 2. As well, an interaction was identified between student problem behaviour trajectories and the percentage of low income families within the school such that students attending lower socioeconomic status schools who engaged in delinquent behaviour were significantly less likely to report feeling connected to their school. Taken together, these findings underscore the importance of considering school connectedness as a key protective variable for adolescent problem behaviour. Implications for policy and practice are also discussed.

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# 1 Chapter One

## 1.1 General Introduction

The incidence of problem behaviours such as aggression and property offences during adolescence is a pressing societal concern, with one in five youth having engaged in physical or relational aggression within a given 12 month period (Hemphill et al., 2011). Property offences such as theft, vandalism, or destruction of property occur less frequently, though may yield significant and lasting consequences (Dubow, Huesmann, Boxer, & Smith, 2015). The overarching commonality between aggression and various property offences centres on the violation of the rights of others as well as societal norms. Together, the perpetration of these behaviours in early adolescence is predictive of future criminality, substance use, and other troubling outcomes in young adulthood and beyond (Dubow et al., 2015). Importantly, efforts to study the development and course of these forms of problem behaviour have identified multiple risk factors that serve to increase the likelihood of maladaptive outcomes (Murray & Farrington, 2010). Conversely, a number of factors operating at the level of the child, family, and community have been found to be protective against such outcomes (Masten, 2011).

## 1.2 Socio-Ecological Model of Development

Bronfenbrenner's (1979) socio-ecological model provides an effective framework for understanding how risk and protection interact within the child and their environment to produce concomitant changes in development. The socio-ecological model posits that development occurs within and is influenced by a series of nested systems which differ in their degree of closeness relative to the child (Bronfenbrenner, 2005). The microsystem consists of the most immediate environments in which the child lives. Importantly, this system comprises a child's

closest interactions which have an immediate and direct impact on their development, such as those with family, friends, and within their school.

While factors within the microsystem exert the greatest influence over development and thus is the focus of the current study, other systems should also be considered (Bronfenbrenner, 1979). Specifically, the mesosystem involves interactions between various microsystems such as communication between a child's parents and their teacher or reciprocal interactions that exist between a child's home and the neighbourhood in which they are raised (Bronfenbrenner, 1994). The exosystem refers to processes that occur in settings in which the individual child does not interact directly such as the relationship between a parent's workplace and their home. While this system is comparatively distal, impact on the child can be still seen indirectly (i.e., a parent's hectic work schedule may affect their ability to adequately supervise the child) (Bronfenbrenner, 1994). Finally, the macrosystem refers to the blueprint of society's cultures, subcultures, and beliefs and provides a diffuse influence on each of the preceding systems.

Importantly, the socio-ecological model emphasizes the key role of reciprocal interactions that occur between the child and their environment (Bronfenbrenner, 2005). These interactions become increasingly complex over time such that development becomes a mutually determined phenomenon. Indeed, understanding how risk and protective influences interact provides critical information that can be used to guide intervention efforts (Tolan, Gorman-Smith, & Henry, 2003). As well, this model also accounts for variation in the relative impact of different factors over time which is necessary given the considerable developmental change that occurs during adolescence. As one example, the transition to adolescence is typically marked by a significant increase in the reliance on peer groups (Simons-Morton & Chen, 2009). While this may serve as a source of support for the adolescent, associating with deviant peers for example

may increase risk and lead to engagement in delinquent behaviour (Stevens, Morash, & Park, 2011).

### **1.3 Risk and Protective Factors for Problem Behaviour**

From an ecological perspective, development occurs within a series of overlapping systems which impact the adolescent (Bronfenbrenner, 2005). Within each of these systems exist various risk and protective factors that serve to alter the course of development. Risk factors are variables that increase the likelihood of a negative outcome (Li, Chu, Xu, Zeng, & Ruby, 2018; Rutter, 1987). These factors may be inherent to the child, such as temperament, or present within the child's environment (e.g., family or community influences). In order for a variable to be classified as a risk factor, it should also be temporally related to an outcome such that it is present or acts upon the individual beforehand (Li et al., 2018).

While definitions of risk within the literature are generally consistent, more variability arises when exploring the concept of protective factors that may impact youth's lives (Farrington, Ttofi, & Piquero, 2016). Part of this inconsistency arises from the fact that many variables have both a positive and negative pole. For example, exposure to family discord could be reasonably classified as a risk factor whereas being raised in a well-functioning family unit may be termed protective. Indeed, Rutter (1987) notes that a protective factor may simply be the "opposite side of the same coin" (p. 316). More recently, however, definitions have sought to capture the interactive nature of risk and protective variables. Ttofi and colleagues (2016) define a protective factor as an influence which reduces the likelihood of negative outcomes when a risk factor is present. Similarly, a negative outcome is more likely to occur when that protective factor is absent (Ttofi et al., 2016). In this way, a protective factor serves to attenuate or buffer the impact of risk. Given the variability in distinguishing whether a factor should be classified as

associated with either risk or protection, the current study examined how factors are typically conceptualized within the literature and used this as a guide. Importantly though, emphasis is placed on the buffering role that protective factors may have in the presence of risk (Ttofi et al., 2016).

The majority of work in the literature exploring risk factors for problem behaviour has been directed towards influences present within the child and family microsystems (Murray & Farrington, 2010). Indeed, among the most reliably identified child factors are difficult temperament (Caspi, 2000), impulsivity (Martino et al., 2008), low intelligence (Masten, 2011), and poor academic achievement (Wang & Dishion, 2012). At the level of the family, low socioeconomic status (Dodge, Greenberg & Malone, 2008), family discord (Holt, Buckley & Whelan, 2008; Wolfe, Crooks, Lee, McIntyre-Smith & Jaffe, 2003), parental mental health issues (Barker, Copeland, Maughan, Jaffee, & Uher, 2012; Goodman et al., 2011), and parent criminality (Farrington, Jolliffe, Loeber, Stouthamer-Loeber, & Kalb, 2001) have been found to predict engagement in delinquent behaviour. Risk may also be imparted from influences within the child's community. Specifically, living within risky neighbourhoods has been identified as a route through which youth are exposed to additional stress and antisocial behaviour coupled with a lack of resources and supports (Erdem et al., 2015; Kingsbury et al., 2015).

While risk has long served as the focal point for research into the manifestation of problem behaviour, a complementary course of study has sought to identify specific factors that protect against such maladaptive outcomes (Masten, 2011; Rutter, 1987). Much like risk, protection from stress and adversity exists and can be understood as arising within the child, their family, and community. A child's sense of self-esteem (Veselka et al., 2009) and the availability of social supports (Branstrom, Sjostrom, Andreasson, 2007; Stevens, Morash & Park, 2011),

especially from prosocial peers, have been reliably identified as robust buffers against adversity. Within the family, strong attachment (Alarid, Burton, & Cullen, 2000), parental support (Arthur, Hawkins, Pollard, Catalano & Baglioni, 2002), and adequate supervision or monitoring (Rekker, Keijsers, Branje, Koot, & Meeus, 2017) have been associated with reduced involvement in delinquent activities. At the level of the community, having a strong sense of connection to school may be particularly impactful in reducing engagement in problem behaviour as well as shifting youth off delinquent trajectories (Bond et al., 2007; Loukas, Cance, & Batanova, 2016; Wang & Dishion, 2012). Although there is no doubt that a range of other factors exist which may impact outcomes in youth, the current study focuses primarily on the school microsystem as a critical context in which development occurs in a reciprocally determined manner based on the adolescent as well as their interactions with other systems (e.g., family, peers) (Bronfenbrenner, 2005; Wang & Dishion, 2012).

While the large majority of youth engage in none or very low levels of problem behaviour during their lives, research consistently finds subgroups of individuals that show high initial or increasing problem behaviour over the adolescent developmental period (Nagin & Tremblay, 1999). These behaviours can be modeled over time, producing trajectories that serve to highlight differences in the timing and rate of perpetration across individuals (Moffitt, 1993; Nagin & Tremblay, 1999). Importantly, trajectories of problem behaviour are affected by the presence of risk and protection within the child and their environment (Farrington, 2005). Knowledge regarding onset, chronicity, and interactions among these influences provides important information regarding their impact on the individual and their microsystems. As well, information of this nature is key for determining the type and timing of intervention efforts designed to mitigate negative outcomes (Cicchetti, 2006; Farrington, 2005).

#### **1.4 The Role of the School**

A growing body of evidence suggests that schools may act as a particularly important system that is well positioned to meet the diverse needs of youth, especially those with exposure to high levels of psychosocial stress (Li & Lerner, 2011; Wang & Dishion, 2012). Youth spend a considerable amount of time within school each week, affording opportunities to learn and develop academically (Brookmeyer, Fanti, & Henrich, 2006). Beyond academics, schools also provide a setting in which some of the youth's most important interactions arise such as the development of connections to other peers (Dornbusch, Erickson, Laird, & Wong, 2001). As well, the establishment of bonds between the youth and their teachers appear to be particularly important during this early adolescent period (Borofsky, Kellerman, Baucom, Oliver & Margolin, 2013). Schools also act as resource centers, providing opportunities for extended education and extracurricular activities (e.g., after school sports programs, parental education classes) (Basch, 2011; Lam et al., 2012). While beneficial to many students, these resources are essential for economically disadvantaged youth and their families by helping to establish a more level playing field such that all students can learn and develop together (Boxer, Goldstein, DeLorenzo, Savoy, & Mercado, 2011). As well, some researchers (e.g., Borofsky et al., 2013) have argued that the school may provide an escape from risky home or neighbourhood environments where youth may be exposed to additional psychosocial risk. In this way, schools fulfill a critical role where risk from other systems can be mitigated while providing opportunities in which youth can further develop their own protective assets (Borofsky et al., 2013; Wang & Dishion, 2012).

While the availability of resources and opportunities is important for establishing a school setting in which students can develop to their fullest potential, the degree to which youth

feel connected to their school has an important influence on the benefits that can be derived from this environment (Bond et al., 2007; Loukas, Cance, & Batanova, 2016). Although there is no single agreed upon definition, the concept of school connectedness refers to a student's belief that school is important in their lives (Bond et al., 2007). Connectedness also encompasses perceptions of fairness and support, feelings of closeness with their teacher, and the importance placed on excelling in academic work (Libbey, 2004). Connectedness has also been referred to within the literature as school bonding, school involvement and engagement, and school attachment (Libbey, 2004). Mounting evidence suggests that the extent to which youth feel connected to their school is critical not only for academic success but also for success in a wide range of domains that include social, emotional, and behavioural functioning both within the school as well as in the youth's home and community (Borofsky et al., 2013; Li & Lerner, 2011; Wang & Dishion, 2012).

The majority of extant research on school connectedness has explored associations with academic achievement, with studies identifying a consistently strong positive correlation between connectedness and performance within the classroom (Dotterer & Lowe, 2011; Wang et al., 2014). In their review of the literature, Thapa and colleagues (2013) identified strong support for this relationship among elementary, middle, and high school students, with connected youth exhibiting better academic achievement relative to their less-connected peers. The impact of connectedness on academic performance has also been demonstrated through intervention research. For example, Osher and Kendziora (2010) found that intervention programs that sought to improve connectedness among students resulted in significantly increased scores on standardized tests of reading, writing, and mathematics.



Moving beyond academic achievement, connectedness also appears to be particularly relevant to the development and course of problem behaviour in adolescence (Li & Lerner, 2011). Youth who report a greater sense of connectedness to their school engage in significantly fewer acts aggression, vandalism, and property crime (Loukas, Ripperger-Suhler, & Horton, 2009; Way, Reddy, & Rhodes, 2007) and are less likely to become involved with antisocial peer groups (Li & Lerner, 2011). From an ecological perspective, being connected to school serves to buffer risk for the development of conduct problems that may arise due to psychosocial stress present in other systems such as problematic family functioning or living in poorly connected and unsafe neighbourhoods (Kingsbury et al., 2015; Loukas, Roalson, & Herrera, 2010).

School connectedness can be modeled over time and while comparatively less work has been done to explore specific trajectories, it appears that connectedness declines as youth age (Loukas, Cance, & Batanova, 2016; Wang & Dishion, 2012). Potential causes for this decline include the shift from a single teacher classroom to the larger, multi-teacher environment common to middle and high school environments (Wang & Dishion, 2012). As well, adolescents' growing and opposing need for both relatedness and autonomy may not be effectively met within a larger school setting (Eccles et al., 2005).

Importantly, these trajectories of school connectedness have been linked with a host of distinct outcomes, including academic achievement, delinquency, and substance use (Li & Lerner, 2011; Wang & Dishion, 2012). As noted, while connectedness tends to drop over the middle and high school years, youth who report the steepest declines exhibit more externalizing problems relative to those who remain more connected (Wang & Dishion, 2012). For example, Li and Lerner (2011) found that youth who were on a decreasing trajectory of school connectedness were more likely to report engaging in substance abuse and delinquent behaviour.

Further, these students also reported higher rates of depression and academic difficulties (Li & Lerner, 2011). Youth that begin to disconnect from school may also show a compensatory bonding effect that results in greater affiliation with antisocial or deviant peer groups (Stevens, Morash & Park, 2011). The bidirectional nature of this interaction highlights the need to consider the impact of both school connectedness and problem behaviour on development. As well, it suggests that intervention in one domain may impact functioning in other systems (Tolan et al., 2003).

In addition to varying over time, perceptions of connectedness also differ considerably across individuals (Loukas, Cance, & Batanova, 2016). Given the impact of connectedness on various developmental outcomes, work has been conducted to identify specific factors that might account for these differences (Bond et al., 2007). For example, individual-level variables such as academic achievement (Niehaus, Rudasill, & Rakes, 2012) and preparedness for school (Basch, 2011; Kleinman et al., 2002) have been shown to reliably predict connectedness. A number of researchers have also identified gender differences in self-reported connectedness. Wang and Dishion (2012) note that boys tend to report feeling less engaged within their school community which in turn accounted for differences in academic performance. However, as pointed out by Loukas, Cance, and Batanova (2016), findings with respect to gender and school connectedness are limited and may be conflicting in some cases. For example, Simons-Morton and Chen (2009) found declines in connectedness that were larger and occurred at a faster rate among female students relative to boys. Given these conflicting findings, it is important that further attention be directed towards clarifying the role that gender may play in school connectedness.

While individual influences have received the most attention in the literature to date, connectedness is also impacted by ecological factors inherent to the child's classroom and school

(Waters, Cross, & Shaw, 2010). For example, both the size and socioeconomic status of a school have been thought to impact perceptions of connectedness (Dodge, Greenberg & Malone, 2008). Factors at the level of the classroom, such as discipline management practices or having an experienced teacher may also explain some variance in connectedness (Hoglund & Leadbeater, 2004; Waters, Cross, & Shaw, 2010). Given the impact of school connectedness on problem behaviour and other domains of functioning in adolescence, more work must be directed towards understanding factors that account for these differences (Waters, Cross, & Shaw, 2010). As well, despite the consistently documented finding that connectedness drops for most students over time the specific etiology of this decline is not well understood (Way, Reddy, & Rhodes, 2007). Ideally, a course of research that helps to expand our knowledge of school connectedness will also identify meaningful targets for intervention.

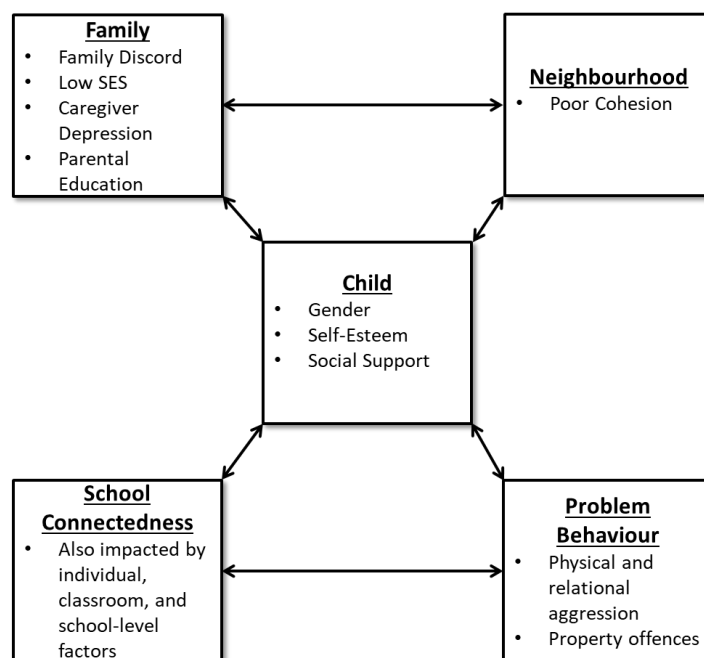
### **1.5 Study Objectives**

This dissertation is composed of two studies and utilizes data from the National Longitudinal Survey of Children and Youth. This dataset provides a unique opportunity to explore development across the early to mid-adolescent period within a Canadian context. The first study sought to describe trajectories of problem behaviour and school connectedness in youth from the age of 10 to 15 using youth self-report and parent-report data. This sensitive developmental period is one in which life-long behaviour and personality patterns are formed (Bava & Tapert, 2010). As mentioned, engagement in aggression and delinquency during this period is also highly predictive of future criminality (Dubow et al., 2015). Given the impact of these variables as well as reciprocal interaction between systems, several researchers (e.g., Arthur et al., 2002) have recommended that studies on the course of problem behaviour in adolescence should include an assessment of a broad range of both risk and protective influences

that may affect development. As such, the first study also explores the predictive capacity of well-established risk and protective factors on youth's trajectories, with particular attention paid to the role that school connectedness may play in predicting delinquent outcomes in adolescence.

The second study sought to develop a richer understanding of specific factors that predict school connectedness using self-, teacher-, and principal-reported data. Given that much is known about factors that account for connectedness at the level of individual, this study focuses on the effect of variables at the classroom and school level in predicting change in connectedness. These classroom and school variables may also be more amenable to intervention efforts relative to individual characteristics and thus serve as important targets for further study (Battistich, Schaps, & Wilson, 2004; Waters, Cross, & Shaw, 2010). Figure 1 represents the various factors under study and the bidirectional nature of their impact.

Figure 1: Conceptual model of factors affecting school connectedness and problem behaviour.



The overarching goal of this dissertation is to advance our understanding of the role that the school microsystem plays in the lives of youth, especially with respect to the onset and

course of problem behaviour during the early to mid-adolescent period. As mentioned, school connectedness has previously been used to explain associations with academic achievement with the overlap between connectedness and problem behaviour being less well understood (Thapa et al., 2013). A finer-grained analysis of change in both problem behaviour and connectedness over time is made possible in this study through the use of semi-parametric group based analysis. Trajectory modeling of this nature offers additional insight beyond other statistical methods that have historically been employed within the school connectedness literature and may help to unmask important patterns of change (Way, Reddy, & Rhodes, 2007). The current project also investigates the role that gender plays in perceptions of connectedness in order to clarify conflicting findings within the literature (Loukas, Cance, & Batanova, 2016). Together, these studies help shed light on why students report worsening connectedness to school over time as well as identify specific factors that account for differences in the rate of this decline. The general discussion that follows considers implications for policy and practice that are relevant to both educators and clinicians. Importantly, the applicability of these findings to intervention efforts is reviewed along with recommendations for promoting school connectedness among youth.

## 2 Chapter Two

### Study One

#### 2.1 Introduction

The prevalence of problem behaviours such as aggression and property offences increases dramatically as children age and transition into adolescence (Moffitt, 1993). In addition to developmental changes, youth experience a multitude of new challenges within familial, social, and academic domains during this period. These stressors can have lasting impacts at a time when patterns of behaviour and personality begin to solidify (Bava & Tapert, 2010). The successful navigation of this period is determined in part by factors within the individual's life that serve to increase their risk for, or protect against, detrimental outcomes (Masten, 2011).

Bronfenbrenner's (1979) socio-ecological model posits that human development occurs within a nested series of systems which are influenced by various factors that act upon the individual. Closest to the child is the microsystem, which includes interactions between the child's friends, family, and school. According to Bronfenbrenner (1979), it is the dynamic interactions that occur within this system that serve as the primary mechanism of development. This model also highlights how various risk and protective factors affect, and are affected by, the individual. Importantly, such interactions are reciprocal and become increasingly complex over time which results in development becoming mutually determined. Taking into consideration these influences serves to enhance our knowledge of the individual as well as allows for predicting change in their development (Wang & Dishion, 2012).

The understanding of complex interactions between an individual and their environment as it relates to problem behaviour has long been an important area of study (Masten, 2011). However, much of this work has centered primarily on static factors unique to the individual

such as gender or self-esteem. A growing body of evidence has suggested that the extent to which youth feel connected to their school may yield important protective effects against delinquency, particularly in adolescence (Li & Lerner, 2011; Loukas, Cance, & Batanova, 2016; Wang & Dishion, 2012). Adolescents spend nearly half their waking hours within a school setting and thus this environment has the potential to exert a powerful and lasting effect on development (Brookmeyer, Fanti, & Henrich, 2006). Youth that report feeling connected to their schools are significantly less likely to engage in bullying and aggression, substance use, and truancy (Li & Lerner, 2011). Conversely, poor connectedness has been linked to association with delinquent peer groups and increased property offences such as theft or vandalism (Loukas, Cance, & Batanova, 2016; Wang & Dishion, 2012).

Indeed, the bidirectional nature of this relationship is such that connected youth appear to be among those most likely to remain connected to their schools (Hawkins, Guo, Battin-Pearson, & Abbot, 2001). Conversely, those individuals who engage in greater perpetration of problem behaviour are likely to experience increased difficulty establishing relationships with teachers and other school staff, report more association to deviant peers, and may fail to take advantage of supports and opportunities available through the school (Loukas, Cance, & Batanova, 2016). Given the importance of this sensitive period as well as the potential harms associated with delinquent behaviours, it is important that factors such as school connectedness be further explored in order to more fully understand its impact on development.

### **2.1.1 Adolescent Problem Behaviour and its Trajectories**

Aggression and property offences are among the most common and persistent forms of maladjustment in adolescence (Campbell et al., 2010). Aggression may take a variety of forms, including overt physical or verbal attacks with the intent to harm another individual (Little,

Henrich, Jones, & Hawley, 2003). As well, aggression may be relational, with perpetrators attacking a victim's reputation or social standing without the use of physical force. Property offences include behaviours such as destruction of property and fire setting as well as more covert actions like vandalism and theft (Slot & Hoeve, 2016).

The study of how these behaviours arise and change as children transition into adolescence is critical, given that these behaviours are predictive of future criminality, substance abuse, and other problems in young adulthood (Dubow et al., 2015). One of the most influential models detailing trajectories of problem behaviour from childhood to adolescence is Moffitt's (1993) developmental taxonomy. This framework distinguishes two major trajectories of antisocial behaviour: life-course persistent and adolescence-limited. Individuals on the life-course persistent trajectory display a pattern of chronic offending throughout childhood and adolescence as well as into adulthood. Alternatively, individuals on the adolescence-limited trajectory engage in delinquent behaviour during adolescence and tend to desist as they transition into adulthood (Moffitt, 1993).

Other researchers (e.g., Broidy et al., 2003; Nagin & Tremblay, 1999) have identified an expanded number of trajectory groups to capture additional patterns evident in the development of problem behaviour. For example, in a study of children followed from age 6 to 15, Nagin and Tremblay (1999) identified four distinct trajectories of aggression and oppositional behaviour. These included a consistently low perpetration group, two desisting groups that displayed either moderate or high initial levels of perpetration that tapered off over time, and a significantly smaller subgroup of chronically delinquent individuals (Nagin & Tremblay, 1999). Other research has found significant consistency within an individual's trajectory such that aggressive and delinquent children are those that become aggressive and delinquent adolescents (Broidy et



al., 2003). Taken together, these findings highlight the importance of distinguishing specific trajectories of problem behaviour during this period.

### **2.1.2 Risk Factors for Adolescent Problem Behaviour**

The development and course of problem behaviours is variable and multiply determined by influences present within the individual and the various microsystems in which they live (Bronfenbrenner, 1979; Lam et al., 2012). In examining trajectories of problem behaviour, the current study concentrated on reliably identified risk factors within the youth's environment that yield among the strongest impact on the development of problem behaviour, specifically gender, family discord, maternal depression, low socioeconomic status, and poor neighbourhood cohesion. The evidence for each of these factors is briefly reviewed.

The association between gender and problem behaviour has long been documented within the child and adolescent development literature, with the majority of studies finding that boys tend to perpetrate significantly greater levels of overt and physical aggression (Broidy et al., 2003). When considering gender from a developmental trajectory lens, boys are also significantly more likely to exhibit chronically high and stable patterns of aggression. However, these trajectory groups also tend to be populated by a small percentage of females (Broidy et al., 2003). While there has been considerably less research into these delinquent girls relative to their male counterparts, it appears that they share similar profiles of risk and protection and experience comparable level of psychosocial stress (Odgers et al., 2008). One important distinction appears to be a significantly increased rate of depressive and anxious symptomatology among girls (Pepler et al., 2010). Tracking forward, Bradshaw, Schaeffer, Petras, and Ialongo (2010) found that rates of negative life outcomes such as high school drop-out, unemployment, early sexual activity, or substance abuse were similar among girls and boys

who displayed trajectories marked by chronically high levels of problem behaviour. These findings suggest that while boys tend to perpetrate more aggressive or disruptive behaviour in general, engagement in this behaviour holds equally troubling consequences for both genders.

Children exposed to home environments punctuated by anger, fighting, and threats of violence experience a host of negative effects (Alaggia & Donohue, 2018; Ireland & Smith, 2009). In particular, these children are more likely to report increased mental health concerns such as anxiety and depression as well as face both cognitive and academic challenges (Holt, Buckley & Whelan, 2008; Wolfe et al., 2003). Children living in these home environments also exhibit higher rates of behavioural problems, including attentional disorders and aggression (Bauer, Gilbert, Carroll & Downs, 2013; Ireland & Smith, 2009). The impact of family discord also tends to be long-lasting in nature, having the potential to negatively affect functioning both across the lifespan and intergenerationally (Ireland & Smith, 2009).

Low socioeconomic status is another critical family-level variable that has been closely linked to problem behaviour in adolescence (Basch, 2011; Dodge, Greenberg & Malone, 2008). This association is mediated through a number of pathways that include poor parenting practices, increased exposure to stress, and reduced access to resources needed for learning (Arthur et al., 2002; Dodge, Greenberg & Malone, 2008). The effect of low socioeconomic status may be particularly impactful during the adolescent period. Specifically, rapid growth in social awareness during adolescence may lead to a heightened sensitivity to status differences between peers as well as a greater cognizance of barriers to success (Boxer et al., 2011).

A number of researchers (e.g., Erdem et al., 2015; Farrington, 2005; Kingsbury et al., 2015) have underscored the importance of considering neighbourhood-level factors such as violence or lack of connection within the community. These neighbourhoods are seen as

comparatively unsafe areas in which to live, work, and raise children. In a large study of Canadian families drawn from the NLSCY, Kingsbury and colleagues (2015) found that youth living in connected neighbourhoods displayed more prosocial interaction, reduced aggression, and fewer impulsive or hyperactive behaviours. As well, neighbourhoods with low levels of cohesion are often at a lower socioeconomic status and thus have fewer available resources such as community centres, libraries, and after school programs (Erdem et al., 2015). These communities may also have weaker social norms to protect against engagement in antisocial behaviour and association with deviant peer groups (Farrington, 2005). Importantly, less cohesive neighbourhoods have reduced levels of adult supervision and monitoring which may fail to limit engagement in delinquent behaviour. Living within these neighbourhoods has also been linked to lasting consequences on adjustment in later adolescence as well as adulthood (Kingsbury et al., 2015). This may be due in part to failures in internalizing prosocial attitudes and behaviours at an early age.

Caregiver depression has also been implicated as a risk factor for both internalizing and externalizing outcomes in youth (Goodman et al., 2011). Depression in caregivers, particularly the mother, is thought to impair children's cognitive and academic development while also affecting the quality of parent-child interactions (Murray, Irving, Farrington, Colman, and Bloxson, 2010). Other researchers (e.g., Barker, Copeland, Maughan, Jaffee, & Uher, 2012) have noted that children of depressed mothers also tend to experience relatively higher levels of psychosocial risk such as low socioeconomic status and poor social support.

### **2.1.3 Protective Factors for Adolescent Problem Behaviour**

Protective factors serve to buffer the impact of risk and adversity that is either inherent to, or experienced by, the child (Masten, 2011). The current study examined the protective role of

three primary factors: access to a supportive peer group, self-esteem, and school connectedness. First, supportive peer groups have been shown to provide a strong buffering effect against the impact of adversity (Branstrom, Sjostrom, Andreasson, 2007; Stevens, Morash & Park, 2011). Support from prosocial peers provides a critical external resource for coping with and managing stress while affording an opportunity for the adolescent to escape damaging family and neighbourhood environments (Borofsky et al., 2013; Viner et al., 2012). Conversely, association with antisocial peers has been consistently reported as one of the strongest predictors for engagement in violence and substance use (Herrenkohl et al., 2000; Viner et al., 2012).

Self-esteem has also been identified as an important factor that may protect against the effects of exposure to various individual and psychosocial risks (Kim, Bassett, Takahashi, & Voisin, 2018). Specifically, positive self-esteem has been associated with reductions in the likelihood of engaging in behaviours such as smoking and substance use as well as aggression and violence (Veselka et al., 2009). Youth with high levels of self-esteem appear less susceptible to the effects of peer pressure, which may help to explain lower observed levels of substance use among these individuals (Kim et al., 2018). As well, these youth are less likely to associate with deviant peer groups (Stevens, Morash, & Park, 2011).

#### **2.1.4 School Connectedness and its Association with Adolescent Problem Behaviour**

The degree to which youth feel connected to their school is a critically important factor that may protect against delinquent outcomes in adolescence. School connectedness refers to a student's level of "commitment to school and a belief that school is important" (Bond et al., 2007, p. 357). The concept of school connectedness captures perceptions of fairness, the quality of the relationship between the student and their teacher, access to support, and the degree of importance placed on academic success (Libbey, 2004). High levels of connectedness to school

have been associated with improved academic and social functioning as well as reduced engagement in risk-taking behaviour (Loukas, Cance, & Batanova, 2016). Schools may also provide a critical safe haven for children living in risky home or neighbourhood environments (Bond et al., 2007; Borofsky et al., 2013).

As noted by Li and Lerner (2011), the bulk of extant research on school connectedness has explored associations with academic achievement. However, being connected to one's school may also yield important protective effects against delinquency (Chapman, Buckley, Sheehan, & Shochet, 2013; Way, Reddy, & Rhodes, 2007). Youth that report higher levels of connectedness to their school perpetrate fewer acts of aggression both within the school and their community (Way, Reddy, & Rhodes, 2007). Connected adolescents commit fewer instances of property crime such as vandalism and theft and are significantly less likely to report engaging in risk taking behaviour such as early initiation of sexual activity or riding in vehicles driven by intoxicated drivers (Chapman et al., 2013; Loukas, Ripperger-Suhler, & Horton, 2009). Schools also provide a setting in which students may further develop their own protective assets and resources (Bond et al., 2007). Specifically, schools offer a space for youth to grow and develop social support networks that include relationships with both peers and teachers (Dornbusch et al., 2001). As well, the effects of a strong connection to school in buffering psychosocial risk and adversity also tends to be quite durable and long lasting (Hawkins et al., 2001).

A number of researchers (e.g., Doumen et al., 2008; Loukas, Cance, & Batanova, 2016) have also noted a bidirectional relationship between school connectedness and problem behaviour. In their study, Loukas, Cance, and Batanova (2016) found that students who reported greater engagement in delinquent behaviour were also among those most likely to feel disconnected from their school over time. Adolescents who exhibit problem behaviour as they

enter middle or high school are more likely to be rejected by their peers and teachers, which negatively impacts their ability to connect to their school (Doumen et al., 2008). These students may also be more likely to assort themselves into deviant peer groups which further hamper opportunities to establish prosocial bonds (Loukas, Cance, & Batanova, 2016). From an ecological perspective, development occurs in a mutually determined fashion as a result of these reciprocal interactions (Bronfenbrenner, 1979). Coupled with other significant developmental changes that occur during adolescence, these findings suggest that school connectedness is a construct that is particularly important to study longitudinally (Doumen et al., 2008).

### **2.1.5 Trajectories of School Connectedness**

Several studies have sought to describe how school connectedness changes over time, with the most consistent finding being that connectedness drops over the early to late adolescent period (Loukas, Cance, & Batanova, 2016; Wang & Dishion, 2012; Way & Reddy, 2007). In a school bonding intervention study, Hawkins and colleagues (2001) found that student perceptions of connectedness to school declined significantly from Grade 7 through to the end of high school, with the sharpest declines found following the transition from elementary to high school. In another study, Wang and Dishion (2012) followed a sample of 1,030 students from sixth through eighth grade and examined several school connectedness factors including perceived academic support, school behaviour management, and availability of social support. Significant declines were identified in all four of the dimensions studied at each time point (Wang & Dishion, 2012).

In contrast to problem behaviour, considerably less is known about the factors that might account for these changes in connectedness over time. Li and Lerner (2011) noted that socioeconomic status may account for some of the decline in perceptions of connectedness.

Specifically, low socioeconomic students were more likely to report both lower initial levels of connectedness as well as more consistent declines over time (Li & Lerner, 2011). While this relationship is certainly multiply determined, schools within low socioeconomic status neighbourhoods tend to have reduced involvement of parents within the school community and employ teachers with fewer qualifications and less experience (Sampasa-Kanyina & Hamilton, 2016). As well, these schools do not provide as many opportunities for extracurricular activities or other resources for the community (Dodge, Greenberg & Malone, 2008). Academically, these students also have worse skills in core areas and are prone to leaving school early (Boxer et al., 2011). Indeed, low socioeconomic status is associated with increased psychological distress which can impair the ability of students to successfully engage in the learning process as well as connect with others at school (Sampasa-Kanyina & Hamilton, 2016)

While no doubt closely connected to socioeconomic status, a parent's own level of academic achievement may also impact school connectedness. For example, parents can work to promote the importance of educational involvement through modeling of attitudes and behaviours that are needed for academic success (Merritt & Buboltz, 2015). Parents that make learning a priority for themselves may also be more likely to create a positive learning environment within the home, assist with homework and projects, and ensure that children are prepared and ready for school, all factors which are linked with enhanced school connectedness (Basch, 2011; Merritt & Buboltz, 2015).

As mentioned, the transition from elementary school to middle school or high school may also precipitate a drop in school connectedness. Eccles and colleagues (2005) have argued that these declines result from an incompatibility between a youth's growing need for both relatedness and autonomy and the significantly larger educational setting of middle and high

schools. For example, students in these schools typically have multiple teachers which provide an opportunity for the development of new relationships but also reduce the quantity of time available to spend with any one teacher (Wang & Dishion, 2012). This may yield fewer deep connections at a time when positive relationships to an adult external to the family may be particularly important (Borofsky et al., 2013).

A youth's trajectory of school connectedness also has important implications for their behavioural adjustment. For example, Wang and Dishion (2012) found that students on a declining trajectory, and especially those who reported the steepest declines, were significantly more likely to exhibit behavioural problems as well as associate with deviant peer groups. Indeed, it appears that a student's school connectedness trajectory may help to forecast their risk for engagement in problem behaviour as well as provide important information about the timing and onset of this behaviour (Li & Lerner, 2011). Given the association between school connectedness and problem behaviour, work directed towards understanding the specific factors that might account for change in connectedness is particularly relevant to preventing these delinquent outcomes (Chapman et al., 2013). As well, by examining both problem behaviour and school connectedness using a trajectory modeling approach it becomes possible to assess the impact that one trajectory may have on the other.

### **2.1.6 School Connectedness and Gender**

Findings regarding gender differences in school connectedness have generally been limited and occasionally conflicting in some cases, with a number of researchers (e.g., Loukas, Cance, & Batanova, 2016; Wang & Dishion, 2012) arguing for the need for greater clarity of this relationship. While girls generally report feeling more connected to their schools than their male counterparts, questions arise when examining gender differences through a developmental



trajectory lens (Lam et al., 2012). For example, Way, Reddy, and Rhodes (2007) revealed a declining pattern of school connectedness that was consistent across genders. However, other research has found sharper declines among female students during adolescence (Simons-Morton & Chen, 2009). These inconsistencies have yet to be resolved, especially with respect to identifying specific factors that might account for such differences.

Attention has also been directed towards studying whether the impact of declining connectedness on problem behaviour varies by gender. For example, Wang and Dishion (2012) found a small effect for gender such that girls who reported declines on some indices of school connectedness (e.g., peer support) exhibited more problem behaviour relative to boys who experienced similar declines. These findings suggest that social support within the context of being connected to school may be particularly important for buffering against delinquency in girls (Wang & Dishion, 2012). However, the researchers point out that effects of gender on school connectedness tend to be small and difficult to detect (Wang & Dishion, 2012). Taken together, it appears that there are gaps in our understanding of the role that gender plays in terms of both school connectedness as well as the impact of connectedness on delinquent outcomes in adolescence.

### **2.1.7 Overview of the Current Study**

Trajectories of adolescent problem behaviour and school connectedness were explored using the National Longitudinal Survey of Children and Youth. The NLSCY is a nationally representative prospective cohort study that was conducted by Statistics Canada and Skills Development Canada (HRSDC). It was designed to obtain data on a variety of social, emotional, and behavioural factors that influence children's health and development from birth to early adulthood (Statistics Canada, 2008). This dataset offers a unique opportunity to explore the

development and course of problem behaviour and school connectedness within a Canadian context. Longitudinal studies have proven to be a powerful route to understanding the impact of risk onset and accumulation of risk over time while also allowing researchers to assess the temporal ordering of risk and problem behaviour (Masten & Cicchetti, 2010). Further, longitudinal datasets allow for understanding the influence of various protective factors that may reduce the impact of such risks over time (Farrington, 2005). Ideally, work of this nature can be used to inform the type and timing of prevention and intervention efforts as well as determine in which domains these efforts may have the greatest impact. Finally, some researchers (e.g., Way, Reddy, & Rhodes, 2007) have highlighted the need for additional studies that rely on modern trajectory approaches to studying development across this period given that classical statistical methods (e.g., ANOVAs, MANOVAs) may mask certain patterns of change.

The current study followed a sample of children drawn from the longitudinal cohort of the NLSCY beginning at age 10 and ending at age 15. This study extends previous research by specifically considering the impact of school connectedness on problem behaviour as well as working to understand which factors might account for change in connectedness over time. As well, this project seeks to fill a gap in the literature by clarifying what is known about the relationship between school connectedness and gender. Three primary questions were explored. First, what are the developmental trajectories of problem behaviour and school connectedness in children as they transition into adolescence? Second, what effect do risk and protective factors have on these trajectories? And finally, what role does school connectedness play in protecting against delinquent outcomes in adolescence?

## **2.2 Methods**

### **2.2.1 Source of Data**

Data from Cycles 4, 5, and 6 of the National Longitudinal Survey of Children and Youth (NLSCY) were used in this study. The NLSCY surveyed non-institutionalized children drawn from Canada's ten provinces. Some children were excluded from participation, including those living on Indian reserves, Crown lands, or in remote regions. Children of full-time members of the Canadian Armed Forces were also excluded. The NLSCY was based in part on the Labour Force Survey (LFS), which utilizes a stratified, multistage probability sampling method to select participants. Further information on the design of the NLSCY is available from Statistics Canada (2008). Data were collected every two years beginning in 1994/1995 (Cycle 1) and ending in 2008/2009 (Cycle 8). The initial longitudinal sample consisted of 22,831 children aged 0 to 11 years in Cycle 1. The response rate for children in the longitudinal sample by Cycle 4 was 84.5% (Statistics Canada, 2001).

Data used in the current study was collected primarily through pencil and paper questionnaires from two sources. First, a comprehensive child self-report measure was provided to selected children in order to gather information on the individual's physical, social, emotional, and behavioural development. Second, the caregiver deemed to be the most knowledgeable about the child (Person Most Knowledgeable; PMK) participated in a computer-assisted interview that collected information about their child's functioning. Caregivers were also asked about their health, education, income, and other demographic information. In 89.8% of cases, the child's biological mother served as the PMK.

All analyses were conducted at the Toronto Research Data Centre. These centres are part of a joint initiative between Statistics Canada, the Social Sciences and Humanities Research

Council, and the Canadian Institutes of Health Research. Access to the NLSCY dataset was permitted by the Research Data Center Access Granting Committee on November 18, 2015. RDC researchers are required to conform to strict confidentiality agreements in order to ensure participant anonymity. As well, all results are vetted by RDC analysts before release. This research was determined to be exempt from review by the University of Toronto Research Ethics Board.

### **2.2.2 Participants**

The sample for this study was children who were 10 or 11 years old in Cycle 4 (time 1, 2000-2001). These individuals were assessed again in Cycle 5 (time 2, 2002-2003) when they were between 12 and 13 years of age and once more in Cycle 6 (time 3, 2004-2005) between ages 14 and 15. Problem behaviour and school connectedness trajectories were determined based on data from these three time points. Risk and protective factor data were gathered in Cycle 4 at time 1. Responses from 2,396 youth with corresponding parent-report data were included in this study. Participants had a mean age of 10.5 at the beginning of this study. Slightly over half the sample was female (50.4%) and the majority (81.4%) of participants were Caucasian. As mentioned, the PMK reported on various demographic variables, risk factors, and other covariates. In terms of age, 2.8% of PMKs were between 15 and 29 years old, 52.4% were between 30 and 39 years old, and 44.7% were 40 years or older. With respect to socioeconomic status, 6.2% of families earned under \$19,999 per year, 22.5% earned between \$20,000 and \$39,999, 27.5% earned between \$40,000 and \$59,999, 19.1% earned between \$60,000 and \$79,999, 11.9% earned between \$80,000 and \$99,999, and 12.7% of families earned \$100,000 or more.

### **2.2.3 Missing Data**

Problem behaviour data was available at two time points for 73.1% of youth and at all three time points for 39.9% of youth. The availability of school connectedness data was similar. Specifically, 82.7% of youth had data available at two time points and 41.5% of youth had data available at all three time points. Full information maximum likelihood was employed to estimate values for participants with missing trajectory data. Rates of missing data in the sample for risk and protective factors reported at time 1 was low and ranged from 0% (parent-reported socioeconomic status) to 5.9% (youth-reported family discord).

### **2.2.4 Measures**

#### **2.2.4.1 Dependent Variables**

##### **2.2.4.1.1 Problem Behaviour**

Youth were asked to self-report their involvement in various forms of delinquent behaviour, including physical aggression, relational aggression, and property offences. Questions relating to physical aggression included whether the student got into fights, the extent to which they react with anger and fighting following an accident, and whether they bully, threaten, or physically attack other people. Questions tapping indirect aggression were based on whether the student perpetrated the following behaviours when they were mad at someone: try to get others to dislike him or her, become friends with another as revenge, get others to not be that person's friend, and telling that person's secrets to a third person. Finally, students rated their participation in various types of property offences, including theft, vandalism, and destroying property. All items were rated on a three-point scale: 1 (Never or not true), 2 (Sometimes or somewhat true), and 3 (Often or very true). These items were recoded to a 0 to 2 scale such that 0

= Never or not true. A total problem behaviour score was created by averaging these items.

Cronbach's alpha for this scale was .80 at time 1, .85 at time 2, and .84 at time 3.

#### **2.2.4.1.2 School Connectedness**

Students responded to ten questions that tapped dimensions related to school connectedness. Students were asked to rate the extent to which they liked school on a scale from 1 (I like school very much) to 5 (I hate school). Self-assessed academic performance was obtained by asking students how well they thought they were doing in their school work. This question was rated on a five-point scale that ranged from 1 (Very well) to 5 (Very poorly). Students were also asked to rate how important it was for them to get good grades, make friends, participate in extra-curricular activities, and learn new things. These items were rated on a four-point scale ranging from 1 (Very important) to 4 (Not important at all). Three questions relating to the student's teacher were asked. These included whether their teacher provided extra help when needed, whether they felt their teacher treated them fairly, and whether they regularly completed homework assigned by the teacher. These items were rated on a five-point scale that ranged from 1 (All the time) to 5 (Never). Finally, students were asked to gauge the extent to which they felt like an outsider or left out of things while at school. This question was also rated on a five-point scale ranging from 1 (All the time) to 5 (Never). Items were reverse coded as required.

Given the variety of scales used for these items, the Proportion of Maximum Scaling Method (POMS) was used to transform scores before being combined into a single scale (Little, 2013). This method subtracts an individual's score from the lowest possible value for the scale. This value is then divided by the maximum possible value subtracted from the minimum possible value. The resulting sum is a proportion that ranges between 0 and 1. This method is preferable

to other forms of standardization as it preserves the absolute distance between observed response values which is particularly important for constructs that are measured longitudinally (Moeller, 2015). Cronbach's alpha for this scale was .65 at time 1, .71 at time 2, and .75 at time 3.

#### **2.2.4.2 Other Protective Factors**

##### **2.2.4.2.1 Self-Esteem**

Youth were asked five questions that assessed their sense of self-esteem, including whether they liked who they were and how they looked, if they had a lot to be proud of, and whether they felt a lot of things about themselves were good. Items were rated on a five-point scale that ranged from 1 (False) to 5 (True). The internal consistency of this scale was .79.

##### **2.2.4.2.2 Social Support**

Four questions were used to examine youth's self-reported level of social support. Specifically, participants were asked whether they had many friends, if they got along easily with their same age peers, whether others their age wanted to be their friend, and whether they were liked by their peers. Items were rated on a five-point scale that ranged from 1 (False) to 5 (True). Cronbach's alpha for this scale was .72.

#### **2.2.4.3 Risk Factors**

##### **2.2.4.3.1 Gender**

Participant gender was drawn from self-report questionnaires. This variable was recoded such that 0 = male and 1 = female.

##### **2.2.4.3.2 Family Discord**

Youth were asked to rate the level of fighting and disagreement they observed between their parents at home. Specifically, participants were asked how well their parents got along with each other, how often they got mad at each other, and how frequently they disagreed with one

another. As well, youth rated parental use of threats, yelling, and physical violence. The item “How well do you think your parents get along with each other?” was rated on a three-point scale ranging from 1 (Very well) to 3 (Not very well). The remaining items were rated on a five-point scale that ranged from 1 (Never) to 5 (Always). Items were standardized using a z-score transformation to account for differences in item scales. The internal consistency for this scale was .67.

#### **2.2.4.3.3 Socioeconomic Status**

The PMK was asked to estimate their total household income from all sources over the past 12 months in order to gauge the socioeconomic status of the family. Based on the distribution of this variable, values were collapsed into six income bands: 1 (\$0 to \$19,999), 2 (\$20,000 to \$39,999), 3 (\$40,000 to \$59,999), 4 (\$60,000 to \$79,999), 5 (\$80,000 to \$99,999), and 6 (\$100,000 or more).

#### **2.2.4.3.4 Low Neighbourhood Cohesion**

The PMK was asked nine questions related to perceptions of safety within their neighbourhood as well as how connected they felt to their community. Specifically, the PMK was asked to rate how they felt about their neighbourhood as a place to bring up children. As well, they rated aspects of neighbourhood safety, whether there were other adults in the neighbourhood they could count on, and if neighbours helped out or worked together to solve problems. Finally, PMKs were asked to assess whether there were other adults in the neighbourhood that their children could look up to. The PMK’s rating of whether the neighbourhood was a safe place to bring up children was assessed using a five-point scale that ranged from 1 (Excellent) to 5 (Very poor). The remaining items were rated on a four-point scale



ranging from 1 (Strongly agree) to 4 (Strongly disagree). Items were standardized using a z-score transformation to account for scale differences. Cronbach's alpha for this scale was .86.

#### **2.2.4.3.5 Primary Caregiver Depression**

The PMK was asked a series of 12 items to gauge their experience of depressive symptomatology. This scale was based on the well-validated Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). Questions tapped typical symptoms of depression, including feelings of sadness, loneliness, difficulty concentrating, low motivation, and lack of hope for the future. PMK's were also asked about disturbances in sleep and appetite. Items were rated on a four-point scale ranging from 1 (Rarely or none of the time) to 4 (Most or all of the time). The internal consistency of this scale was .85.

#### **2.2.4.4 Other Covariates**

##### **2.2.4.4.1 Maternal and Paternal Education**

The PMK was asked to report on their educational attainment, choosing from 4 response options: 1 (Less than secondary school), 2 (Secondary school graduation), 3 (Beyond high school), and 4 (College or university degree). The PMK also reported on their spouse's level of education using the same scale.

#### **2.2.5 Analytic Strategy**

Analyses were conducted using SPSS version 24 and STATA version 14 for Windows and utilized unweighted data. Outliers were handled in a conservative manner. Specifically, data were assessed for outliers using percentiles as well as visually using box plots. A small number ( $n = < 5$ ) of outliers were identified as having problem behaviour scores at greater than the 99.9<sup>th</sup> percentile. These extreme scores were replaced with the next closest non-extreme value. For school connectedness, the criterion for outliers was set at a value greater than 3 times the

interquartile range of the boxplot generated for each time point. Again, a small number ( $n = < 5$ ) of extreme low values were identified and replaced with the next lowest non-extreme value. With respect to other variables used in the study, a small number ( $n = < 5$ ) of outliers were identified in the low neighbourhood cohesion variable. These values were similarly replaced with the next closest non-extreme value. No other outliers were detected in the remaining variables.

Analysis proceeded in three stages. First, descriptive statistics (e.g., means, standard deviations) for all variables were computed. As well, bivariate correlations were produced to determine associations between variables. Intercorrelations between longitudinal variables and other covariates are presented in Table 1 of Appendix A.

Second, semi-parametric mixture modeling using the TRAJ macro for STATA was used to determine trajectories of problem behaviour and school connectedness in youth from age 10 to age 15 by separating participants into groups based on growth patterns (Jones & Nagin, 2013). The TRAJ program first determines the number of trajectory groups then models the specific shape of each trajectory. Given that the current study utilizes data from three time points, only linear trajectories could be explored. A complete description of the statistical underpinnings of the trajectory estimation procedure is available in Nagin (2005). The TRAJ macro utilizes Full Information Maximum Likelihood (FIML) to estimate values for participants that are missing data at one or two of the three time points. Given that the majority of youth in the sample reported very low levels of problem behaviour, trajectories were modeled using a censored normal distribution. This approach is recommended when data cluster at either the minimum or maximum of a scale (Jones, Nagin & Roeder, 2001).

Models were selected based on four factors. First, the Bayesian information criterion (BIC) and the Akaike information criterion (AIC) were examined. The BIC and AIC operate differently based on the number of groups and parameters that are to be estimated. Specifically, the BIC favours parsimony and as a result rewards models with fewer groups or trajectories whereas the AIC penalizes additional estimated parameters. Models with the lowest value for each information criterion were preferred. While there is a high likelihood of agreement between the BIC and the AIC, some researchers (e.g., Kuha, 2004) advocate considering both values during the model selection process. Second, Nagin (2005) recommends selecting models where the average posterior probability of correct group assignment is equal to or greater than .7. These values are calculated post hoc to determine the likelihood that each participant is a member of a specific trajectory group based on their problem behaviour and school connectedness profiles. Third, as the number of groups in the model increases, there is a potential for some groups to become sparsely populated. This can result in trajectory estimates that are unreliable as they are based on a small and potentially insufficient number of individuals (Nagin, 1999). As well, sparsely populated groups hamper follow-up analysis such as multinomial regression to assess the impact of risk factors. Fourth, more parsimonious models (i.e., those with the fewest number of groups) were favoured.

Finally, multinomial regression was used to determine the predictive capacity of risk and protective factors examined in the current study. Bivariate tests of association (ANOVA or Chi-Square, as appropriate) between each factor and trajectory group were conducted in order to determine whether these variables were at least marginally predictive ( $p < .10$ ). Only factors that fell below this value were included in the final multinomial regressions. Results are presented for problem behaviour trajectories first followed by school connectedness trajectories.

## 2.3 Results

### 2.3.1 Descriptive Statistics

Table 1 presents means and standard deviations for self-reported problem behaviour and school connectedness for youth in the study. Problem behaviour scores for the whole sample remained stable across time ( $M = .19$  to  $M = .20$  from time 1 to time 3). School connectedness showed a decline across the study period ( $M = .86$  to  $M = .74$  from time 1 to time 3).

Table 1: Means and standard deviations for longitudinal variables.

Variable	Time 1	Time 2	Time 3
	Mean (SD)	Mean (SD)	Mean (SD)
Problem Behaviour	.19 (.005)	.20 (.006)	.20 (.007)
School Connectedness	.86 (.003)	.78 (.003)	.74 (.003)

Table 2 presents means, standard deviations, and percentages for risk and protective factors as well as other covariates measured at time 1. As noted above, the family discord and low neighbourhood cohesion variables were standardized due to differences in item scales.

Table 2: Means and standard deviations for risk and protective factors.

Variable	Mean (SD)
Family Discord	.00 (.02)
Socioeconomic Status	3.49 (.03)
Low Neighbourhood Cohesion	-.01 (.02)
Primary Caregiver Depression	1.34 (.02)
Maternal Education	2.90 (.02)
Paternal Education	2.85 (.03)
Social Support	4.26 (.02)
Self-esteem	4.42 (.02)
	Percentage
Gender	
Male	49.6
Female	50.4

### 2.3.2 Trajectories of Problem Behaviour

Bivariate correlations between mean problem behaviour scores at each time point are presented in Table 3. Correlations ranged from .24 to .45. All correlations were significant at the

.01 level. Correlations between average problem behaviour scores and other covariates are available in Appendix A.

Table 3: Bivariate correlations among problem behaviour scores from time 1 to time 3.

	Time 1	Time 2	Time 3
Time 1	-	-	-
Time 2	.39**	-	-
Time 3	.24**	.45**	-

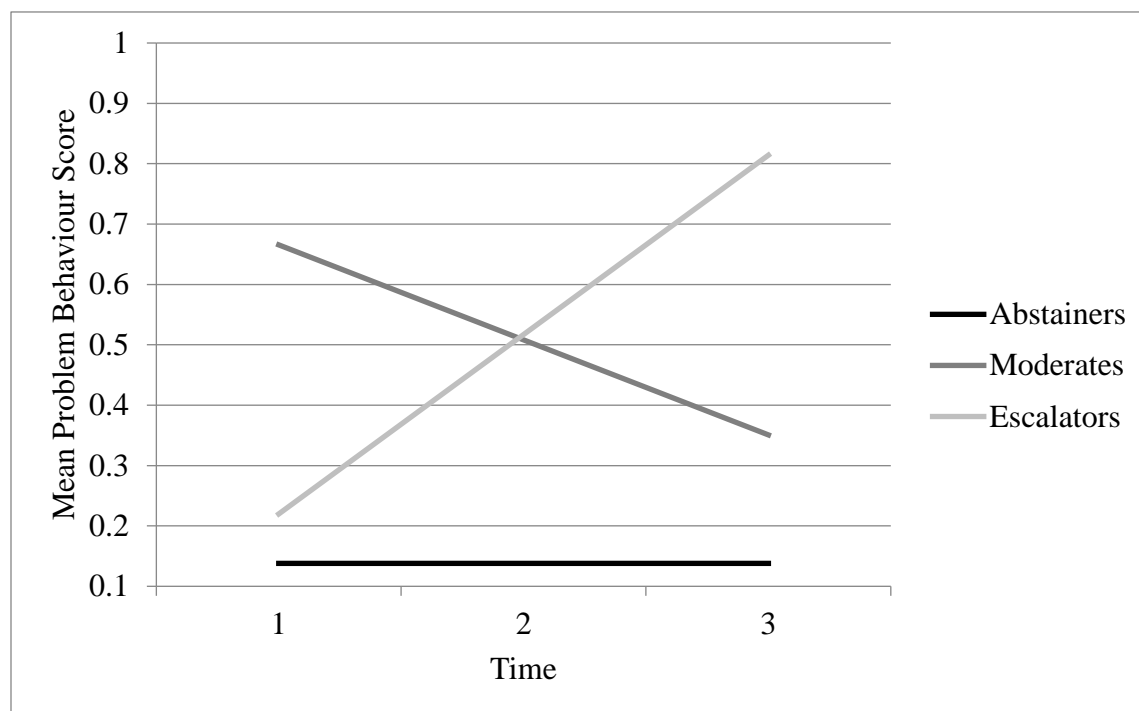
\* ( $p < 0.05$ ), \*\* ( $p < 0.01$ )

The STATA TRAJ macro was used to explore trajectories of problem behaviour. Due to insufficient trajectory data (i.e., no values reported at any time point), 268 individuals were not included in this analysis. This resulted in a final sample size of 2,128 youth. Model selection proceeded by reviewing the BIC, AIC, average posterior probability, and group size for each model. A continued decrease in the BIC and AIC was observed when exploring models with additional groups. As well, models with up to 4 groups displayed average posterior probabilities that fell above Nagin's (2005) recommended .70 cutoff. While a 4 group model showed significantly lower BIC and AIC values, this model returned one group that comprised only 1.5% of the sample. As noted above, such sparse groups may be unreliable and would also hinder follow up analyses. Thus, a 3 group model was selected. Each group in this model was adequately populated and had average posterior probabilities that were above .70. Given that the trajectory of the largest group showed no significant change in problem behaviour over time, this trajectory was set to utilize only the group's intercept. This improved the BIC slightly while the AIC remained unchanged. Further information on these values is available in Appendix A.

As shown in Figure 1, three distinct trajectories of problem behaviour were identified. These trajectories were labeled as abstainers, moderates, and escalators. The abstainers accounted for 86.4% of the sample. Moderates made up 8.7% of the sample. Finally, escalators

comprised 4.9% of the sample. The average posterior probability, or likelihood of correct trajectory group assignment, in the final model was .93 for abstainers, .76 for moderates, and .77 for escalators.

Figure 1: Trajectories of problem behaviour over time.



### 2.3.3 Effect of Risk and Protective Factors on Problem Behaviour Trajectories

Following the specification of trajectories, bivariate tests of association (ANOVAs, Chi-square tests of significance) were then used to assess for significant differences across the abstainer, moderate, and escalator groups. Predictors that showed at least a trend level significance of  $p < .10$  were entered into the final multinomial regression.

Analyses indicated that eight variables differed significantly across problem behaviour trajectories, specifically (1) family discord ( $F = 69.76, p < .001$ ); (2) socioeconomic status ( $F = 5.33, p < .01$ ); (3) low neighbourhood cohesion ( $F = 6.78, p < .01$ ); (4) primary caregiver depression ( $F = 4.41, p < .05$ ); (5) maternal education ( $F = 3.85, p < .05$ ); (6) social support ( $F =$

25.14,  $p < .001$ ); (7) self-esteem ( $F = 56.80$ ,  $p < .001$ ); and (8) gender ( $\chi^2 = 22.47$ ,  $p < .001$ ).

There were no differences across trajectory groups with respect to paternal education ( $p = .37$ ).

Table 4 displays means, standard deviations, and percentages for risk and protective variables separated by problem behaviour trajectory group. Significant differences between groups are denoted with a superscript A, B, or C. Compared to abstainers, individuals on the moderate trajectory of problem behaviour showed significantly higher levels of family discord and primary caregiver depression as well as lower socioeconomic status, maternal education, social support, and self-esteem. Members of the escalator group showed higher levels of family discord relative to abstainers. As well, individuals on this trajectory also reported lower neighbourhood cohesion, social support, and self-esteem compared to abstainers. Significant differences between individuals on the moderate and escalator trajectories were found only for family discord, with moderates reporting significantly more conflict relative to both abstainers and escalators. Gender differences were also observed. Specifically, a significantly larger proportion of boys were found in both the moderate and escalator trajectory groups. Paternal education did not differ significantly different across trajectory groups.

Table 4: Bivariate associations between trajectory group and risk and protective factors.

	Abstainers	Moderates	Escalators
	Mean (SD)	Mean (SD)	Mean (SD)
Family Discord <sup>a,b,c</sup>	-.06 (.57)	.58 (.75)	.18 (.52)
Socioeconomic Status <sup>a</sup>	3.54 (1.43)	3.17 (1.48)	3.35 (1.42)
Low Neighbourhood Cohesion <sup>b</sup>	-.04 (.68)	.08 (.71)	.19 (.62)
Primary Caregiver Depression <sup>a</sup>	1.33 (.44)	1.44 (.52)	1.35 (.44)
Maternal Education <sup>a</sup>	2.92 (1.04)	2.68 (1.10)	2.87 (1.06)
Paternal Education	2.87 (1.11)	2.85 (1.12)	2.69 (1.13)
Social Support <sup>a,b</sup>	4.30 (.64)	3.90 (.77)	4.11 (.64)
Self-esteem <sup>a,b</sup>	4.48 (.56)	3.97 (.74)	4.11 (.79)
	Percentage	Percentage	Percentage
Gender <sup>a,b</sup>			
Male	47.4	62.2	62.9
Female	52.6	37.8	37.1

Note:

<sup>a</sup> Significant difference between the abstainer group and the moderate group ( $p < 0.05$ );

<sup>b</sup> Significant difference between the abstainer group and the escalator group ( $p < 0.05$ );

<sup>c</sup> Significant difference between the moderate group and the escalator group ( $p < 0.05$ ).

Table 5 displays results of a multinomial logistic regression that was conducted to assess the predictive capacity of risk and protective factors on trajectory group membership. The abstainer trajectory was utilized as the reference category for this analysis. Compared to abstainers, individuals on the moderate trajectory were significantly more likely to report higher levels of family discord and lower social support and self-esteem. As well, these individuals were more likely to be male. Escalators reported significantly greater family discord along with lower levels of neighbourhood cohesion and self-esteem relative to individuals on the abstainer trajectory.



Table 5: Multivariate effects on problem behaviour trajectory membership.

	Problem Behaviour Trajectory Group			
	Moderates		Escalators	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Family Discord	3.12***	[2.25, 4.32]	1.60*	[1.05, 2.44]
Socioeconomic Status	.94	[.80, 1.11]	.82	[.67, 1.01]
Low Neighbourhood Cohesion	1.09	[.80, 1.50]	1.79**	[1.20, 2.67]
Primary Caregiver Depression	1.05	[.69, 1.59]	.82	[.46, 1.46]
Maternal Education	.84	[.68, 1.04]	1.09	[.84, 1.40]
Social Support	.67*	[.49, .91]	.90	[.60, 1.34]
Self-Esteem	.56***	[.41, .77]	.55**	[.37, .82]
Gender	.48**	[.31, .74]	.62	[.37, 1.05]

Note: The abstainer trajectory group served as the reference category. \* ( $p < 0.05$ ), \*\* ( $p < 0.01$ ), \*\*\* ( $p < 0.001$ )

### 2.3.4 Trajectories of School Connectedness

Table 6 presents bivariate correlations between mean school connectedness values at each time point. Correlations ranged from .36 to .48. All correlations were significant at the .01 level. Table 1 of Appendix A lists correlations between school connectedness at each time point and other covariates.

Table 6: Bivariate correlations among school connectedness scores from time 1 to time 3.

	Time 1	Time 2	Time 3
Time 1	-	-	-
Time 2	.42**	-	-
Time 3	.36**	.48**	-

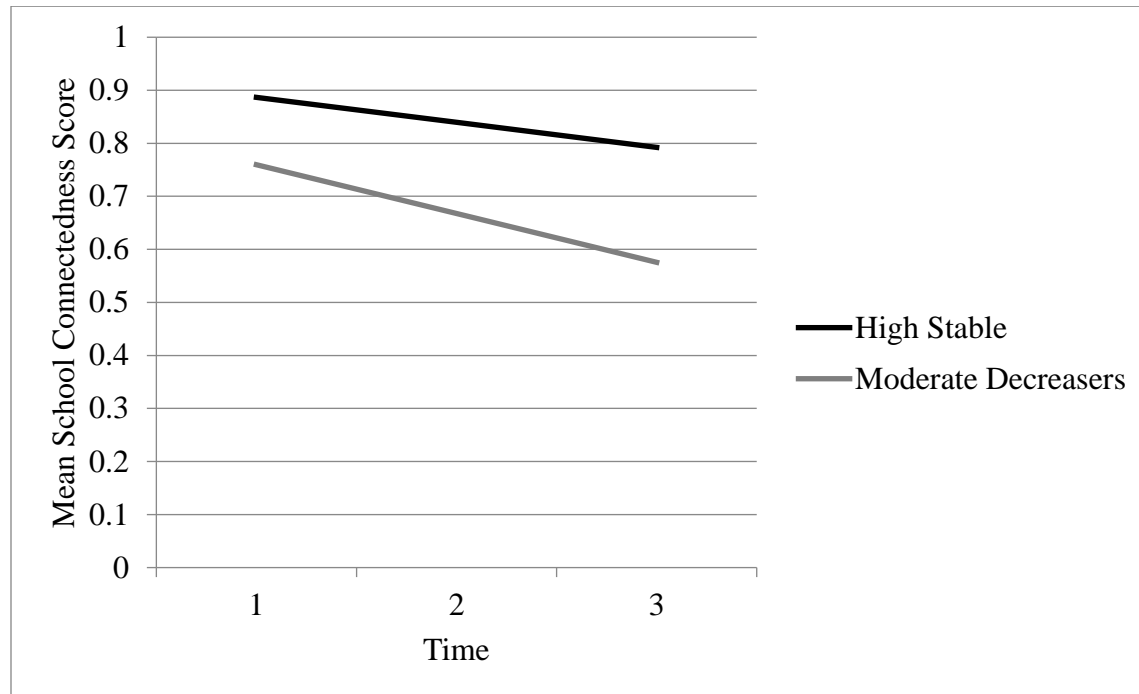
\* ( $p < 0.05$ ), \*\* ( $p < 0.01$ )

School connectedness trajectories were also examined using STATA TRAJ. Sufficient trajectory data was available for 2,119 participants. As with the above analysis of problem behaviours, it was only possible to explore linear trajectories. Models with varying numbers of groups were explored with a two group model ultimately being chosen. This model was selected for several reasons. First, the adequate posterior probability of correct group assignment was very high for both trajectory groups. As well, both groups were sufficiently populated. While the

BIC and AIC were lowest in a single group model, analysis revealed that a two group model was favourable to models with three or more groups. Finally, past research (e.g., Li & Lerner, 2011; Loukas, Cance, & Batanova, 2016; Wang & Dishion, 2012) has identified multiple trajectories of school connectedness that vary based on gender, mental health status, socioeconomic status, and other variables. Indeed, bivariate and multinomial analysis of risk and protective factors revealed distinct differences among members of these trajectories. Thus, a two group model was selected and used in further analyses. Further model selection data is available for review in Appendix A.

Two distinct trajectories of school connectedness were identified: high stable and moderate decreasers. Individuals in the high stable group accounted for 74.5% of the sample while moderate decreasers comprised 25.5% of the sample. Figure 2 displays these trajectories graphically.

Figure 2: Trajectories of school connectedness over time.



### 2.3.5 Effect of Risk and Protective Factors on School Connectedness Trajectories

A series of bivariate tests were run to assess differences in risk and protective factors across school connectedness trajectories. Analyses revealed significant differences between trajectory groups for all covariates, including (1) family discord ( $F = 75.91, p < .001$ ); (2) socioeconomic status ( $F = 20.33, p < .001$ ); (3) low neighbourhood cohesion ( $F = 12.29, p < .001$ ); (4) primary caregiver depression ( $F = 18.34, p < .001$ ); (5) maternal education ( $F = 12.51, p < .001$ ); (6) paternal education ( $F = 8.77, p = < .01$ ); (7) social support ( $F = 120.86, p < .001$ ); (8) self-esteem ( $F = 179.15, p < .001$ ); and (9) gender ( $\chi^2 = 38.45, p = < .001$ ).

Table 7 displays means, standard deviations, and percentages for risk and protective variables separated by school connectedness trajectory group. When compared to individuals in the high stable group, moderate decreaseers showed significantly higher levels of family discord and primary caregiver depression. Members of the moderate decreaseer group also reported

significantly lower socioeconomic status, neighbourhood cohesion, maternal and paternal education, social support, and self-esteem. Gender was also related to trajectory membership, with males significantly more likely to fall on the moderate decreaser trajectory.

Table 7: Bivariate associations between trajectory group and risk and protective factors.

	High Stable	Moderate Decreasers
	Mean (SD)	Mean (SD)
Family Discord <sup>a</sup>	-.07 (.57)	.24 (.67)
Socioeconomic Status <sup>a</sup>	3.58 (1.42)	3.24 (1.43)
Low Neighbourhood Cohesion <sup>a</sup>	-.04 (.67)	.09 (.70)
Primary Caregiver Depression <sup>a</sup>	1.31 (.41)	1.41 (.53)
Maternal Education <sup>a</sup>	2.94 (1.03)	2.75 (1.11)
Paternal Education <sup>a</sup>	2.90 (1.10)	2.70 (1.13)
Social Support <sup>a</sup>	4.36 (.60)	3.95 (.74)
Self-esteem <sup>a</sup>	4.53 (.51)	4.08 (.77)
	Percentage	Percentage
Gender <sup>a</sup>		
Male	45.6	61.0
Female	54.4	39.0

Note: <sup>a</sup> Significant difference between the high stable group and the moderate decreaser group ( $p < 0.05$ ).

Results from the multinomial regression examining the effect of risk and protective factors on trajectory group membership are presented in Table 8. The high stable school connectedness trajectory was utilized as the reference category. Compared to individuals on the high stable trajectory, moderate decreasers were more likely to report higher levels of family discord and lower socioeconomic status and neighbourhood cohesion. As well, moderate decreasers also reported significantly lower social support and self-esteem. Gender differences were also observed such that males were more likely to fall on the moderate decreaser trajectory.

Table 8: Multivariate effects on school connectedness trajectory membership.

	School Connectedness Trajectory Group	
	Moderate Decreaser	
	Odds Ratio	95% CI
Family Discord	1.48**	[1.14, 1.93]
Socioeconomic Status	.86*	[.76, .97]
Low Neighbourhood Cohesion	1.26*	[1.00, 1.58]
Primary Caregiver Depression	1.12	[.79, 1.59]
Maternal Education	.90	[.77, 1.04]
Paternal Education	.91	[.79, 1.05]
Social Support	.55***	[.44, .69]
Self-Esteem	.44***	[.34, .57]
Gender	.59**	[.44, .80]

Note: The high stable trajectory group served as the reference category.

\* ( $p < 0.05$ ), \*\* ( $p < 0.01$ ), \*\*\* ( $p < 0.001$ )

### 2.3.6 Effect of School Connectedness Trajectories on Problem Behaviour Group

#### Membership

School connectedness trajectories were then used to predict a student's problem behaviour trajectory membership. All significant predictors from both of the above multinomial regressions were included to assess the role that an individual's trajectory of school connectedness played above and beyond the predictive impact of these other variables. Table 9 displays the results of this analysis. Individuals on the moderate problem behaviour trajectory reported significantly lower levels of social support and self-esteem. These individuals were also more likely to be male and to report higher levels of family discord. Members of the escalator trajectory group reported significantly lower levels of neighbourhood cohesion relative to both abstainers and moderates.

When considering the role of school connectedness, individuals on the moderate decreaser trajectory were significantly more likely to fall on either of the two concerning problem behaviour trajectories. Specifically, youth on this school connectedness trajectory were

2.20 times [CI: 1.40, 3.46] more likely to be on the moderate problem behaviour trajectory and 4.50 times [2.59, 7.84] more likely to be on the escalator problem behaviour trajectory.

Table 9: Multinomial logistic regression predicting problem behaviour group membership.

	Problem Behaviour Trajectory Group			
	Moderates		Escalators	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Family Discord	3.11***	[2.26, 4.28]	1.42	[.93, 2.17]
Socioeconomic Status	.96	[.82, 1.13]	.85	[.70, 1.04]
Low Neighbourhood Cohesion	1.03	[.75, 1.40]	1.64*	[1.11, 2.44]
Maternal Education	.88	[.71, 1.07]	1.10	[.86, 1.41]
Social Support	.72*	[.52, .98]	1.05	[.70, 1.58]
Self-Esteem	.66*	[.47, .91]	.72	[.48, 1.09]
Gender	.53**	[.34, .81]	.68	[.41, 1.15]
Moderate Decreaser School Connectedness Trajectory	2.20**	[1.40, 3.46]	4.50***	[2.59, 7.84]

Note: The abstainer trajectory group served as the reference category.

Table 10 displays results of a second multinomial regression that was run to determine the strength of the association between school connectedness and problem behaviour without regard to other covariates. This analysis revealed that individuals on the moderate decreaser school connectedness trajectory were 4.59 times [CI: 3.36, 6.27] more likely to be on the moderate problem behaviour trajectory and 6.59 times [CI: 4.37, 9.95] more likely to be on the escalator problem behaviour trajectory.

Table 10: School connectedness trajectory predicting problem behaviour group membership.

School Connectedness Trajectory Group	Problem Behaviour Trajectory Group			
	Moderates		Escalators	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Moderate Decreaser School Connectedness Trajectory	4.59***	[3.36, 6.27]	6.59***	[4.37, 9.95]

Table 11 displays the percentage of individuals falling into each school connectedness trajectory separated by problem behaviour trajectory.

Table 11: School connectedness group membership separated by problem behaviour group.

Problem Behaviour Trajectory Group	School Connectedness Trajectory Group	
	High Stable ( <i>n</i> = 1580)	Moderate Decreasers ( <i>n</i> = 539)
	Percentage	Percentage
Abstainers	92.2	69.4
Moderates	5.3	18.4
Escalators	2.5	12.2

## 2.4 Discussion

The current study sought to examine trajectories of problem behaviour and school connectedness as well as specific factors that predict trajectory group membership across the early to mid-adolescent period. Three trajectories of problem behaviour were identified: abstainers, moderates, and escalators. Abstainers, which accounted for the majority of the sample, demonstrated none or very little problem behaviour over time. Moderates showed higher initial levels of problem behaviour that remained relatively stable. Finally, escalators demonstrated comparatively lower initial levels of problem behaviour that increased considerably by the end of the study period. This finding is generally consistent with existing literature on the development of delinquent behaviours across early to mid-adolescence. Past research (e.g., Bongers, Koot, Ende, & Verhulst, 2004; Broidy et al., 2003; Nagin & Tremblay, 1999) has found between three and five trajectory groups, with the large majority of youth perpetrating little to no problem behaviour over time. As well, existing research has shown that between 3% and 10% of individuals in a sample will exhibit significant problem behaviour, which was the case in the current study (Brame, Nagin, & Tremblay, 2001; Broidy et al., 2003).

Interestingly, a high-stable problem behaviour group (i.e., significant levels of aggression at all time points) was not identified. While this may be due in part to differences in trajectory group nomenclature, it may also be an artifact of the restricted time period that was examined in the current study. For example, Pepler, Jiang, Craig, and Connolly (2008) plotted trajectories of

aggression for a large sample of youth followed from age 10 to 17. The researchers identified four trajectory groups, including abstaining, moderate, high, and desisting. Pepler and colleague's (2008) high-stable group exhibited a pattern of offending from age 10 to 14 that was very similar to the escalator trajectory group in the current study before plateauing for the remainder of the period (Pepler et al., 2008). Future research that follows youth over longer periods will help to reveal a more complete profile of offending.

Two distinct trajectories of school connectedness were identified: high stable and moderate decreaseers. High stable individuals were those that showed a high level of connectedness over the study period. Moderate decreaseers, which accounted for a substantial proportion (25.5%) of participants, showed a lower initial level of school connectedness as well as a steeper decline over time. While connectedness was lower for both groups by time 3, the drop among moderate decreaseers was significantly greater than those on the high stable trajectory. The finding of two distinct trajectories is unique to the current study, as much of the existing literature on school connectedness has identified only a general declining trend without further differentiating individuals into separate groups (Wang & Dishion, 2012). The current study also sought to classify individuals on the basis of specific factors, described below, that help to explain differences in connectedness. This work is important as separating students into finer-grained trajectories aids in both predicting outcomes as well providing additional data for the tailoring intervention efforts.

However, perhaps the most striking finding involved the association between school connectedness and adolescent problem behaviour. Specifically, youth on the moderate decreaseer school connectedness trajectory were 2.2 times more likely to fall onto the moderate problem behaviour trajectory and 4.5 times more likely to fall onto the escalator problem behaviour



trajectory. When examining school connectedness in isolation of other risk and protective factors, youth with this profile of connectedness were 4.6 times and 6.6 times more likely to fall onto the moderate and escalator behaviour trajectories, respectively. These results emphasize the need to better understand the bidirectional impact that disconnecting from school may have on the manifestation of problem behaviour in adolescence. Indeed, connectedness to school serves several critical functions. First, it serves to buffer risk that may be present in other areas of a youth's life. For example, research by Loukas, Roalson, and Herrera (2010) found that school connectedness significantly reduced the negative impact of low quality parent-child relationships. Connectedness may also help to attenuate other familial problems such as low socioeconomic status. Specifically, schools are well placed to provide supplemental resources such as food or supplies that may not be available within the youth's home (Basch, 2011).

Youth that are connected to their school are also afforded opportunities to develop prosocial connections to both peers and teachers, the presence of which has been linked to decreased levels of adjustment problems throughout the adolescent period (Li & Lerner, 2011; Loukas, Cance, & Batanova, 2016). The association between connectedness and engagement in delinquent behaviour may be mediated in part through perceptions related to the cost of deviance on a student's social standing (Crosnoe, Erickson, & Dornbusch, 2002). Connected students are more likely to internalize prosocial norms, rules, and expectations, providing them with further incentive to avoid perpetrating delinquent behaviours (Loukas, Ripperger-Suhler, & Horton, 2009). Youth who develop positive social connections are also better equipped to navigate situations where peer pressure may lead to engagement in risky activities such as substance use or vandalism (Way, Reddy, & Rhodes, 2007; Li & Lerner, 2011).

### 2.4.1 Profiles of Risk and Protection

Following an ecological perspective, a series of multivariate analyses were conducted to evaluate the impact of well-established risk and protective influences that exist within the youth and various microsystems in order to determine their impact on trajectory group membership. Significant differences were apparent among youth on the moderate and escalator trajectories, with these individuals showing both greater risk as well as fewer protective resources. First, greater levels of family discord were common to youth on either of the troubling problem behaviour trajectories. Discord was similarly predictive of being on the moderate decreaser school connectedness trajectory. This finding is consistent with past research that has identified associations between high levels of family conflict and increased delinquency, substance use, and peer interaction problems in adolescence (Lopez, Perez, Ochoa, & Ruiz, 2008; Moffitt, 2013). Children living within these home environments also have more difficulties engaging in academic tasks as well problems with attention, concentration, and sleep (Hildenbrand et al., 2012).

Youth on the escalator problem behaviour trajectory as well as the moderate decreaser school connectedness trajectory were also more likely to live in neighbourhoods with poor levels of cohesion. Lack of cohesion has been associated with increased perpetration of aggression and violence (Kamphuis et al., 2010). Coupled with weaker social norms against delinquent behaviour, these neighbourhoods may serve as an avenue for youth to associate with and learn from antisocial peers (Herrenkohl et al., 2000). These neighbourhoods are also less likely to offer resources and supports that may help to reduce the likelihood of engagement in delinquent behaviour (Farrington, 2005). These findings highlight the role that the school may play in buffering neighbourhood risk. Indeed, careful planning with respect to allocation of funding will

be critical to ensure that schools in these neighbourhoods are equipped to support their communities adequately (Basch, 2011).

The profile of risk and protection for youth on the abstainer trajectory rests in stark contrast to those on either of the concerning problem behaviour trajectories, with these youth reporting both lower levels of all risk variables as well as the presence of significantly greater protective resources. Specifically, both social support and self-esteem imparted a strong protective effect against problem behaviour. These variables have long been identified as key in promoting healthy adjustment at all stages of development, though may be particularly crucial as children transition into adolescence (Bava & Tapert, 2010; Veselka et al., 2009). Adequate social support, especially from prosocial peers, has been shown to have far-reaching effects on risk at the level of the individual, family, and neighbourhood (Stevens, Morash & Park, 2011). As well, high self-esteem may better equip a youth with the confidence to resist negative peer influences and avoid engagement in antisocial behaviour (Kim et al., 2018; Veselka et al., 2009). Both factors were also strongly associated with trajectories of school connectedness. This was expected given that youth with higher levels of self-esteem are more likely to report stronger connections to their peers and teachers (King, Vidourek, & McClellan, 2002). As well, socially connected youth tend to place a higher value on their education as well as participate in more extracurricular activities (Lam et al., 2012).

As noted above, a strong association was identified between school connectedness and problem behaviour such that well-connected youth were much more likely to fall on the abstainer problem behaviour trajectory. Importantly, it should be noted that the relationship between school connectedness and problem behaviour is likely reciprocally determined. For example, research by Loukas, Ripperger-Suhler, and Horton (2009) examined connectedness to school and

early adolescent conduct problems in a sample of middle school students. The researchers found that well-connected students were less likely to engage in problem behaviour (Loukas, Ripperger-Suhler, & Horton, 2009). Conversely, youth that exhibited greater externalizing problems were more likely to associate with deviant peers, leading to further alienation from their school one year later (Loukas, Ripperger-Suhler, & Horton, 2009).

What emerges from this analysis are profiles of risk and protection that can be used to help predict a student's trajectory of problem behaviour and identify which students may be most in need of support. As well, layering the presence or absence of protective factors yields a more complete estimate of future behaviour. While findings relating to school connectedness were robust, it should be noted that just under 8% of well-connected youth also reported some engagement in problem behaviour. Future research could explore this subgroup of well-connected yet delinquent youth in order to outline potential differences in terms of psychosocial stressors.

#### **2.4.2 Gender Differences**

Gender has long been identified as a risk factor for engagement in externalizing behaviour (Martino et al., 2008). Consistent with past research, the current study found that males were significantly less likely than female participants to fall on the abstainer trajectory. The current study also sought to address and clarify gaps in the literature regarding the association between gender and school connectedness. Based on multivariate analyses, boys in the sample were more likely to fall on the moderate decreaser school connectedness trajectory relative to girls. This is consistent with findings from Wang and Dishion (2012), who noted that while both genders tend to report declines in connectedness over time, this decline is sharper among boys.

Several explanations have been advanced to account for gender differences in connectedness. For example, Lam and colleagues (2012) note that boys tend to experience school less favourably than girls while also showing reduced motivation with respect to achievement. This may be due in part because girls generally perceive school as more supportive of their learning and emotional needs relative to boys (Loukas, Ripperger-Suhler, & Herrera, 2009). Other research by Way, Reddy, and Rhodes (2007) has found that girls are often perceived and rated as harder workers relative to boys within the classroom.

The identification of gender-specific findings with respect to school connectedness is particularly important when coupled with the already well-supported association between male gender and problem behaviour (Broidy et al., 2003). Specifically, these results suggest that boys are more likely to exhibit delinquent and aggressive behaviour while also simultaneously at a higher risk for disengaging from school. The reciprocal nature of school connectedness and problem behaviour is such that these aggressive youth will face additional challenges connecting to their school over time (Loukas, Ripperger-Suhler, & Horton, 2009). Knowledge of gender differences in the perception of critical aspects of school life (e.g., teacher support, whether the student is thought of as a hard worker, feelings relating to fairness, etc.) provides relevant data that can be used to inform intervention efforts to promote connectedness while reducing the occurrence of problem behaviour especially among boys (Wang & Dishion, 2012). Indeed, some researchers (e.g., Mann, Smith, & Kristjansson, 2015) have advocated for gender specific intervention programs designed to target the unique needs of girls and boys in building a sense of connection to school.

### 2.4.3 Implications

Taken together, these results highlight the importance of utilizing an ecological approach to consider both traditional avenues of risk and protection as well as less well-studied factors such as school connectedness. The current study also adds to the literature by helping to establish profiles of risk and protection that may impact developmental outcomes. These profiles may be useful in helping to target students most in need of intervention, such as youth with few peer supports or those living in risky neighbourhood environments. By fostering a sense of connection to the school community, the school may then serve as an important anchor for youth while also allowing for the development of other protective factors such as improved self-esteem, greater association with prosocial peers, or access to a trusting adult (Borofsky et al., 2013; Kim et al., 2018; Veselka et al., 2009).

School connectedness is a particularly important target as it is amenable to change through school-based intervention programs (Battistich, Schaps, & Wilson, 2004). As well, given the strength of the association between school connectedness and problem behaviour, interventions may yield particularly robust effects in reducing delinquency (Simons-Morton & Chen, 2009). Catalano and colleagues (2004) describe one such program that has been investigated as part of the Seattle Social Development Project and the Raising Healthy Children program. Based on the concept that children learn patterns of appropriate behaviour from their social environment, youth are taught specific skills that promote commitment and bonding to the school as well as prosocial peer groups. Catalano and colleagues (2004) argue that it is these bonds that serve to inhibit delinquency as these behaviours are inconsistent with social norms and attitudes that develop when youth associate with prosocial peers. Implementation of this program yielded significant reductions in externalizing behaviour as rated by teachers as well as

improvement in bonding, classroom participation, and academic achievement (Catalano et al., 2004).

The effects of interventions that seek to promote connectedness to school also tend to be quite durable. For example, Battistich, Schaps, and Wilson (2004) examined the long-term impact of a comprehensive school connectedness intervention program for youth in elementary school. This intervention focused on developing “caring communities of learners” by improving student’s sense of community, achievement motivation, commitment to prosocial behaviours and norms, and problem solving skills (Battistich, Schaps, & Wilson, 2004, p. 245). Treatment was delivered at the level of the classroom and whole school and also included a family support component. The researchers later examined the functioning of middle school youth who had participated in the program several years earlier when they were in elementary school (Battistich, Schaps, & Wilson, 2004). Youth that received the intervention showed reduced engagement in problem behaviour as well as improved academic performance and greater association with prosocial peers. There was also evidence of a dose-dependent response effect, with youth that were placed in the high-implementation group showing the largest and longest-lasting effects relative to youth in other treatment conditions (Battistich, Schaps, & Wilson, 2004).

The identification of an effect between gender and school connectedness in the current study also has important implications for intervention. Specifically, it is possible that supports which target male and female students differentially may be more impactful given their varying developmental needs during the transition to adolescence (Mann et al., 2015). For example, boys tend to hold lower academic expectations for themselves (Warrington, Younger, & Williams, 2000). Further, girls appear more willing to engage in and complete school activities even when they find them to be challenging or unenjoyable (Freudenthaler, Spinath, & Neubauer, 2008).

Thus, it may be necessary to provide additional supports for boys with the goal of improving motivation to complete school activities while also tailoring task difficulty such that they are able to experience regular and meaningful academic success. These customized supports may also be particularly important during transitions between schools when students who may already be on a declining trajectory of connectedness must then re-establish bonds within a new school environment (Loukas, Cance, & Batanova, 2016).

#### **2.4.4 Limitations**

While the current study yields several important findings regarding trajectories of problem behaviour and school connectedness as well as the factors that predict trajectory group membership, several limitations should be noted. First, it was only possible to explore linear trajectories as opposed to higher order trajectories (e.g., cubic, quadratic). This was due to substantial changes to the self-report questionnaire given to youth aged 10 to 15 years old compared to youth 16 years or older. Additional longitudinal data, especially during the latter half of adolescence, may be particularly relevant for trajectories of delinquency. For example, a number of researches (e.g., Karriker-Jaffe, Foshee, Ennett, & Suchindran, 2008; Sampson, Morenoff, & Raudenbush, 2005) have noted that aggression in adolescence may follow a curvilinear pattern which can only be modeled using data available at four or more time points. Such considerations highlight the importance of creating developmentally appropriate measures that allow sufficient flexibility for studying change in these behaviours across the entire adolescent period.

As with any secondary analysis, researchers are limited to the data collected at the time the study was conducted. The inclusion of a broader range of questions such as the extent to which youth associate with deviant peers or additional information regarding the quality of the



teacher-student relationship may be useful in developing a richer understanding of school connectedness. The presence of whole-school data would also allow for multi-level analysis such as nested models to explore for possible between-school effects on school connectedness and problem behaviour.

Risk and protective factor data captured on self-report questionnaires represent only a snapshot in time, when youth were between 10 and 11 years of age. As a result, the current study did not include certain early life factors that may have impacted the likelihood of falling on a specific behavioural or school connectedness trajectory. Similarly, some variables (e.g., social support, self-esteem) are more malleable over time and thus future research that explores these effects in a time-varying manner may be informative. While the TRAJ macro allows for the assessment of time-varying binary variables, other modeling approaches would be required to study continuous variables.

#### **2.4.5 Conclusions**

Despite these limitations, the current study adds to the literature on both the development and course of problem behaviour in adolescence and confirms the role of well-known risk and protective factors that impact these trajectories. This study also helps to clarify how school connectedness changes over the early to mid-adolescent period and identified specific factors that predict differences in youth's perception of connectedness. The emergence of a particularly strong association between problem behaviour and school connectedness as well as differential gender outcomes provide important information that can be incorporated into intervention efforts directed towards students such as those that may be at a higher risk of becoming disconnected from school.

Future research exploring change in connectedness over a longer time period or bracketing specific events such as transitions from elementary school to high school would be helpful to further clarify where interventions may be most effective (Battistich, Schaps, & Wilson, 2004). Such interventions are especially critical for those youth that show early signs of engagement in problem behaviour (i.e., youth on the escalator trajectory) as well as those reporting among the lowest levels of connectedness to school.

## 3 Chapter Three

### Study Two

#### 3.1 Introduction

The transition from childhood to adolescence is marked by significant change across physical, behavioural, and social domains (Bava & Tapert, 2010). Youth face increasing academic demands during this period while also transitioning into new and often larger educational settings such as from elementary school to high school. The difficulty of navigating these developmental challenges may place youth at greater risk for engagement in problem behaviours such as aggression and property offences (Masten & Reed, 2009; Wang & Dishion, 2012). A growing number of researchers (e.g., Bond et al., 2007; Borofsky et al., 2013; Loukas, Cance, & Batanova, 2016) have marked school connectedness as a critical, yet understudied, factor that may serve to buffer the stress of this developmental period. School connectedness refers to a student's level of "commitment to school and a belief that school is important" (Bond et al., 2007, p. 357). The concept of connectedness centers upon a youth's feelings of fairness, the quality of the relationship between the student and their teacher, access to support, and the degree of importance placed on academic success (Libbey, 2004). Youth who feel more connected to their school report fewer adjustment and behavioural problems as well as improved academic and social functioning (Way, Reddy, & Rhodes, 2007; Wang & Dishion, 2012). Connected students are also afforded with opportunities to further develop their own protective assets that may shield against other risks such as low socioeconomic status or familial mental health issues (Borofsky et al., 2013; Goodman et al., 2011).

The degree to which youth feel connected to their school is multiply determined by factors at the level of the individual, the classroom, and the school (Way, Reddy, & Rhodes,

2007). While previous research has identified a number of individual factors that account for differences in perceptions of connectedness, comparatively less work has explored classroom and school factors that may impact this construct (Wang & Dishion, 2012). In addition to helping explain why some students feel more connected to their school than others, a number of researchers (e.g., Battastich, Schaps, & Wilson, 2004; Waters, Cross, & Shaw, 2010) have pointed out that classroom and school characteristics may also be more amenable to change relative to individual-level factors and thus serve as important targets for intervention.

The current study examined key individual, classroom, and school factors that relate to connectedness using data from the National Longitudinal Survey of Children and Youth. This dataset provides a unique opportunity to explore these influences within a Canadian context. Importantly, a richer understanding of the impact of these factors can help to inform extant programs that work to promote connectedness with the goal of improving academic adjustment and functioning across the adolescent developmental period.

### **3.1.1 School-Ecological Theory**

Examining connectedness by taking into account a school's ecology provides a useful theoretical framework for understanding the dynamic relationships between specific individual-, classroom-, and school-level factors (Waters, Cross, & Shaw, 2010). School ecology is a natural extension of Bronfenbrenner's (1979) socio-ecological theory that places enhanced focus on the structural, functional, and built characteristics of the school. The structural level includes factors such as the number of students taught within the school and the socioeconomic status of families served by the school. School policies and programs that guide learning or discipline are included as part of the functional level. The built level includes physical aspects of the school such as the

quality of educational facilities or the presence of graffiti on school property (Waters, Cross, & Shaw, 2010).

A school ecology model also takes into account the dynamic and reciprocal interactions that arise between different levels of the school system (Waters, Cross, & Runions, 2009). For example, interactions between teachers and the administration may impact how effectively a teacher is able to operate and manage their classroom by providing varying degrees of autonomy and oversight. Similarly, school-wide policies exert control over both the individual student as well as their teacher and classroom unit (Luiselli, Putnam, Handler, & Feinberg, 2005). A student's individual characteristics also interact with and are affected by aspects of the school's structural, functional, and built ecology. For instance, a significant contributor to school connectedness includes student perceptions of fairness with respect to the management of discipline problems (Libbey, 2004). School policies at the functional level that seem unfair or unevenly applied may impart a negative effect on connectedness. As well, built aspects such as the layout of the school or the presence of supervision and monitoring may determine in part the potential for students to engage in delinquent behaviour (Stevens, Morash, & Park, 2011).

### **3.1.2 Individual-Level Factors Affecting School Connectedness**

Although the importance of taking into account the full ecology of a school has been recognized in theoretical models, the majority of past research into connectedness has concentrated on factors specific to the individual such as gender and academic achievement (Wang & Dishion, 2012). With respect to gender, boys tend to report lower levels of connectedness relative to girls (Crosnoe, Erickson, & Dornbusch, 2002; Lam et al., 2012). Trajectory analysis and multinomial regression from the first study in this dissertation revealed that boys were indeed more likely to report both poorer initial school connectedness as well as

steeper declines over time. These differences may be related in part to how teachers perceive effort, with girls being thought of as harder workers (Way, Reddy, & Rhodes, 2007). As well, several researchers (e.g., Lam et al., 2012) have noted that boys report lower intrinsic motivation towards school relative to girls. These differences may manifest as a reduced willingness to complete homework, participate in class, and engage in extracurricular activities (Lam et al., 2012).

High achieving students tend to report feeling significantly more connected to school (Catalano et al., 2004; Simons-Morton & Chen, 2009). For example, in a longitudinal study of 330 sixth-grade students, Niehaus, Rudasill, and Rakes (2012) found that students with the strongest academic performance also reported the highest degree of connection to their school. Further, while the researchers found that connectedness tended to drop for all students over the study period, those who were among the highest achieving reported the smallest decline in connectedness (Niehaus et al., 2012). Students that perform well academically also often receive more support from their classroom teacher, which may account in part for the trend towards improved connectedness (Chen, 2005).

Arriving at school sufficiently prepared to learn is another important factor to consider in explaining perceptions of connectedness (Basch, 2011; Kleinman et al., 2002). For example, Basch (2011) notes that social functioning, mental health, and connectedness are negatively impacted by hunger, with students who miss breakfast reporting worse outcomes on these measures. Conversely, being prepared for school means that a student is well fed and rested, dressed appropriately, and has with them all necessary materials (e.g., writing utensils, paper, textbooks, etc.) for the day. Given that children depend on parental support for many of these tasks, school preparedness is likely also a reflection of a family's socioeconomic status as well as

a parent's ability to engage in and support their child's daily living and educational needs (Thompson et al., 2006).

Students who exhibit externalizing behaviour such as aggression and conduct problems also report feeling significantly less connected to their schools (Doumen et al., 2008; Wang & Dishion, 2012). This is important given that a growing body of research has recognized that school connectedness may serve as a powerful buffer against these delinquent outcomes (Loukas, Cance, & Batanova, 2016). The first study in this dissertation examined delinquency and school connectedness across early to mid-adolescence. Trajectory analyses revealed a strong association between youth's perception of connectedness to school and perpetration of problem behaviour. Specifically, youth that reported lower as well as worsening school connectedness over the study period were between 2.2 and 4.5 times more likely to fall on either a moderate or escalator problem behaviour trajectory after accounting for variance in other well-studied risk factors. These results are in line with work by other authors (e.g. Li & Lerner, 2011; Loukas, Cance, & Batanova, 2016) that have similarly identified a strong association between the presence of delinquent behaviour and poor school connectedness among adolescents.

One of the major avenues through which school connectedness imparts protection against externalizing outcomes is through increased opportunities for prosocial engagement with peers (Wang & Dishion, 2012). The attenuation of risky behaviour occurs in part through socialization to behavioural norms of the peer group and the school, with connected youth showing a greater willingness to avoid delinquent activities (Li & Lerner, 2011). As well, these youth are also better equipped to navigate situations where peer pressure may lead to problem behaviours such as substance use or property crimes (Kim et al., 2018; Wang & Dishion, 2012).

### 3.1.3 Classroom-Level Factors that Predict School Connectedness

Several factors at the level of the classroom have been closely linked to school connectedness including classroom functioning, discipline management, and teacher experience. First, the extent to which a classroom functions effectively to meet the learning needs of the student is an important predictor of connectedness (McNeely, Nonnemaker, & Blum, 2002). Well-managed classrooms that operate smoothly offer both an opportunity for students to learn and collaborate while also featuring significantly lower levels of delinquent or aggressive behaviour (Hoglund & Leadbeater, 2004). Exposure to such behaviours not only detracts from the lesson but may also cause fear in some students, further reducing their ability to learn and feel safe within the school (Koth, Bradshaw, & Leaf, 2008). Importantly, classroom functioning has been found to be amenable to change through intervention and discipline reform (McNeely, Nonnemaker, & Blum, 2002). For example, students in classrooms where teachers promote prosocial interaction and cooperation report increased levels of connectedness as well as enhanced feelings of safety (Hoglund & Leadbeater, 2004; Koth, Bradshaw, & Leaf, 2008).

A highly related factor is the extent to which teachers feel supported by their school's administration to manage discipline problems that occur within their classroom. Equipping teachers with the authority and support to manage difficult behaviours is associated with reduced job-related stress, improved classroom functioning, and increased teacher efficacy (Price, 2012). Teachers that are empowered by their administration to make decisions relating to externalizing behaviours are also more effective in promoting safety within the classroom, which as mentioned, is associated with feelings of connectedness (Hoglund & Leadbeater, 2004). For example, Mokhele (2006) found that teachers who felt less supported to make autonomous decisions regarding discipline were also more likely to apply rules in an inconsistent and



arbitrary manner. This inconsistency acts as a risk factor for future behavioural problems while also negatively impacting student perceptions of fairness (Koth, Bradshaw, & Leaf, 2008; Libbey, 2004).

Finally, a teacher's level of experience has also been linked with school connectedness (Martinez, McMahon, Coker, & Keys, 2016; Wehby, Lane, & Falk, 2003). Experienced teachers may be better able to manage their classrooms, both from the perspective of moving smoothly between activities as well as anticipating and preventing breakdowns in discipline (Wehby, Lane, & Falk, 2003). Sufficient experience is also critical for working with students with behavioural or emotional challenges as these exceptionalities require teachers who have both training as well as a depth of knowledge in order to support and encourage their learning (Martinez et al., 2016). However, less is known about how teacher experience may impact school connectedness specifically. For example, research by Waters, Cross, and Shaw (2010) failed to find a main effect for the role of teacher experience on how connected students are to their school. These mixed findings highlight the need for further study into the role that teacher experience may play in predicting connectedness.

### **3.1.4 School-Level Factors that Predict School Connectedness**

Several researchers (e.g., McNeely, Nonnemaker, & Blum, 2002; Wang & Dishion, 2012) have identified a negative association between school connectedness and the size of the school. As children move forward in grade level, they transition to educational settings that are often significantly larger in terms of student population as well as physical size (Waters, Cross, & Shaw, 2010; Way, Reddy, & Rhodes, 2007). Moving to these new and larger learning environments may disrupt established peer groups while also increasing the risk for association with delinquent peers (Li & Lerner, 2011). As students transition to middle school or high

school, they are also more likely to be taught by multiple teachers. While this provides an opportunity for the establishment of new teacher-student relationships, it also reduces the quantity of time spent with any one teacher (Wang & Dishion, 2012). This may yield fewer deep relationships at a time when a positive connection to an adult external to the adolescent's family may be particularly protective (Borofsky et al., 2013).

Youth from schools with a higher proportion of economically disadvantaged students are also more likely to report feeling disconnected from their learning environment (Dodge, Greenberg & Malone, 2008). These schools tend to have fewer resources for extracurricular activities and community programming and often have reduced parent and family involvement (Dodge, Greenberg & Malone, 2008; Lawson, 2003). Researchers such as Hoglund and Leadbeater (2004) have also found that low socioeconomic status is associated with difficulties in socialization, which can manifest as behaviour and discipline problems within the school. These problems may contribute to reduced feelings of safety within school and a lower aggregate level of connectedness (Wang & Dishion, 2012).

The presence of aggression and violence within the school community is another important factor that predicts connectedness (Libbey, 2004). Schools must effectively manage these behavioural problems in order for students to feel safe and enable them to develop a strong connection to their learning environment (O'Brennan & Furlong, 2010). Schools that fail to provide a physically and emotionally safe environment risk greater student avoidance, disengagement, and problems in motivation (Blum, 2005). The functional impact of school discipline problems on connectedness is further highlighted by the fact that the majority of school connectedness intervention programs specifically target reductions in antisocial behaviour as one of their first objectives (Catalano et al., 2004).

Finally, the academic working and learning environment of a school is another key factor that may impact connectedness (Furlong et al., 2003). Schools that work to establish a positive learning environment by promoting the importance of personal effort, improvement, and mastery demonstrate significantly higher levels of self-reported connectedness among students (Anderman, 2003). The development of such an atmosphere also helps to establish prosocial norms that serve to further guide behaviour and learning (Furlong et al., 2003). Importantly, it appears that the typical pattern of decline in school connectedness seen over the adolescent period may be attenuated somewhat within schools that work to foster a positive learning environment (Anderman, 2003).

### **3.1.5 Overview of the Current Study**

The current study utilized data from multiple informants drawn from the National Longitudinal Survey of Children and Youth to explore individual-, classroom-, and school-level factors that predict perceptions of connectedness to school. This research employs a school ecological model to expand on previous work by directing specific attention to the role that classroom and school level variables play in determining school connectedness. Given that the effect of individual-level factors on school connectedness tends to be strong, it is important that they be controlled for when examining influences more distal to the child (e.g., classroom dynamics, school policies) (Waters, Cross, & Shaw, 2010). While the effects of these factors may be smaller, they are nevertheless important to explore as they are often more amenable to change via intervention (Simons-Morton et al., 2005). As well, one of the strongest predictors of connection to school is a student's current level of connectedness (Bond et al., 2007; Li & Lerner, 2011). Indeed, it appears that while connectedness tends to drop in later grades, those students who start out connected tend to stay connected and those who report early declines

continue to disconnect over time (Wang & Dishion, 2012). As such, this project assesses the influence of these less well-studied classroom and school factors by examining the extent to which they predict change in perceptions of connectedness over time as well as above and beyond influences at the individual level. Finally, interactions between problem behaviour and key variables were also explored in order to better understand the differential impact that delinquency may have on connectedness. Ideally, findings from this study can be used to guide the development of classroom and school based intervention programs with the goal of promoting enhanced school connectedness. Table 1 summarizes the specific variables under study.

Table 1: Variables at the individual-, classroom-, and school-level.

Student Level	Classroom Level	School Level
School Connectedness	Classroom Functioning	School Size
Gender	Teacher Discipline Support	Low School SES
Academic Achievement	Teacher Experience	School Discipline Problems
School Preparedness		School Learning Environment
Problem Behaviour		

## 3.2 Methods

### 3.2.1 Source of Data

Data from Cycles 4, 5, and 6 of the National Longitudinal Survey of Children and Youth (NLSCY) were used in this study. The NLSCY is a nationally representative prospective cohort study that was conducted by Statistics Canada and Skills Development Canada (HRSDC). It was designed to obtain data on a variety of social, emotional, and behavioural factors that may influence children's health and development from birth to early adulthood (Statistics Canada, 2008). The target population of this survey were non-institutionalized children drawn from Canada's ten provinces. Some children were excluded from participation, including those living on Indian reserves, Crown lands, or in remote regions. Children of full-time members of the

Canadian Armed Forces were also excluded. The NLSCY was based in part on the Labour Force Survey (LFS), which utilizes a stratified, multistage probability sampling method to select participants. Further information on the design of the NLSCY is available from Statistics Canada (2008). Data were collected every two years beginning in 1994/1995 (Cycle 1) and ending in 2008/2009 (Cycle 8). The initial longitudinal sample consisted of 22,831 children aged 0 to 11 years in Cycle 1. The response rate for children in the longitudinal sample by Cycle 4 was 84.5% (Statistics Canada, 2001).

Data used in the current study was collected primarily through pencil and paper questionnaires from three sources. First, a comprehensive child self-report measure was provided to selected children in order to gather information on the individual's physical, social, emotional, and behavioural development. Second, the child's teacher completed questionnaires detailing their academic functioning and abilities within the classroom. Teachers also provided data on certain school-level factors (e.g., learning environment, disciplinary climate). Finally, the principal of the child's school responded to questions relating to school demographics and policies. Teacher and principal questionnaires were mailed to the child's principal. In cases where the child had multiple teachers, the principal was asked to distribute the questionnaire to the teacher who they felt knew the child best. Preference was also given to language or math teachers in these circumstances. Consent for collection of teacher and school information was obtained from the child's primary caregiver, which was the biological mother in most cases.

All analyses were conducted at the Toronto Research Data Centre. These centres are part of a joint initiative between Statistics Canada, the Social Sciences and Humanities Research Council, and the Canadian Institutes of Health Research. Access to the NLSCY dataset was permitted by the Research Data Center Access Granting Committee on November 18, 2015.

RDC researchers are required to conform to strict confidentiality agreements in order to ensure participant anonymity. As well, all results are vetted by RDC analysts before release. This research was determined to be exempt from review by the University of Toronto Research Ethics Board.

### **3.2.2 Participants**

The sample for this study was children who were 10 or 11 years old in Cycle 4 (time 1; 2000-2001). In order to assess change in participant's level of school connectedness and avoid confounds, only children who indicated that they were in the same school in Cycle 5 (time 2; 2002-2003) were included. As well, data from Cycle 6 (time 3; 2004-2005) was also used to determine problem behaviour trajectories (see below and Study 1 for further details). Teacher and principal data were gathered in Cycle 4. This resulted in a final sample size of 139 youth with available self-report, teacher, and principal questionnaires. While the sample was limited in size due to methodological issues in NLSCY teacher and principal data collection as well as ensuring matched informants had sufficient information, it was adequate for regression analyses based on recommendations in Tabachnick and Fidell (2013). Participants had a mean age of 10.5 and the sample consisted of 51.8% females. The majority of participants were Caucasian. Specific demographic data was not available given the sample size as well as minimum cell size requirements for disclosure. As mentioned, the PMK reported on various demographic variables, risk factors, and other covariates. In terms of age, 14.4% of PMKs were between 25 and 34 years old, 42.4% were between 35 and 39 years old, and 43.2% were 40 years or older. With respect to socioeconomic status, 27.3% of families earned under \$39,999 per year, 27.3% earned between \$40,000 and \$59,999, 20.1% earned between \$60,000 and \$79,999, 14.4% earned between \$80,000 and \$99,999, and 10.8% earned \$100,000 or more.

### **3.2.3 Measures**

Table 2 lists the means, standard deviations, and percentages for student-, classroom-, and school-level variables and is located at the beginning of the Results section.

#### **3.2.3.1 Student-level Variables**

##### **3.2.3.1.1 School Connectedness**

Students responded to ten questions that tapped dimensions related to school connectedness. Students were asked to rate the extent to which they liked school on a scale from 1 (I like school very much) to 5 (I hate school). Self-assessed academic performance was obtained by asking students how well they thought they were doing in their school work. This question was rated on a five-point scale that ranged from 1 (Very well) to 5 (Very poorly). Students were also asked to rate how important it was for them to get good grades, make friends, participate in extra-curricular activities, and learn new things. These items were rated on a four-point scale ranging from 1 (Very important) to 4 (Not important at all). Three questions relating to the student's teacher were asked. These included whether their teacher provided extra help when needed, whether they felt their teacher treated them fairly, and whether they regularly completed homework assigned by the teacher. These items were rated on a five-point scale that ranged from 1 (All the time) to 5 (Never). Finally, students were asked to gauge the extent to which they felt like an outsider or left out of things while at school. This question was also rated on a five-point scale ranging from 1 (All the time) to 5 (Never). Items were reverse coded as required.

Scores on these variables were obtained from students at two time points. Specifically, students aged 10 and 11 years at time 1 were asked to complete the same questionnaire again at time 2, when they were between 12 and 13 years of age. Items were standardized to account for

differences between scales. As well, items were reverse coded as required. Cronbach's alpha for this scale was .67 at time 1 and .80 at time 2.

#### **3.2.3.1.2 Gender**

Student gender was drawn from self-report questionnaires. This variable was recoded such that 0 = male and 1 = female.

#### **3.2.3.1.3 Academic Achievement**

Teachers were asked to rate their student's current level of academic achievement in reading, writing, mathematics, and science. Teachers also provided a global rating of academic achievement across all areas of instruction. Ratings were made using a five-point scale ranging from 1 (Near the bottom of the class) to 5 (Near the top of the class). The internal consistency for this scale was .94.

#### **3.2.3.1.4 School Preparedness**

School preparedness is a teacher-rated variable that refers to whether students arrived to class prepared to begin their learning for the day. Five key indicators were used to assess preparedness since the beginning of the school year, including whether the student arrived with the correct materials (e.g., notebooks, paper) and was adequately dressed for the weather conditions. Teachers also reported whether the student was well rested and fed and whether they arrived with a lunch and snacks. Items were rated on a five-point scale ranging from 1 (Never) to 5 (Always). Cronbach's alpha for this scale was .72.

#### **3.2.3.1.5 Problem Behaviour Trajectories**

Trajectories of problem behaviour were established in Study 1. These trajectories were based on student self-report of their involvement in physical aggression, relational aggression, and property offences. Questions relating to physical aggression included whether the student got



into fights, the extent to which they react with anger and fighting following an accident, and whether they bully, threaten, or physically attack other people. Questions tapping indirect aggression were based on whether the student perpetrated the following behaviours when they were mad at someone: try to get others to dislike him or her, become friends with another student as revenge, get others to not be that person's friend, and telling that person's secrets to a third person. Finally, students rated their participation in various types of property offences, including theft, vandalism, and destruction of property. All items were rated on a three-point scale: 1 (Never or not true), 2 (Sometimes or somewhat true), and 3 (Often or very true). These items were recoded to a 0 to 2 scale such that 0 = Never or not true. A total problem behaviour score was then created by averaging these items. Cronbach's alpha for this scale was .80 at time 1, .85 at time 2, and .84 at time 3.

Semi-parametric mixture modeling using the TRAJ macro for STATA was used to determine problem behaviour trajectories by separating participants into groups based on growth patterns (Jones & Nagin, 2013). The TRAJ macro utilizes Full Information Maximum Likelihood (FIML) to estimate values for participants that are missing data at one or two of the three time points. Three trajectories were established: abstainers (participants who exhibited none or very little problem behaviour with no change in level of problem behaviour over time), moderates (participants who displayed moderate and stable levels of problem behaviour over time), and escalators (participants who showed an increasing level of problem behaviour over time). Behaviour trajectories were dichotomized for this study. Specifically, abstainers were recoded as 0 whereas moderates and escalators were recoded as 1. For a full description of how these trajectories were determined, see Study 1.

### **3.2.3.2 Classroom-level Variables**

#### **3.2.3.2.1 Classroom Functioning**

Teachers were asked to rate the extent to which they felt their classroom was able to move smoothly between various learning activities in order to provide an estimate of the overall functioning of their classroom. This item was rated on a five-point scale ranging from 1 (Never) to 5 (Always).

#### **3.2.3.2.2 Teacher Experience**

Teacher experience was measured as the total number of months that the respondent had worked as a teacher.

#### **3.2.3.2.3 Teacher Support for Managing Discipline Problems**

Teachers were asked to rate whether they felt that they received sufficient support from their administration to manage disciplinary problems that occurred within their classroom. This was rated on a five-point scale from 1 (Strongly disagree) to 5 (Strongly agree).

### **3.2.3.3 School-level Variables**

#### **3.2.3.3.1 School Size**

Principals were asked to report the total number of students that were enrolled in their school at the beginning of the academic year.

#### **3.2.3.3.2 Low School Socioeconomic Status**

In order to gauge the economic background of students attending their school, principals were asked to specify the percentage of families at the school that earned less than \$30,000 per year. Schools with a higher percentage of families in this income category translate into a lower average socioeconomic status for the school.

### **3.2.3.3.3 School Discipline Problems**

Principals were asked how often they had to discipline students for a variety of behavioural problems that may arise within a school. Specifically, principals rated the frequency of discipline for verbal or physical conflicts among students, vandalism of school property, theft of student or staff belongings, smoking or use of drugs and alcohol on school property, verbal abuse or physical assault of staff members, harassment of specific students (e.g., ethnic groups), and possession of weapons (e.g., pocket knife, gun). These items were rated on a five-point scale ranging from 1 (Never) to 5 (Always). The internal consistency of this scale was .84.

### **3.2.3.3.4 School Learning Environment**

One item was used to assess the learning climate fostered within the school. Specifically, teachers were asked to rate whether they felt that their school provided a positive working and learning environment for its students. This item was rated on a five-point scale from 1 (Strongly disagree) to 5 (Strongly agree).

## **3.2.4 Analytic Strategy**

Analyses were conducted using SPSS version 24 for Windows and utilized unweighted data. Data were assessed for outliers visually using box plots. The criterion for outliers was set at values greater than 3 times the interquartile range of the boxplot for each variable. No data points were identified at or above this value.

Analysis proceeded in two stages. First, descriptive statistics (e.g., means, standard deviations) for all variables were generated. As well, bivariate correlations were generated to determine associations between variables. Second, hierarchical linear regression was used to predict student perceptions of school connectedness at time 2 using data measured at time 1. Predictors were entered in four steps. Time 1 school connectedness was entered in Step 1 to

control for this variable and allow for testing of the unique contributions of individual-, classroom- and school-level factors in predicting connectedness at time 2. Student-level predictors were entered in Step 2 while classroom- and school- level variables were entered in Step 3. Finally, two-way interactions between a student’s problem behaviour trajectory and student-, classroom-, and school-level variables were entered in Step 4.

### 3.3 Results

#### 3.3.1 Descriptive Statistics

Means and standard deviations for student-, classroom-, and school-level factors are presented in Table 2. All variables were measured at time 1 with the exception of time 2 school connectedness. Students in this study reported relatively high levels of connectedness ( $M = .86$ ). Connectedness declined to an average of .80 when measured two years later. The sample consisted of roughly equal male and female respondents. Participants had an average age of 10.5. Table 2: Means, standard deviations, and percentages for student-, classroom-, and school-level variables.

Variable	Mean (SD)	Cronbach’s Alpha
Student Level		
Time 1 School Connectedness	.86 (.004)	.67
Time 2 School Connectedness	.80 (.005)	.74
Academic Achievement	3.58 (.99)	.95
School Preparedness	4.61 (.46)	.76
Gender (% Female)	51.8%	–
Problem Behaviour Trajectory (% Abstainers)	88.5%	–
Classroom Level		
Classroom Functioning	3.72 (.80)	–
Teacher Experience in Months	193.78 (114.92)	–
Teacher Support for Discipline Problems	3.37 (1.23)	–
School Level		
School Size	391.37 (190.37)	–
School Discipline Problems	1.94 (.35)	.85
School Learning Environment	4.18 (.63)	–
Low SES (% Earning < \$30,000 per year)	31.9%	–

### 3.3.2 Bivariate Correlations among Variables

Intercorrelations between variables at the student-, classroom-, and school-level are presented in Table 3. The strongest correlation ( $r = .57, p < .001$ ) was between time 1 and time 2 school connectedness. Time 2 school connectedness was positively correlated with academic achievement, school preparedness, teacher support for managing discipline problems, and being in a positive school learning environment. Time 2 connectedness was negatively correlated with gender, with males reporting a poorer connection to their school. A significant negative correlation between a student's problem behaviour trajectory was also found such that students on either the moderate or escalator trajectory were more likely to report feeling less connected to their school.

Table 3: Intercorrelations between student-, classroom-, and school-level variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Time 1 School Connectedness	-												
2. Time 2 School Connectedness	.57**	-											
3. Gender (0 = Male)	-.19*	-.16*	-										
4. Problem Behaviour Trajectory	-.41**	-.40**	.10	-									
5. Academic Achievement	.15*	.33**	-.05	-.17*	-								
6. School Preparedness	.25**	.40**	-.18*	-.06	.43**	-							
7. Classroom Functioning	.14	.04	-.19*	-.13	.05	.11	-						
8. Teacher Experience	.04	-.10	.01	-.00	-.09	.01	.22**	-					
9. Teacher Discipline Support	.01	.18*	-.10	-.03	.02	.08	.18*	-.09	-				
10. School Size	-.08	-.12	-.02	-.03	-.04	-.07	-.05	-.04	.02	-			
11. Low School SES	.13	-.04	-.09	-.08	.04	.15*	.09	.11	-.06	-.20**	-		
12. School Discipline Problems	.10	.03	.07	-.09	.02	.11	-.12	-.03	-.15*	.17*	.09	-	
13. School Learning Environment	.04	.15*	-.12	-.07	.03	-.01	.22**	-.04	.35**	.01	-.21**	-.19*	-

\* ( $p < 0.05$ ), \*\* ( $p < 0.01$ )

### 3.3.3 Regression Analysis

Hierarchical multiple regression was used to examine which factors predict student perceptions of school connectedness at time 2 after controlling for connectedness at time 1. A four step model was used. Time 1 school connectedness was entered in Step 1. Gender, problem behaviour trajectory, academic achievement, and school preparedness were entered in Step 2. Classroom functioning, teacher experience, teacher discipline support, school size, low school socioeconomic status, school discipline problems, and school learning environment were entered in Step 3. Finally, interactions between a student's problem behaviour trajectory and each student-, classroom-, and school-level variable were entered in Step 4. Given the large number of interaction terms, stepwise entry was used for this step.

Multicollinearity was assessed by examining the tolerance and Variance Inflation Factor (VIF). Multicollinearity was an issue when interaction terms were entered into the final step of the model and thus significant predictors were mean centered following recommendations by Aiken and West (1991). After mean centering, the tolerance for all predictors fell within acceptable limits, ranging from .73 to .94. VIF values ranged from 1.06 to 1.38.

Table 4 displays the standardized beta coefficients,  $R^2$ , adjusted  $R^2$ , F statistic, and change in F statistic for models predicting school connectedness at time 2. The first model, which used time 1 school connectedness as a predictor, was significant and explained 32% ( $p < .001$ ) of the variance in school connectedness at time 2. The addition of student-level factors also significantly predicted time 2 school connectedness, explaining an additional 11% ( $p < .001$ ) of the variance. Classroom and school factors explained an additional 4% ( $p < .05$ ) of the variance in time 2 school connectedness after controlling for time 1 school connectedness and other student-level variables. With respect to interactions, only the interaction between problem

behaviour trajectory and low school socioeconomic status was significant. The inclusion of this interaction term explained an additional 4% of the variance ( $p < .01$ ). The full model explained 51.4% of the variance in time 2 school connectedness.

After controlling for time 1 school connectedness, student's problem behaviour trajectory and their degree of preparedness for school predicted connectedness at time 2. In step 3, it was found that the percentage of low income families in the school also significantly predicted time 2 connectedness. In the final step of the regression, time 1 school connectedness, problem behaviour trajectory, teacher support for managing discipline problems, and low school socioeconomic status significantly predicted school connectedness at time 2. As well, a significant interaction effect was identified between student's problem behaviour trajectory and the percentage of low income families in their school.



Table 4: Hierarchical linear regression predicting time 2 school connectedness from time 1 student-, classroom, and school-level factors.

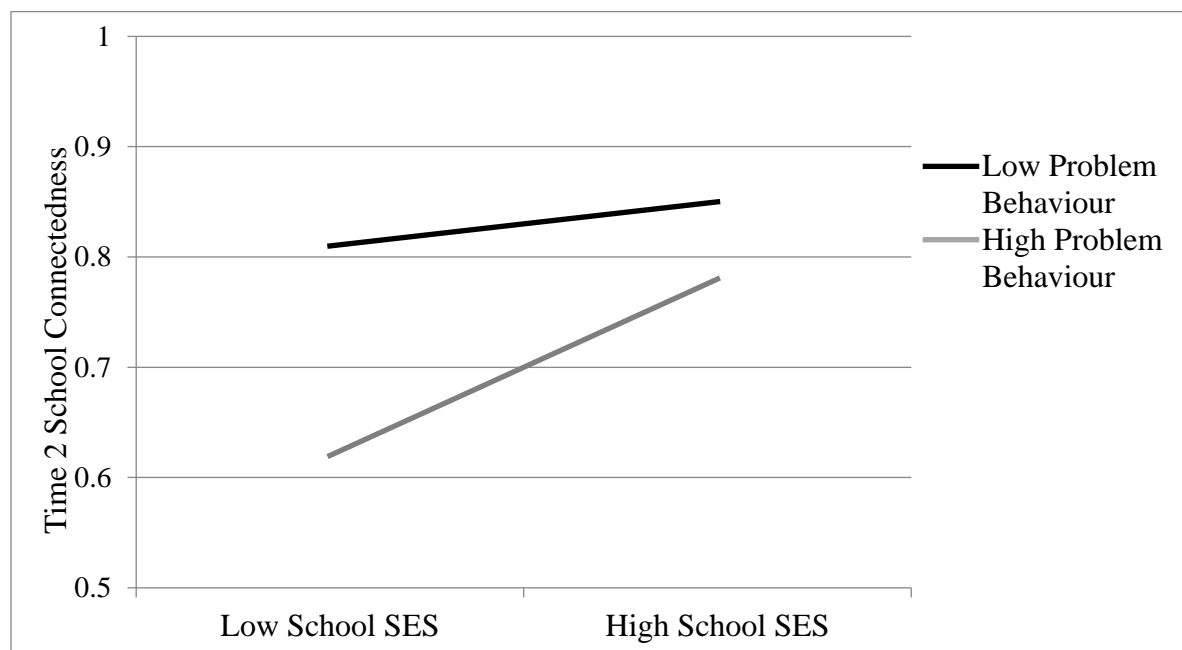
	Step 1	Step 2	Step 3	Step 4
<b>Student Level</b>				
Time 1 School Connectedness	.57***	.41***	.43***	.43***
Gender		-.02	-.02	-.04
Problem Behaviour Trajectory		-.19**	-.21**	-.27***
Academic Achievement		.14	.12	.10
School Preparedness		.22**	.24**	.24**
<b>Classroom Level</b>				
Classroom Functioning			-.10	-.12
Teacher Experience			-.06	-.02
Teacher Discipline Support			.13	.16*
<b>School Level</b>				
School Size			-.11	-.10
Low School SES			-.15*	-.20**
School Discipline Problems			-.01	-.01
School Learning Environment			.05	.07
<b>Interactions</b>				
Problem Behavior Trajectory x Low School SES				-.23**
R <sup>2</sup>	.33	.45	.52	.56
Adjusted R <sup>2</sup>	.32	.43	.47	.51
Model F statistic	66.54***	21.50***	11.18**	12.21**
F change	-	7.22	2.55	12.42

\* ( $p < 0.05$ ), \*\* ( $p < 0.01$ ), \*\*\* ( $p < 0.001$ )

In order to better understand the interaction between problem behaviour and school socioeconomic status, regression lines were plotted for participants in schools with proportions of low income students one half standard deviation above (+.5 SD) and one half standard deviation below (-.5 SD) the mean of this predictor. Figure 2 depicts this interaction graphically. Students on the abstaining or low problem behaviour trajectory showed similar levels of school connectedness regardless of the number of low income students in their school. However, students in lower socioeconomic status school who also engaged in delinquent behaviour were significantly less likely to report feeling connected to their school. A much smaller impact on

school connectedness was observed among high problem behaviour students who attended wealthier schools.

Figure 1: Plot of the interaction between problem behaviour and school socioeconomic status in predicting school connectedness controlling for all other predictors.



### 3.4 Discussion

Using a nationally representative Canadian dataset with information drawn from multiple informants, the current study sought to understand specific school ecological factors at the level of the student, classroom, and whole school that predict change in youth's perceptions of connectedness to their school two years later. This study contributes several key findings to the literature by confirming the impact of established factors that account for school connectedness and also highlights the need to consider classroom and school influences above and beyond factors at the level of the individual student. Given the key role that connectedness plays in a host of academic, social, and behavioural outcomes, these results also underscore the need for

further work to be directed towards improving connectedness within the individual student, their classroom, and school (Mann et al., 2015).

At the individual level, a student's sense of connection to school largely predicted their connectedness two years later. This finding is consistent with past research that has shown that connected students tend to stay connected (Li & Lerner, 2011; Wang & Dishion, 2012). Conversely, students that begin to disconnect from their school are likely to remain disconnected, which is especially true for students that present to school with emerging behaviour problems (Loukas, Cance, & Batanova, 2016). The durability of school connectedness underscores the importance of supporting youth to establish richer bonds with their school early on as a way of ensuring optimal development (Hawkins et al., 2001).

Consistent with previous research, school connectedness was also found to relate significantly to whether students arrived at school prepared to learn (Hildenbrand et al., 2012). Basic necessities such as being appropriately dressed and fed are critical for engagement and socialization and allow the student to perform at their best (Basch, 2011). Insufficient sleep has also been linked with increased perpetration of school-violence related behaviour and absenteeism (Hildenbrand et al., 2012; Maume, 2013). Several researchers (e.g., Basch, 2011; Dodge, Greenberg, & Malone, 2008) have drawn a connection between school preparedness and a student's socioeconomic status, with struggling families less able to provide the resources necessary for the child's day to day school functioning. Importantly, the impact of insufficient resources at home may be partially ameliorated through school-based programs (Basch, 2011). For example, Kleinman and colleagues (2002) found that children who have access to breakfast programs exhibit better school performance and engagement while also reporting an improved sense of connection to school. The availability of classroom programs that provide snacks as

needed or a shared pool of school supplies where students in need have access to materials may be another mechanism for reducing the negative impact of limited financial resources in the home.

Third, teacher-rated academic achievement was positively correlated with perceptions of connection to school though it did not contribute significantly to the final model after controlling for school connectedness and other variables. As part of the school connectedness scale in the current study, self-ratings of academic performance as well as items assessing the degree of importance the student placed on getting good grades in school were included. It is likely that these items accounted for variance in achievement such that teacher-rated academic ability became insignificant. Curiously, extant studies within the literature are relatively mixed with regards to including academic achievement within the operationalization of school connectedness (Libbey, 2004). While some definitions incorporate academic performance directly into measures of school connectedness, others include similar yet distinct characteristics such as a student's motivation to perform well instead (Chung-Do, Goebert, Chang, & Hamagani, 2015). These differences highlight the need for clarity when defining school connectedness with the goal of allowing for further research as well as comparison of outcomes across studies (Libbey, 2004).

Student externalizing behaviour was also significantly related to school connectedness at time 2 after controlling for connectedness at time 1. Building from work conducted in the first study of this dissertation, it is clear that students who report engaging in problem behaviours are significantly more likely to report feeling disconnected from their schools. This finding is in line with previous research (e.g., Loukas, Cance, & Batanova, 2016; Wang & Dishion, 2012) which has found poorer connectedness among students that report engaging in delinquent behaviour.

The current study utilized a student's trajectory of problem behaviour as opposed to ratings made at a single point in time in order to provide a more complete assessment of their pattern of functioning. This is especially important given the negative reciprocal influence that problem behaviour has on school connectedness, with chronically delinquent youth becoming increasingly disconnected from their schools over time (Loukas, Ripperger-Suhler, & Horton, 2009). Indeed, these results suggest a particularly troubling conclusion as it these students who could perhaps benefit the most from additional supports available through the school. Connection to one's school indeed serves instead as a relatively invisible buffer that can be activated at times when a youth is undergoing greater psychosocial stress (Borofsky et al., 2013). Youth that also lack other protective factors such as social support or those that live in low socioeconomic status families may be less able to weather other risks that arise during their lives and thus most in need of this support (Bond et al., 2007).

Importantly, the current study also identified several classroom and school factors that predict connectedness, over and above a student's self-reported connectedness at time 1 as well as other individual-level variables. Specifically, a positive association was identified between connectedness and support for teachers in managing discipline problems within the classroom. While much of the literature on school connectedness has focused on the impact of setting school-wide discipline policies that serve to dictate acceptable behaviour for all students, it is often teachers who are responsible for providing immediate intervention during instances of verbal or physical aggression (Luiselli et al., 2005; O'Brennan & Furlong, 2010). Given that this variable was measured at the first time point in the study suggests a lasting impact from being within a classroom where teachers are able to implement tailored disciplinary and management strategies and, importantly, feel supported to do so by their administration. Specifically, these

results suggest that aspects common to one teacher or classroom may yield lasting carryover effects to other classrooms as well, which is perhaps unsurprising given the relatively durable nature of school connectedness (Battistich, Schaps, & Wilson, 2004).

This finding also underscores the need to provide teachers with sufficient support from their administration in order to maintain a classroom that is safe and able to meet the needs of its students (McNeely, Nonnemaker, & Blum, 2002). Support may include providing sufficient training to teachers in de-escalation strategies as well as other approaches to handling discipline problems. Training may also emphasize the importance of modeling self-control as well as highlight the negative impact that overly punitive discipline measures may have on already dysregulated students (Marini, Dane, & Kennedy, 2010). Indeed, it appears that teachers report feeling more effective at their jobs when they are well-trained and empowered by administrators to make decisions and tailor discipline models to fit the unique needs of their classroom (Martinez et al., 2016).

In a study of teacher discipline practices, Gregory and colleagues (2010) found that educators that employed an authoritative stance with respect to discipline were most effective in managing breakdowns in behaviour within their classrooms. This approach features clearly specified behavioural norms and expectations, a high level of structure, and disciplinary measures that are both fair and consistent (Gregory et al., 2010). Authoritative teachers also demonstrate care and support towards their students which has been consistently linked with improved connectedness to school (Bond et al., 2007). In adopting this disciplinary stance, teachers can create a classroom that promotes safety and respect in order to manage problems before they can negatively affect the learning process (Koth, Bradshaw, & Leaf, 2008). The consistent application of discipline coupled with a high level of respect towards students has also

been shown to reduce the influence of deviant peer groups and, in turn, engagement in delinquent behaviour (Wang & Dishion, 2012).

The current study also identified a significant interaction between school socioeconomic status and student externalizing behaviour. Specifically, students in schools with a larger proportion of low socioeconomic status families who also exhibited significant delinquent behaviour appeared to be at particular risk of disconnecting from school. Interestingly, students who fell on the abstaining problem behaviour trajectory reported similar levels of connectedness regardless of the socioeconomic status of their school. This relationship is likely mediated through multiple pathways. For example, youth from lower income families are more likely to attend schools that are understaffed and insufficiently funded (Li & Lerner, 2011; Sampasakanyina & Hamilton, 2016). While financial difficulty at the level of the child and family yield a more direct effect, both neighbourhood and school poverty may also negatively impact a child's ability to experience positive social interactions, feel safe at school, and engage in the learning process (Hoglund & Leadbeater, 2004). Students in these lower income schools are also at greater risk of bullying and victimization, both of which negatively influence feelings of safety and connectedness within the school (Bauer, Guerino, Nolle, & Tang, 2008; Brockenbrough, Cornell, & Loper, 2002).

Addressing the availability of supports for delinquent youth from low socioeconomic status schools should be a specific priority for educators and policy makers. For these youth, the school may fulfil an especially important protective role given that children from disadvantaged families experience reduced access to resources and support both at home and in their communities (Li & Lerner, 2011). Indeed, a number of researchers (e.g., Basch, 2011; Wang & Dishion, 2012; Whitlock, 2006) have noted the importance of ensuring that the school is

equipped and able to meet the needs of youth based on their developmental stage. For youth with externalizing problems, the provision of appropriate supports such as the use of fair and progressive discipline practices, establishing opportunities to re-connect with peers especially after an altercation, and working to foster stronger bonds with the student's teacher are critical to improving their school functioning (Whitlock, 2006).

Interesting effects were also identified with respect to gender. Specifically, males reported poorer connectedness to school at both time points. However, this relationship was no longer significant in the full model that included gender along with other covariates. Previous research has indicated that boys typically report significantly worse connectedness relative to girls (Martino et al., 2008; Wang & Dishion, 2012). However, some researchers (e.g., Loukas, Cance, & Batanova, 2016; Mann et al., 2015) have argued that studies of gender differences in connectedness to school require a much finer grained analysis of specific dimensions of this construct (e.g., teacher bonding, motivation to succeed) rather than relying on a composite score. Gathering more in depth information on these factors as well as others such as the extent of student involvement in extracurricular activities or participation within the classroom may be useful in identifying underlying gender-based influences (Lam et al., 2012).

### **3.4.1 Implications**

As demonstrated in the first study of this dissertation, youth that feel a greater connection to their school are also much more likely to report a robust profile of other protective factors such as having access to a supportive peer network and an improved sense of self-esteem. In many cases, youth with these profiles may need little if any additional support in order to connect with, and maintain their connection to, school over time. However, for some adolescents, such as those already on a troubling behaviour trajectory or that lack other



compensatory protective factors, it is critical that they be provided with more intensive supports such that they are able to re-establish a connection to their school moving forward. Failure to halt this process of disconnection also means that youth will become increasingly less able to take advantage of additional supports available through the school that may serve to buffer other areas of risk such as lack of resources or access to services (Chapman et al., 2013).

The finding of an interaction effect between problem behaviour and low school socioeconomic status suggests that support directed towards improving connectedness among these students may be particularly important. Indeed, Hopson and Lee (2011) found that students from impoverished families who attend schools that have worked to establish a more inclusive and connected climate displayed improved functioning with respect to externalizing behaviours as well as internalizing problems such as anxiety and depression. Indeed, it appears that low income youth that attend schools with a more connected environment begin to take on the attitudes of their more well-adjusted peers while also following norms for appropriate behaviour (Hopson & Lee, 2011). These findings highlight the importance of directing efforts towards developing connection within the school community as a way of attenuating difficulties that may arise from socioeconomic and behavioural challenges.

Results from the current study also shed light on the reciprocal and multiply determined nature of school connectedness. While individual-level factors account for a large proportion of the variance in school connectedness these variables are often static (e.g., gender). Importantly, influences at the classroom- and school-level may be more malleable through changes to policy or targeted intervention. For example, beyond support for discipline management, classroom teachers could also be supported via their administration to make available supplies or snacks to help ensure that their students are ready and able to learn each morning (Basch, 2011). Indeed,

strategies may be implemented at different levels to support the individual student and foster an improved sense of connection to school. In this way, schools serve to ease some of the burden on the home environment that may not be sufficiently equipped to provide required resources or support (Li & Lerner, 2011).

### **3.4.2 Limitations**

Although the current study offers a number of insights into factors related to school connectedness, certain limitations should be taken into account. As with any secondary analysis, researchers are constrained to the variables that were collected at the time of the original study and data on several classroom- and school-level variables that may be relevant to understanding connectedness were not available within the NLSCY education dataset. For example, Waters, Cross, and Shaw (2010) identify the importance of including specific ecological factors such as the quality of school structures and grounds, the presence of graffiti or vandalism, and the availability of school equipment. While a school's relative socioeconomic status may provide some insight into these factors, a finer grained analysis would be possible if additional data had been gathered. This knowledge may be especially helpful when planning for the deployment of limited city or provincial resources (Boxer et al., 2011).

Teacher and principal data were only collected for grade school aged youth during the fourth cycle of the NLSCY (Statistics Canada, 2001). This meant that longitudinal analysis of the impact of factors rated by teachers and principals was not possible. Future studies designed to capture classroom and school information across the entire adolescent developmental period, and particularly during transitions (e.g., from middle school to high school), may be useful in assessing for differential effects over time (Loukas, Cance, & Batanova, 2016).

Past research (e.g., Lam et al., 2012; O'Brennan & Furlong, 2010) has also shown that a number of factors such as student engagement, achievement, or discipline problems may vary significantly across schools. The use of nested models where adolescents are grouped into classrooms that are then aggregated into schools can help to explain these differences (O'Brennan & Furlong, 2010). While the sample size of the study was adequate for regression analyses based on recommendations in Tabachnick and Fidell (2013), the sampling strategy of the NLSCY as well as low return rates for teacher and principal questionnaires meant that it was not possible to examine nested, between-school effects. Future work that captures a larger sample of adolescents and other informants is needed to understand why some schools are more efficacious in promoting school connectedness relative to others (Waters, Cross, & Shaw, 2010).

### **3.4.3 Conclusions**

Despite these limitations, the current study advances our understanding of school connectedness in several ways. Working from a school ecological perspective, this study identified key factors operating at both the level of the classroom and the school as a whole that predict change in school connectedness above and beyond well-established individual-level variables. Importantly, by relying on data from multiple informants, the current study was able to capture a broader set of factors that influence youth's perceptions of connectedness. Results highlight the importance of ensuring that students arrive at school prepared and ready to learn within a safe, well-managed classroom environment. This is particularly true for youth from economically disadvantaged families who face additional challenges in terms of access to resources as well as greater exposure to psychosocial stress (Bauer et al., 2008; Hildenbrand et al., 2012). For these students, the school may serve a particularly important role by acting as both a resource center and a safe haven from risky home or neighbourhood environments (Basch,

2011; Borofsky et al., 2013). Conversely, more troubling outcomes are likely for those youth in schools that fail to provide a safe space in which to learn as well as those that do not adequately meet the needs of their students.

Future research that examines the stability and change of these factors over time may be helpful in furthering our understanding of school connectedness. As well, given that many of the classroom and school factors that were associated with connectedness may be more amenable to change compared to individual factors, the development and study of intervention programs that specifically target these variables will be needed (Simons-Morton et al., 2005). Overall, the current study as well as future research projects that seek to promote a greater understanding of school connectedness are critical for ensuring optimal social, academic, and behavioural functioning among adolescents.

## 4 Chapter Four

### 4.1 General Discussion

This dissertation explored the development and course of problem behaviour in the early to mid-adolescent period. Employing a socio-ecological framework, this project also considered the impact of known risk and protective influences present within the youth and their various microsystems on delinquent outcomes. In addition to considering well-established factors such as socioeconomic status, gender, and self-esteem, this dissertation sought to address limitations within the literature with regards to the unique role that the school may play in protecting against problem behaviour. Specifically, the impact of youth's sense of connection to their school was investigated along with variables that forecast change in connectedness over time. In doing so, this dissertation aimed to provide a richer understanding of development during adolescence while marking important targets for intervention.

Using data from a nationally representative Canadian longitudinal survey, the first study identified three distinct trajectories of problem behaviour. While the majority of youth in the sample did not report engaging in delinquent behaviour over the study period, two smaller groups exhibited a troubling pattern of offending. This is consistent with previous research that has found similar trajectories of abstinence and offending during the early adolescent period (Broidy et al., 2003; Nagin & Tremblay, 1999). Findings regarding the role of various risk and protective factors were also generally consistent with existing literature (Li & Lerner, 2011; Loukas, Cance, & Batanova, 2016). The first study also explored the course of school connectedness, identifying two distinct trajectories as well as a general downward trend in connectedness over time. Importantly, this study identified a strong association between school connectedness and problem behaviour. Specifically, students that displayed a consistently high

level of connection to school were significantly less likely to engage in problem behaviour.

These findings underscore the importance of school connectedness as a key protective variable in adolescence.

The aim of the second study was to identify specific factors at the level of the student, classroom, and school that predict change in perceptions of school connectedness. Consistent with previous research, much of the variance in school connectedness at the second time point was accounted for by individual-level variables, chiefly school connectedness as measured at time 1 (Loukas, Cance, & Batanova, 2016; Waters, Cross, & Shaw, 2010). However, after controlling for self-reported connectedness and other individual-level factors, several classroom and school factors emerged as significant predictors. Specifically, teacher support for managing discipline problems within the classroom as well as school socioeconomic status were identified as significant predictors. As well, an interaction was found between the socioeconomic status of the school and a student's problem behaviour trajectory such that students from low socioeconomic status schools who engage in delinquent behaviour were at an increased risk of disconnecting from their school over time.

#### **4.2 Contributions to the Literature**

This dissertation provides several unique contributions to the literature. First, study 1 highlighted a strong association between problem behaviour and school connectedness. Specifically, it was shown that youth who reported higher levels of connectedness were at a much lower risk of falling onto either of the two concerning problem behaviour trajectories. Importantly, the association between connectedness and problem behaviour was found to hold even after controlling for other well-known risk and protective factors at the level of the individual, family, and neighbourhood. As has been mentioned, connected youth report reduced

engagement in delinquent behaviour and involvement with antisocial peers, demonstrate fewer risk taking behaviours, and are more likely to complete school (Chapman et al., 2013; Way, Reddy, & Rhodes, 2007). Conversely, poor connectedness has been associated with earlier sexual intercourse as well as increased substance use including marijuana, alcohol, and other drugs (Bond et al., 2007; Loukas, Ripperger-Suhler, & Horton, 2009). Simply put, Li and Lerner (2011) argue that “adolescents stayed away from problematic behaviours when they attended classes regularly, came prepared with necessary materials, cared about school, and felt attached to school personnel” (p. 1189). Taken together, these findings underscore the importance of considering school connectedness when working to understand the development and course of problem behaviour in adolescence. This information is directly relevant to intervention efforts of which only a handful thus far have capitalized on connection to school as a mechanism for reducing problem behaviour (Wang & Dishion, 2012).

Second, two specific trajectories of school connectedness for youth in the early to mid-adolescent period were identified. The current study expands upon past research by clarifying that the general and consistent downward trend in self-reported school connectedness does not hold for all students (Li & Lerner, 2011; Wang & Dishion, 2012). While the majority of youth showed a high and relatively stable level of connectedness over time, just over a quarter of students reported a substantially worsening trajectory of connection. Multivariate analyses revealed key differences between youth on these two trajectories. Specifically, individuals on the declining trajectory were more likely to be of lower socioeconomic status, experience higher levels of family discord, and live in neighbourhoods with a lower sense of cohesion.

These findings forecast a troubling outcome for youth with this profile of risk or those that exhibit significant behaviour problems as they are among the least likely to feel connected to

their school. Indeed, the bidirectional relationship between school connectedness and problem behaviour is such that aggressive and delinquent youth will experience greater difficulty connecting with their peers and teachers as well as engaging in the learning process both at the outset and throughout their school careers (Loukas, Ripperger-Suhler, & Horton, 2009). As youth begin to disconnect, it may become increasingly difficult, or impossible in the case of students who have dropped out, for these students to take advantage of supports that are available through the school (Chapman et al., 2013). When applied to the sphere of intervention, these results underscore the importance of providing appropriate support to these youth at the earliest of opportunities (Mann et al., 2015; Way, Reddy, & Rhodes, 2007).

Combining results from the second study, the factors that account for change in connectedness become clearer, with important effects seen at each of the levels of studied. For example, youth that arrive to their classrooms adequately prepared for the day exhibit better connectedness to their school. As well, providing support for teachers to manage discipline problems in the classroom was associated with improved connectedness. Conversely, youth in low socioeconomic status schools as well as those who engaged in problem behaviour reported worsening connectedness over time. These results indicate the need to explore school connectedness both longitudinally as well as at specific levels relevant to the individual student. Future research that tracks school connectedness over time using additional measurement points would yield a finer grained analysis of factors that account for change. This may be particularly important during critical transitions such as from elementary school to high school (Rudasill, Niehaus, Crockett, & Rakes, 2014).

Third, findings also highlight the importance of considering gender when examining school connectedness. Consistent with previous research (e.g., Lam et al., 2012; Loukas,



Ripperger-Suhler, & Herrera, 2009; Way, Reddy, & Rhodes, 2007), boys reported lower initial levels of school connectedness as well as steeper declines in connectedness over the study period relative to girls. Gender was also associated with poorer connectedness in study two. Given the protective role of connectedness as well as the fact that boys are considerably more likely to engage in externalizing behaviour, the establishment of a connection to school among these youth may be particularly helpful in reducing engagement in delinquent behaviour and preventing other related maladaptive outcomes (Martino et al., 2008; Simons-Morton & Chen, 2009). Additional work would be helpful in determining whether there are gender differences with respect to specific aspects of school connectedness (e.g., achievement motivation, engagement in extracurricular activities, etc.) and whether this information could be used to further tailor intervention and support (Mann et al., 2015).

Data from multivariate analyses also helped to shed light on specific risk and protective factors relevant to adolescent development as well as those that may be amenable to change through intervention. For example, findings from the first study underscore the role that socioeconomic status plays in determining trajectories of school connectedness, with students of lower socioeconomic status reporting sharper declines. As well, one of the strongest student-level predictors of change in connectedness identified in the second study was school preparedness. This variable assessed the extent to which the student arrived with basic materials for learning as well as whether they were appropriately dressed and fed, factors which are likely closely linked to a student's socioeconomic status (Dodge, Greenberg, & Malone, 2008). Schools are in a unique position to help level the playing field with respect to these forms of economic disparity (Basch, 2011). For example, schools may provide needed supplies via a classroom supply pool or offer breakfast and lunch programs to ensure that students are able to learn and

participate without being distracted by hunger (Basch, 2011). As well, the availability of extracurricular activities such as after-school sports programs where equipment is provided by the school affords additional opportunities for engagement without further straining family resources (Rothstein, 2008). These supports are critical for this age group as adolescents are particularly sensitive to socioeconomic differences, with economically disadvantaged students facing a greater risk of academic disengagement and reduced achievement (Boxer et al., 2011).

The socioeconomic status of the school also played an important role in the association between connectedness and problem behaviour. In study two, significantly worse connectedness was observed among aggressive and delinquent youth who attended lower socioeconomic status schools. Prioritizing supports for these youth should be an important goal for educators and policy makers. Interventions designed to promote connection to school may also be particularly relevant as these youth experience additional psychosocial stressors that may further alienate them from their schools (Dodge, Greenberg, & Malone, 2008; Li & Lerner, 2011). While these low socioeconomic status schools will likely face challenges with respect to being able to provide adequate resources to their students, research by Waters, Cross, and Shaw (2010) suggests that targeted spending to improve the built characteristics of a school (i.e., physical condition) may be a particularly cost effective method of enhancing connectedness.

The overall intensity of discipline problems within the school did not predict differences in connectedness though interesting effects were identified at the level of the classroom. Specifically, the degree to which teachers felt supported to manage disciplinary problems that occurred within the classroom was associated with positive change in school connectedness. While the disciplinary climate of a school is typically determined by the principal, teachers serve as the front line, observing and intervening as behavioural issues arise (Price, 2012). Several

researchers (e.g., Bradshaw et al., 2008; Price, 2012) have highlighted that teacher commitment to implementing school-wide disciplinary strategies and programs is mediated in part by the quality of teacher-administrator relationships. Administrators that allow teachers to capitalize on their knowledge of students by tailoring discipline strategies to the needs of their classroom may also increase the level of fairness with which these measures can be applied (Osher et al., 2010). Given the centrality of fairness to the concept of school connectedness, teacher training that stresses the need for mutual respect and the consistent application of discipline in the classroom may also be helpful in promoting stronger connectedness (Libbey, 2004; Osher et al., 2010).

### **4.3 Clinical Implications**

Results from these studies have several important implications for the development of intervention programs designed to foster connectedness, especially those with the ultimate goal of reducing problem behaviour in adolescence (Simons-Morton et al., 2005). Schools are well positioned to build resilience among students who are navigating adversity or other psychosocial stress (Alaggia & Donohue, 2018). Indeed, schools can help individuals develop their own protective assets in order to attenuate risk that may be present in other domains such as their home environment (Borofsky et al., 2013; Cicchetti, 2010). Educators and clinicians can work together to determine students that may benefit the most from an enhanced connection to their school based on their specific profile of risk and protection. Targeted connectedness intervention also reduces the likelihood that youth will associate with deviant peer groups or engage in other risk behaviours (Kim et al., 2018; Stevens, Morash, & Park, 2011). Conversely, failing to provide adequate support to these youth may result in further disconnection from school along with the loss of opportunity and access to resources that may otherwise be available.

A number of classroom- and school-wide programs have been developed to promote connectedness, including the Positive Action Program (Flay et al., 2001), Going Places (Simons-Morton et al., 2005), the Seattle Social Development Project (Catalano et al., 2004), and the Gatehouse Project (Bond et al., 2004). These programs have shown success with respect to driving reductions in aggression, delinquency, and risk taking behaviour (Chapman et al., 2013). Importantly, research has also shown that the impact of intervention on connectedness tends to be relatively durable and may extend to other areas of the youth's life (Catalano et al., 2004). Specifically, fostering school connectedness enhances the ability of the individual to take advantage of school resources and supports them to further develop their own protective assets such as their ability to cope with other psychosocial stressors (Borofsky et al., 2013).

Chapman and colleague's (2013) systematic review of intervention programs for improving connectedness reveal several common features. First, programs need to be delivered flexibly and include components for the individual student and classroom teacher as well as policy directives that serve to influence overall school climate. Focus must be placed on the teacher-student relationship which, as described above, is critical to fostering connectedness (Borofsky et al., 2013). Specific curricula designed to build problem solving skills, behavioural and emotional regulation abilities, and interpersonal communication should be included (Chapman et al., 2013). As well, interventions need to be developmentally appropriate and implemented longitudinally, with boosters provided to maintain program effects (Chapman et al., 2013).

From an ecological perspective, the ongoing interaction that occurs between various systems underscores the value that intervening in one sphere may have on other aspects of a youth's life (Bronfenbrenner, 1979). For example, it may be particularly important to offer

supports that help youth's families become more involved in the school with the ultimate goal of improving youth's sense of connectedness (Dove, Zorotovich, & Gregg, 2018; Morin, Bradshaw, & Berg, 2015). Indeed, the fostering of stronger partnerships between families and schools helps to provide a supportive framework in which to coordinate efforts and ensure that youth receive appropriate supports (Epstein & Sheldon, 2009). Parental engagement can occur through a variety of avenues, including parent-teacher conferences or other forms of ongoing communication, participation in field trips, school-wide open houses and community nights, and opportunities for collaboration through parent-teacher associations (Dove, Zorotovich, & Gregg, 2018). As another example, instrumental support such as the provision of breakfast programs and school supplies in the classroom may in turn reduce the negative effects that low socioeconomic status may have on adolescent development (Basch, 2011).

More intensive support may be especially important for students in lower socioeconomic status schools as well as those who already exhibit behaviour problems (Wang & Dishion, 2012). Indeed, it is these students who are most in need of support but also face the greatest risk of further disconnection from school. Coupled with trajectory data that shows a general decline in connectedness for all students, the provision of earlier intervention may help these individuals to reconnect to their school while working to shift them off more troubling problem behaviour trajectories.

#### **4.4 General Limitations**

These findings should be interpreted in light of some limitations, chiefly the relatively low internal consistency found in the school connectedness scale especially among younger participants (i.e., those who were 10 or 11 year olds). While the NLSCY utilized a number of scales that were drawn from published works to measure specific phenomena (e.g., anxiety or

emotional disorders, motor and social development, etc.), there was no such scale to examine school connectedness (Statistics Canada, 2008). Instead, the current study created a scale that utilized a variety of youth self-report items in order to reasonably capture the various dimensions of school connectedness.

To date, very few studies have explored school connectedness using data from the NLSCY. As well, given the considerable variability among definitions of school connectedness, comparison between the current study and other published research is challenging. However, one pattern that emerges is that the internal consistency of school connectedness scales tends to improve in step with children's age. For example, Peter, Roberts, and Buzdugan (2008) created a six item school connectedness scale using NLSCY data, reporting an alpha of .75 among 12 and 13 year olds. Other work by Robson, Albanese, Harrison, and Sanders (2013) found an alpha of .77 when querying 15 and 16 year olds using their own eight item scale. With respect to the current study, a pattern of increasing consistency was observed, with alphas improving from .65 at time 1 to .75 by time 3 when students were between 14 and 15 years old. No published work using NLSCY data could be identified that examined school connectedness among 10 and 11 year olds, the youngest individuals in the current study. However, given both the predictive capacity of connectedness over time as well its strong association with trajectories of problem behaviour, it is critical that students be surveyed at the earliest possible age (Battistich, Schaps, & Wilson, 2004).

It may be that the concept of school connectedness itself varies somewhat by child age and developmental stage. For example, younger children may place a greater emphasis on the importance of their relationship with their teacher. As children grow older, other factors inherent to connectedness such as social support within the school or the availability of extracurricular

activities may become more prominent (Crosnoe et al., 2002). Indeed, some researchers (e.g., Wang & Dishion, 2012) have advocated exploring these specific dimensions of school connectedness in more detail. While the NLSCY lacked required depth of this nature, future research may utilize a more comprehensive survey to investigate different aspects of connectedness such as behavioural engagement or teacher emotional support as well as explore how these dimensions may vary across students of different ages.

#### **4.5 Conclusions**

Despite these limitations, this project contributes several unique findings regarding trajectories of problem behaviour and school connectedness as well as the factors that predict trajectory group membership. In addition, the roles of specific individual-, classroom-, and school-level factors that predict change in school connectedness were also identified. As has been discussed, school connectedness is a critical, yet understudied, facet of a youth's life (Bond et al., 2007). The growing body of literature that has explored the effects of school connectedness has also begun to demonstrate the importance of this construct to the development of problem behaviour in adolescence (Loukas, Cance, & Batanova; 2016; Wang & Dishion, 2012). In addition to providing a setting in which to develop academically and socially, schools are a crucial microsystem in which to provide supports that may help shift youth off maladaptive behaviour trajectories or offer resources that may be lacking within their home or neighbourhood environment (Li & Lerner, 2011).

Given the key role of the school in developmental outcomes for youth, it is critical that schools be challenged to maximize the impact of their influence. As such, both educators and policy makers should capitalize on the effect that improved connectedness may have on these

outcomes in adolescence. Conversely, youth that report declines in connectedness may be among those most in need of support.



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## Appendix A

### List of Tables:

Table 1: Intercorrelations between problem behaviour, school connectedness, and other covariates.

Table 2: BIC, AIC, posterior probability, and smallest group percent results for problem behaviour models.

Table 3: BIC, AIC, posterior probability, and smallest group percent results for school connectedness models.

Table 1: Intercorrelations between problem behaviour, school connectedness, and other covariates.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Time 1 Problem Behaviour	-														
2. Time 2 Problem Behaviour	.39**	-													
3. Time 3 Problem Behaviour	.24**	.45**	-												
4. Time 1 School Connectedness	-.41**	-.31**	-.23**	-											
5. Time 2 School Connectedness	-.21**	-.43**	-.30**	.42**	-										
6. Time 3 School Connectedness	-.18**	-.28**	-.42**	.36**	.48**	-									
7. Family Discord	.39**	.24**	.22**	-.35**	-.19**	-.21**	-								
8. Gender (0 = Male)	.15**	.10**	.10**	-.15**	-.16**	-.15**	.05*	-							
9. Socioeconomic Status	-.10**	-.10**	-.04	.11**	.13**	.12**	-.11**	.01	-						
10. Low Neighbour. Cohesion	.04	.10**	.10**	-.10**	-.09**	-.10**	.08**	-.04	-.41**	-					
11. Social Support	-.26**	-.18**	-.15**	.40**	.24**	.22**	-.23**	-.11**	.09**	-.08**	-				
12. Self Esteem	-.33**	-.22**	-.23**	.51**	.30**	.26**	-.32**	-.05*	.05*	-.04	.42**	-			
13. Maternal Education	-.10**	-.10**	-.02	.08**	.10**	.07**	-.05*	-.01	.34**	-.10**	.01	.04	-		
14. Paternal Education	-.02	-.07*	-.05	.03	.07*	.10**	-.04	.01	.32**	-.06*	-.01	.02	.36**	-	
15. Caregiver Depression	.12**	.07*	.07*	-.12**	-.09*	-.13**	.18**	.02	-.19**	.13**	-.10**	-.07**	-.11**	-.03	-

\* ( $p < 0.05$ ), \*\* ( $p < 0.01$ )

Table 2: BIC, AIC, posterior probability, and smallest group percent results for problem behaviour models.

Number of Groups	BIC	AIC	Lowest Average Posterior Probability	Smallest Group Size in Percent
1	-1538.00	-1529.50	1	100%
2	-1317.29	-1300.31	.83	14.7%
3	-1260.94	-1235.46	.75	4.9%
4	-1231.47	-1197.50	.72	1.5%

Table 3: BIC, AIC, posterior probability, and smallest group percent results for school connectedness models.

Number of Groups	BIC	AIC	Lowest Average Posterior Probability	Smallest Group Size in Percent
1	2839.54	2848.03	1	100%
2	3126.78	3143.78	.83	25.5%
3	3193.26	3218.76	.77	6.8%
4	3222.35	3256.35	.75	4.4%