Emotion Regulation in At-Risk Mother-Child Dyads During Middle Childhood: Associations with Concurrent Functioning and Adolescent Outcomes

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ABSTRACT

Emotion Regulation in At-Risk Mother-Child Dyads During Middle Childhood: Associations with Concurrent Functioning and Adolescent Outcomes

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The two studies that make up the present dissertation were designed to investigate the emotion regulation abilities of school-aged children and their mothers in two different samples of families at-risk for negative psychosocial outcomes. Specifically, it examined the associations between mother and child emotion regulation abilities in middle childhood, and mothers' childhood histories of aggression, parenting factors, child behaviour, and the longitudinal association of these early behaviours to adolescent health-risk behaviours.

Participants in Study 1 were mothers and their 9-12-year-old children (n = 82); participants in Study 2 (n = 59) were mothers and their 5-12-year-old children. Both samples were drawn from the Concordia Longitudinal Risk Project (Concordia Project): a prospective, longitudinal, intergenerational study of high-risk children from disadvantaged neighbourhoods that began in 1976-1978. Original participants were screened along dimensions of aggression, social withdrawal, and likeability in childhood, and were followed into parenthood. The Concordia Project provides a unique opportunity to study the intergenerational transfer of health and psychosocial risk during childhood, and to determine the processes and protective factors that predict positive outcomes for children within an ‘‘at-risk’’ population.

A unique observational coding system was developed and used in both studies in the present dissertation. Emotion regulation behaviours in children and mothers were

observationally coded second-by-second, using the Middle Childhood Emotion Regulation System. Observational codes loaded onto three broad dimensions: avoidance, approach, and self-comfort. Behaviour problems, parental support, parental stress, and adolescent risk behaviour were all measured through the use of reliable and well-validated questionnaire measures. Results revealed that certain child emotion regulation behaviours (e.g., self-comfort, approach) were related to maternal childhood histories of aggression. Moreover, results from both studies found links between child emotion regulation behaviors and parental variables. Finally, emotion regulation behaviours in middle childhood were associated with both concurrent behaviour problems and longitudinal risky behaviours, such as drug use.

Together, findings contribute to our understanding of how emotion regulation behaviours in children are intergenerationally, concurrently, and longitudinally associated. Results have implications for the design of preventative interventions for both individuals and families to target the development of adaptive emotion regulation behaviours.

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"Real courage is when you know you're licked before you begin, but you begin anyway and see it through no matter what." – Harper Lee

Table of Contents

List of Tables

Chapter 2

List of Appendices

Chapter 1: General Introduction

Emotional competence constitutes the development of contextually appropriate expression, recognition, regulation, experience, and understanding of emotion (Saarni, 1999). It has a significant impact on children's socio-emotional and behavioural functioning across the lifespan (Denham et al., 2003; Denham, Ferrier, Howarth, Herndon, & Bassett, 2016). A particularly crucial component of emotional competence is emotion regulation, a construct that encompasses a broad set of behaviors that permit a child to dampen, intensify, or maintain the magnitude and duration of emotional responses (Gross 2014; Gross & Thompson, 2007). The study of emotion regulation falls into the larger rubric of 'self-control' (Sheppes et al., 2014). Although the term 'self-control' can be used with regards to emotions, cognitions, and behaviours, the present series of two studies aimed to explore the emotional component of self-control, specifically as it relates to middle-childhood development in the context of an at-risk population.

Defining Emotion Regulation

Emotion regulation is one of the fastest growing areas within psychology (Aldao, Gee, De Los Reyes, & Seager, 2016; Compas et al., 2017; Koole, 2009; Tamir, 2011). Over the past two decades, emotion regulation has become an increasingly popular topic in both child (e.g., Cicchetti & Toth, 2009; Thompson, 2014) and adult (e.g., Gross, 2013; Tamir, 2011) psychological literatures. It has become a critical construct in work examining a broad spectrum of psychological issues, including but not limited to social competence (e.g., Denham et al., 2016), moral development (e.g., Song, Colasante, & Malti, 2017), psychopathology (e.g., Aldao et al., 2016; Sheppes, Suri, & Gross, 2015),

and socialization (e.g., Meyer, Raikes, Virmani, Waters, & Thompson, 2014; Morris, Criss, Silk, & Houltberg, 2017). Understanding how this construct is central to both adaptive and maladaptive development requires a thorough examination of its definition. Despite rising interest in the topic, there is still no singular definition of emotion regulation in the literature; and emergent studies continue to attempt to dissect the various aspects of the construct (e.g., Compas et al., 2014, attempt to differentiate 'emotion regulation' from 'coping').

At their basic level, emotions are considered to be an evolutionarily adaptive set of biologically based capabilities that lend to human survival (Cole, Martin, & Dennis, 2004). Their biological basis provides individuals with the ability to quickly assess situations and to be prepared to escape or avoid unfavorable conditions. This type of situational assessment was coined "appraisal" by Arnold (1960). There is no consensus as to whether appraisals cause emotions, emotions cause appraisals, or the two co-occur; however, it is largely agreed upon that appraisals are a key element in the emotional experience (Gross, 2014). Emotions include specific thoughts, feelings, behaviours, and physiological responses (Frijda, 2006). Once specific emotions have been activated, they have different effects on individual, interpersonal, or environmental factors depending on how they are regulated.

Bridging the concepts of 'emotions' and 'emotion regulation' can be accomplished by examining Lazarus' (1991) observations regarding emotion regulation relative to emotion processing. This work stipulates that individuals' primary emotional response to a situation is qualitatively different from their secondary emotional response. The primary response deals with the immediate and raw reaction to emotionally relevant

events that emerges from neural activity. This makes reference to the innate biological characteristic of the ability to express emotions. Conversely, the secondary emotional response relates to an individual's ability to cope with the primary reaction (Baumann, Kaschel, & Kuhl, 2007), while taking into consideration factors such as environmental and interpersonal contexts. This leads to understanding the emotional experience within an "emotion-appraisal-response" framework, also referred to as the process model of emotion regulation (Gross & Thompson, 2007). In contrast to a one-factor model, which has been criticized for being confounding (e.g., Kagan, 1994) due to the fact that emotional experiences and regulation occur concurrently (Campos, Frankel, & Camras, 2004), the process-oriented model of emotion posits that individuals evaluate or appraise cues from emotion-eliciting situations, which ultimately leads to adaptive or maladaptive responses to these situations (Gross, 2013). Appraisal, reappraisal, and distraction are amongst the major emotion regulation strategies that are frequently studied in adults (Sheppes et al., 2014).

Emotion regulation can be broadly conceptualized as the changes that follow the activation of specific emotions. These changes deal with the valence, intensity, or time course of emotional content. Because emotion regulation relates to people's abilities to cope with an emotional response, intentions and goals are critical (Eisenberg & Spinrad, 2004). Coping behaviours include, but are not limited to, self-soothing, avoidance, reappraisal, and self-distraction (Mangelsdorf, Shapiro, & Marzolf, 1995; Thompson, Virmani, Waters, Raikes, & Meyer, 2013; Sheppes et al., 2014).

Regulation is largely accepted as a voluntary activity, as opposed to one that is unconsciously applied (Compas et al., 2014). In a given situation, one's attempt to

modulate emotions is often at least in part based on an objective to achieve a goal. Goal setting, planning, focusing, as well as modulating one's behaviours, emotions, and attention are all core elements of emotion self-regulation (Rueda, Posner, & Rothbart, 2005). These types of behaviours were included in the creation and operationalization of observational codes in the coding system developed for the current series of studies. Over time, individuals adopt styles of emotion regulation that emerge as a result of repeated interactions between biological factors and the social environment (Gross, 2014). If individuals are not flexible in responding to environmental change, emotion regulation styles can become maladaptive (Bridges, Denham, & Ganiban, 2004). Consequently, emotion regulation can be perceived as a dynamic concept, necessitating change over time.

Emotion Regulation, Development, and Theoretical Frameworks

Within developmental literature, much of the research examining emotion regulation has focused on its relation to adaptive and maladaptive adjustment from infancy through early childhood (Bridges et al., 2004; Cole et al., 2004; Eisenberg & Fabes, 1999). There is a linear narrative, emphasizing the ability to move from co-regulation early on in infancy, to the ability to self-regulate throughout the course of the preschool and childhood years. The importance of emotion regulation has been highlighted in mother-infant studies (e.g., August et al., 2015; Doiron & Stack, in press; Jean & Stack, 2012; Jean, Stack, & Fogel, 2009; Tronick, Als, Adamson, Wise, & Brazelton., 1978). Nevertheless, it is clear that parents continue to assist their children in regulating emotions far beyond the infant and preschool years (Cole et al., 2004; Kopp, 1989). However, studies on the development of emotion regulation and the relation

between school-age children and adolescents' emotion regulation abilities and their adjustment have been rarer (Silk, Steinberg, & Morris, 2003). The thorough examination of emotion regulation abilities in middle childhood constitutes a unique and important strength of this dissertation.

During infancy, the regulation of emotion is facilitated by parents (mothers in most published research studies), who interpret emotional signals, provide stimulation, modulate infants' levels of arousal, and reinforce infants' actions. Infants may use objects such as blankets to self-regulate, but predominantly use cues to signal to their caregivers when they need assistance (Landy & Thompson, 2006). Maternal parenting strategies and behaviours are used to socialize adaptive emotional development in their young children (Denham et al., 2003). The importance of maternal regulation of infants' emotion can be observed in examining the effects of a disruption in the expected course of a social interaction, such as in the Still Face paradigm (Tronick et al., 1978). Different forms of maternal touch may communicate different meanings to their infants within the social interchange and help to regulate them (Jean et al., 2009).

By the time children approach preschool age, caregivers begin to expect them to regulate their emotions more independently. By the second through fifth years of life, children develop cognitive, motor, and language skills that afford them increased abilities to regulate their own emotions (Cole et al., 2004). Between 24 and 36 months of age, preschoolers begin to express a wider range of emotions than during infancy, yet they remain better at distinguishing positive emotions than negative ones (Landy & Thompson, 2006). It is also during this period that tantrums are most common, and conflicts with parents, siblings, and peers increase. Between 3 and 6 years of age, children begin to

develop the skills to regulate intense emotions without external controls. This ability is associated with beginning to understand another's perspective, which contributes to a decline in tantrums (Landy & Thompson, 2006). Preschoolers also become more successful at decoding others' emotions, a skill that allows them to react more appropriately in social situations (Denham et al., 2003). Towards the end of the preschool period, children learn to recognize when they have reached a barrier in their abilities to self-regulate and are able to more effectively solicit help from caregivers (Landy & Thompson, 2006).

During middle childhood, children's understanding of social group norms about when, where, and how to express emotions improves (Zeman & Garber, 1996). Emotion regulation abilities and strategies steadily continue to become more independent, however, regulatory help is still sought from parents, especially when children are cognitively or emotionally fatigued (e.g., Carlson & Wang, 2007). Parenting practices play an important role in helping their children learn to regulate emotions over time. School-aged children whose parents exercise high levels of control were found to be more likely to develop internalizing or externalizing behaviour problems if they also displayed high levels of negative emotionality (Morris et al., 2002). Among school-aged children, externalizing problems are associated with poorer emotion regulation skills, such as difficulty with attention and focus (Eisenberg et al., 1995).

Adolescents are more aware of the interpersonal consequences of grandiose displays of emotion in social contexts, which impacts their motivation to improve their regulatory skills (Zeman & Garber, 1996). Despite adolescents' increased awareness of their emotional states, evidence suggests that adolescents experience negative

emotions more frequently and more intensely than children and adults (Larson, Moneta, Richards, & Wilson, 2002), leaving them with more to regulate. The importance that adolescents attach to interpersonal situations may lead them to regulate their emotions differently in social relationships with their peers and siblings versus those with their parents and teachers. Neurological maturation of the prefrontal cortex during adolescence contributes to more sophisticated abstract reasoning and problem solving abilities, which are important elements in successful emotion regulation in social situations (Steinberg, 2005). As adolescents move into late adolescence and young adulthood, there may be increased emotional concerns regarding role stability (Arnett, 2001). In addition, toward the onset of adulthood, both the growth and decline of certain emotion regulation strategies may be observed (Zimmermann & Iwanski, 2014).

Conceptualizing emotion regulation in terms of how it contributes to social relationships is essential, since emotions are inherently relational phenomena. The emotional experience encompasses a multitude of processes related to an individual's transactions with their physical and social environments. These processes are best understood within the framework of the transactional model. The transactional model (Sameroff, 2009; 2010) emphasizes the reciprocal nature of dyadic interactions, which are seen as a continuous and dynamic interplay between one person's behaviours, another's responses, and environmental variables that may influence both members of the dyad. The success of short- and long-term goals of social transactions largely depends on a person's ability to aptly navigate emotional processes; specifically, we would argue, a person's ability to *regulate* their emotions. Understanding how emotional experiences

are managed during interpersonal dyadic transactions is of interest in understanding developmental phenomena (Eisenberg & Fabes, 1999).

The present body of research was also conceptualized with Bronfenbrenner's Ecological Systems Theory (1979) in mind. Drawing from Bronfenbrenner's theoretical framework, we examined the role of proximal (e.g., individual emotion regulation strategies of both mothers and children) and distal (e.g., maternal childhood histories of aggression, education) factors in the development of emotion regulation abilities. Ecological Systems Theory highlights the relevance of context in developmental outcomes, and provides a framework for identifying and understanding the mechanisms that make some families more likely to enhance or impede the development of emotion regulation abilities. By examining concurrent emotion regulation behaviours of both members of the dyads and in two interaction contexts, we examined both the meso- and microsystems. In the longitudinal objective for Study 2 health-risk outcomes predicted from early emotion regulation behaviours were investigated and these related to the Process-Person-Context-Time model (PPCT model; previously termed 'chronosystem') described in Bronfenbrenner's framework (Rosa & Tudge, 2013).

Emotion regulation strategies acquired early in the lifespan are thought to translate into behavioural strategies used in later childhood (Gardner, Dishion, & Connell, 2008; Kopp, 1989). Failure to acquire these skills may result in difficulties in behavioural control, social competence, and school adjustment (Keane & Calkins, 2004). There is a paucity of research that has addressed if and how the emotions people attempt to alter are different depending on their developmental stage (Gross & Thompson, 2007; Zimmermann & Iwanski, 2014). Tracing the development of emotion regulation across

infancy, preschool, and childhood provides a backdrop for a better understanding of emotion regulation capacities and behavioural outcomes in adolescence. It also affords the opportunity to consider the developmental trajectory of emotion regulation by examining its changes across time. Ultimately, this allows us to better understand how adaptive and maladaptive emotion regulation behaviours may ultimately contribute to the emergence of psychopathology throughout development, a rationale tightly tied to the developmental psychopathology perspective (Cicchetti, 2016). The unique considerations with regards to the development of emotion regulation over time require age-appropriate methods to measure emotion regulation at various stages of the lifespan.

Measurement of Emotion Regulation

Because children (and adolescents) have considerable difficulties reporting their emotional states, self-report measures of emotion-related constructs are often perceived to be unreliable (Cole et al., 2004). Numerous studies on emotion regulation in children have called for the use of observational measures as an important direction for this field (e.g., Callear, Harvey, & Bimler, 2017; Cole et al., 2004; Criss, Morris, Ponce- Garcia, Cui, & Silk, 2016; Eisenberg, Cumberland, & Spinrad, 1998; Gross, 2015; Morris, Silk, Steinberg, Myers, & Robinson, 2007; Thompson, 1994). Observational methods allow for the collection of detailed, rich, and layered data. The most innovative aspect of the present series of studies in this dissertation is that, to our knowledge, it is the first body of work to observationally code (second-by-second) emotion regulation behaviours in mother-child interactions in middle-childhood. An additional unique feature to our approach is that dyads in both studies were in contexts (e.g., maternal childhood histories of risk; maternal level of education) considered to be at-risk.

For the empirical observation of emotion regulation, it is essential to differentiate between emotion expression and emotion regulation. Observers must note the regulatory qualities of various behaviours within the context that they occur. The potential confound in the observational measurement of emotion regulation is that researchers are left to infer that emotions were activated based on observable expressive behaviours (e.g., facial cues or verbalizations; Cole et al., 2004). To date, the majority of guidelines for the accurate measurement of emotion regulation have been proposed for measuring the construct in infants and young children, while there is a dearth of research with older children and adolescents. One possible explanation for the lack of research may be the limited availability of tools designed to properly measure the construct in this population (Zeman, Cassano, Perry-Parrish, & Stegall, 2006). Given the cognitive, linguistic, and motor advances made during middle childhood, it is of interest to learn in detail about children's emotion regulation abilities during this period, especially in considering how they may relate to later behavioural outcomes. All observations of emotion regulation behaviours in our work were conducted with participants from the Concordia Longitudinal Risk Project (ages 5-13-years-of-age).

The Concordia Longitudinal Risk Project

The Concordia Longitudinal Risk Project (Concordia Project) is a prospective longitudinal community study of boys and girls who grew up in relatively disadvantaged neighbourhoods in Montréal, Québec. Participants in the original study were rated along dimensions of aggression, social withdrawal, and likeability during childhood and have been followed into parenthood. The Concordia Project is conceptualized as a high-risk sample both because of the socioeconomic disadvantage in original participants'

communities as well as other demographic characteristics (e.g., maladaptive peer relations, level of education) that were and are below the population means. The original sample of children was followed in smaller sub-samples at three-to-five year intervals and into parenthood. Many of the original participants have become parents, and several subsamples of the Concordia Project, including those examined in the current body of work, examine outcomes for both the original participants as well as their offspring. Using subsamples from the Concordia Project for our two studies allowed us to examine the constructs of interest within an at-risk population. For a detailed description of the original Concordia Project sample, consult Schwartzman, Ledingham, and Serbin (1985), Serbin et al. (1998), and / or Stack et al., (in press).

Intergenerational research has demonstrated that parental histories of maladaptive peer relations influence their children's development (e.g., Caspi, Elder, & Bem, 1988). These studies and research designs take experiences and characteristics of the parent generation and use them to help identify processes and patterns that affect the well-being of their children. The Concordia Project and other longitudinal studies have found that aggressive girls are particularly at-risk for negative adolescent and adult outcomes. Aggressive girls are at a higher risk for developing and exhibiting antisocial behavior (Loeber, Capaldi, & Costello, 2013; Serbin, Marchessault, McAffer, Peters, & Schwartzman, 1993); early and/or risky sexual behaviour and teen pregnancy (Fite, Johnson-Motoyama, Rubens, & Peaches, 2014; Scaramella, Conger, Simons, & Whitbeck, 1998; Serbin, Peters, McAffer, & Schwartzman, 1991); school dropout and lower levels of maternal education (Serbin et al., 1998); and the development of internalizing disorders (Zoccolillo, Pickles, Quinton, & Rutter, 1992). When aggressive

girls become mothers, they may be more likely to use aggressive behaviour styles and communication within their families, increasing the potential for negative outcomes in their children (Serbin et al., 1991; Serbin & Karp, 2004). It has also been found that parenting practices (e.g., hostility, harsh punishment, parental modeling), parent-child interactions, and children's observations of parental behaviours, can be transferred across generations (Stack, Serbin, Enns, Ruttle, & Barrieau, 2010).

Despite well-established findings regarding the intergenerational transfer of risk, some individuals from moderate-to-high-risk backgrounds demonstrate resilience and develop adaptively despite their status of disadvantage. As such, the transfer of risk is deemed to be *probabilistic*, but not certain. The probabilistic nature of the transfer for risk is consistent with the developmental psychopathology framework, which posits that protective factors in a developing individual's environment may decrease negative outcomes associated with being part of a high-risk population and protect them (Cicchetti, 2006; 2013; 2016; Cicchetti & Toth, 2009). As such, not all children deemed at-risk for following negative developmental trajectories will exhibit problems later in life (Cairns & Cairns, 1994; Chase-Lansdale & Brooks-Gunn, 2014; Feinstein & Bynner, 2006; Saltaris et al., 2004; Serbin & Karp, 2004; Serbin et al., 1998; Serbin et al., 2004).

Concurrent Risk Factors

In addition to examining the association between maternal childhood histories of aggression on their own children's emotion regulation behaviours, this series of studies was designed to examine concurrent factors that may impact their emotion regulation behaviours. For example, we sought to examine the role of parental stress in relation to both parent and child emotion regulation behaviours. Higher parenting stress is linked to

poor emotion regulation (Papoušek & von Hofacker, 1998), thus an objective in each of our studies was dedicated to examining this association. Few extant studies have examined the relationship between sources of stress on the Parenting Stress Index (PSI) and disruptive child behaviour on independent measures. Mash and Johnston (1983) found significant correlations between both of the PSI domain scores and the Externalizing Problem Scale score of the Child Behavior Checklist, suggesting that parental levels of stress may contribute to 'acting out' behaviours in children. It is plausible that children of parents with higher parenting stress use these externalizing behaviours as a means to seek attention from their parents, who may be preoccupied with stress and somewhat less available to their children. While maternal level of stress may be predictive of child behaviour problems, maternal support may increase the experience and expression of positive emotions (e.g., Fredrickson, 2001; 2013). In fact, maternal support (characterized by warmth, affection, and validation) is a predictor of overall child social competence (Davis et al., 2001). Examining maternal support and stress, as well as the observational examination of mothers' emotion regulation behaviour provided the opportunity to closely examine the functioning of at-risk mothers, a component that is frequently less prominent in research on child emotion regulation and its outcomes.

In addition to examining how parental stress and support impact children's current behaviours, we examined how children's own emotion regulation behaviours were predictive of their concurrent behaviour problems (internalizing, externalizing, and total problems). We were also interested in the relationship between children's emotion regulation behaviours and their cognitive ability, since emotional experiences influence cognitive availability to learn in school (Villavicencio & Bernardo, 2013).

To extend the exploration of emotion regulation's relationship to aspects of development longitudinally, we examined adolescent health risk behaviours and their association with observed emotion regulation behaviours (in Study 2). Adolescence is the key period for the adoption of maladaptive health behaviours such as alcohol and substance misuse, risky sexual behaviours, poor diet and exercise choices, and the mismanagement of chronic disorders. The persistence of these types of behaviours across the lifespan is associated with numerous deleterious negative health outcomes to the self and to one's offspring (Stuart & Green, 2008; De Genna, Stack, Serbin, Ledingham, & Schwartzman, 2006), thus emphasizing the importance of understanding the factors associated with their onset and frequency during key developmental periods. In addition to the long-term deleterious health outcomes associated with substance-related risk behaviours, it is important to understand risk behaviours for their more proximal consequences. Particularly in the case of alcohol and drug use, the use of these substances is associated with poorer decision making and greater incidence of hazardous behaviours, such as behaviour resulting in injury (Bonomo, Bowes, Coffey, Carlin, & Patton, 2004). Risk behaviours in adolescence are also important in that they are often indicative of a less optimal environment. High rates of these behaviours during adolescence are associated with lower levels of parental monitoring (LaChausse, 2008) as well as greater impulsivity (Poikolainen, 2002), higher levels of aggression, and greater delinquency (Low & Espelage, 2014). For these reasons, it is important to understand the developmental precursors to these health-related risk behaviours, and in the context of our studies, to understand their association with emotion regulation behaviours.

Emotion Regulation and Mental Health

Studies of parental socialization of children's emotion (i.e., emotion socialization) highlighting the development of emotion regulation have been pivotal in helping to inform and understand healthy child adjustment (Morris et al., 2007). Since the beginning of the century, more effort has been placed on trying to understand the socialization processes relevant to child psychopathology (e.g., Katz et al., 2014; Suveg et al., 2008) and associated emotion regulation difficulties (Grusec & Hastings, 2015; Southam-Gerow & Kendall, 2002; Zeman, Dallaire, & Borowski, 2016).

Previous studies of maladaptive emotion regulation strategies have identified dysregulatory patterns that fall into two broad categories: *over*-regulation and *under*-regulation. These categories likely exist on opposite extremes of a continuum. This curvilinear pattern is similar to that of general findings regarding self-regulatory abilities; that is, both high and low ends of the self-regulatory abilities spectrum are maladaptive (see review by Gross, 2014). The vast majority of studies on emotion dysregulation have focused on the concept of under-regulation, which typically is described as exhibiting high, intense levels of negative emotion and is more clearly associated with externalizing disorders (Mullin & Hinshaw, 2007).

A large and growing body of research points to the successful regulation of affective states as being central to mental health (Aldao et al., 2016; Schäfer, Naumann, Holmes, Tuschen-Caffier, & Samson, 2017; Sheppes et al., 2015; Thompson & Goodman, 2010; Yap, Allen, & Ladouceur, 2008). Many contemporary theories of child and adolescent psychopathology conceptualize maladjustment as the result of difficulties regulating emotions (e.g., Bradley, 2000; Cicchetti, 2016; Heleniak, Jenness, Vander

Stoep, McCauley, & McLaughlin, 2016; Steinberg & Avenevoli, 2000). Given the predisposition to increased fluctuation in affect during adolescence, it is not surprising that the prevalence of affective and behavioral disorders (formal diagnoses and presence of symptomatology) dramatically increases across this developmental period (Silk et al., 2003). Adolescents experience more negative affect than school-aged children (Larson et al., 2002), and may therefore require greater regulatory resources to deal with their emotions. Improved understanding of emotion regulation during adolescence may help us better conceptualize individual differences in the emergence of mental health problems (Gross, 2013; Silk et al., 2003).

Dysfunctional emotion regulation is a predictor of psychopathology (Cracco, Goossens, & Braet, 2017). Maladaptive management of emotional states can be referred to as emotion *dysregulation,* which plays a role in both internalizing and externalizing disorders during adolescence (Aldao et al., 2016; Sheppes et al., 2015; Schäfer et al., 2017; Steinberg & Avenevoli, 2000). With regards to internalizing disorders, difficulties down-regulating negative emotions and up-regulating or maintaining positive emotions are problematic (Silk et al., 2003). For example, depressed adolescents have more difficulty improving negative affect, are more likely to ruminate, and lack regulatory skills such as problem solving or cognitive restructuring (Dodge & Garber, 1991). Although approaching or engaging with stressors is associated with better adjustment, adolescents diagnosed with depression are more likely to use passive and avoidant strategies (Compas, Connor, Saltzman, Thomsen, & Wadsworth, 1999).

With regards to externalizing problems, emotion dysregulation can be in the form of inappropriate displays of anger or uncontrollable excitement that may accompany a

diagnosis of Attention Deficit Hyperactivity Disorder (ADHD; Barkley, 2014). Some evidence suggests that emotion dysregulation plays a greater role in adolescent internalizing than externalizing problems (Garnefski, Kraaij, & van Etten, 2005; McLaughlin, Hatzenbuehler, Mennin, & Nolen-Hoeksema, 2011). This finding may reflect the fact that relatively little research has investigated the relation between emotion dysregulation and externalizing problems in adolescents. Research with younger children demonstrates that those high in negative emotional intensity display higher rates of externalizing behavior over time (Eisenberg et al., 1995).

In addition to behaviour problems, children's cognitive abilities are an important and frequently measured marker of their adaptive development during middle childhood. The cognitive correlates of emotion regulation are typically examined by measuring variables such as cognitive suppression, reappraisal, and flexibility (Gross 2001, 2002). The ability to effectively regulate emotion can be linked to these and other specific cognitive abilities (e.g., Gyuark et al., 2009; McRae, Jacobs, Ray, John, & Gross, 2012). The first study of this dissertation sought to investigate how children's observed emotion regulation behaviours are linked to their cognitive capacity, by examining the relationship between observed regulatory strategies and Full Scale IQ scores.

Developing a better understanding of how emotion regulation in children and adolescents is linked to the development of psychopathology (e.g., exploring this association via the developmental psychopathology framework) may ultimately have implications for clinical interventions that target mental health problems. The present set of two studies was designed to explore emotion regulation in at-risk dyads during middle-

childhood, while focusing on the following areas: measurement, development, and intergenerational, concurrent, and longitudinal associations.

The Present Studies

Given the importance of emotion regulation to adaptive development, the present dissertation consisted of two studies designed to examine the emotion regulation abilities of school-aged children and their mothers in two different samples of families at-risk for negative psychosocial outcomes.

Study 1 had four objectives: (1) To develop an observational measure of emotion regulation that could be applied to both school-age children and their mothers in different interaction contexts; (2) To examine the relationship between maternal childhood histories of aggression and both children and mothers' emotion regulation behaviours; (3) To examine the relationship between concurrent maternal support and children's emotion regulation; and (4) To examine the relationship between children's emotion regulation behaviours and their problem behaviours and cognitive abilities.

Study 2 was designed to replicate and extend the findings of Study 1 by examining emotion regulation in another sample of the Concordia Project and exploring both intergenerational and longitudinal associations. Study 2 had four objectives: (1) To apply the observational tool of emotion regulation developed in Study 1 to a second sample of both children and their mothers; (2) To examine the link between emotion regulation behaviours (of both children and their mothers) and parenting stress; (3) To examine children's emotion regulation behaviours as they relate to externalizing and internalizing problem behaviours; and (4) To examine the longitudinal association

between middle childhood emotion regulation behaviours and adolescent health risk behaviours such as alcohol consumption, tobacco use, and drug use.

Together, the present set of two studies contributes unique observational data to the literature on emotion regulation in mother-child interactions. These studies represent an important advancement with regards to the design of an observational measure to examine school-aged children's emotion regulation behaviours, as well as their mother's emotion regulation behaviours during dyadic interactions. The exploration of the association between emotion regulation behaviours and maternal histories of aggression allowed for the examination of the intergenerational transfer of problem behaviours. It also allowed for a better understanding of the emotion regulation behaviours of mothers who were aggressive during their own childhood. Finally, linking observer-rated emotion regulation to children's current cognitive and behavioural outcomes (Study 1), as well as linking it longitudinally to risky adolescent behaviours (Study 2), allowed for the exploration of observable predictors of maladaptive behaviours.

Chapter 2: Dissertation Study 1

Emotion Regulation in Mother-Child Dyads during Middle-Childhood: Relation to Maternal Childhood Histories of Aggression, Child Behaviour and Functioning

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ABSTRACT

Emotion Regulation in Mother-Child Dyads during Middle-Childhood: Relation to Maternal Childhood Histories of Aggression, Child Behaviour and Functioning

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The present study was designed to examine emotion regulation abilities in at-risk school-aged children using a systematic observational tool. Objectives were to: (1) develop an observational measure of emotion regulation that could be applied to both school-age children and their mothers in different interaction contexts; (2) examine the association between maternal childhood histories of aggression and mothers' and children's emotion regulation strategies; (3) examine the relationship between maternal support and child emotion regulation; and (4) examine the relationship between children's emotion regulation behaviours and their problem behaviours and cognitive abilities. Participants were drawn from the Concordia Project, a longitudinal, intergenerational study of disadvantaged children screened along dimensions of aggression and social withdrawal, and followed into parenthood. The current sample of 81 mothers and their 9-to-12-year-old children (n = 82) engaged in cooperative (game-playing) and conflict (discussion of topic rated as conflictual by the dyad) tasks. Emotion regulation behaviours (e.g. self-soothing, avoiding eye contact, turning away) for mother and child were observationally coded using the Middle Childhood Emotion Regulation System, a coding system developed for this study. Observational codes loaded onto three overall dimensions: avoidance, approach, and self-comfort. Results revealed that certain child emotion regulation behaviours (e.g., self-comfort, approach) were related to maternal childhood histories of aggression. Moreover, links between

child emotion regulation behaviors and parental support were found. Finally, emotion regulation behaviours in middle childhood were associated with children's externalizing and total problem behaviours and their Full Scale IQ. Findings contribute to our understanding of how maternal childhood behaviours are related to emotion regulation strategies in their offspring. Results have implications for the development of home- and school-based behaviour training programs that include emotion regulation strategies.

Emotion Regulation in Mother-Child Dyads during Middle-Childhood: Relation to Maternal Childhood Histories of Aggression, Child Behaviour and Functioning

Studies across developmental stages suggest that emotion regulation is a core component of both emotional competence and social development (e.g., Cole, Martin, & Dennis, 2004; Deater-Deckard, Li, & Bell, 2015; Eisenberg, Hofer, & Vaughan, 2007; Gross, 2013; Thompson, 1994). The urgency of understanding factors associated with the development of emotion regulation is highlighted by research linking the regulation of emotion to the development and manifestation of externalizing and internalizing problems from childhood through adolescence (Gardner, Dishion, & Connell, 2008). Maladaptive (or dysregulated) emotion regulation abilities in children are associated with higher externalizing (e.g., aggression, impulsivity) and internalizing (e.g., depression, social anxiety) behaviours (Eisenberg et al., 1995; Lougheed & Hollenstein, 2012; Silk, Steinberg, & Morris, 2003).

At present, there is a substantive clinical literature highlighting the significance of behavioural manifestations of maladaptive emotion regulation (e.g., depressive or suicidal ideation; impulsivity; non-suicidal self-injury; Kring, 2001; Voon, Hasking, & Martin, 2014), and pointing to the successful or adaptive regulation of emotion as a central tenant of favourable mental health and well-being (Berking & Wupperman, 2012; Yap, Allen, & Ladouceur, 2008). However, less is known about what specifically constitutes emotion regulation behaviours and/or strategies and how these strategies may be predictive of adaptive or maladaptive outcomes in non-clinical populations. We designed the present study to fill some of this gap in the literature, by observationally

examining emotion regulation behaviours in a non-clinical, at-risk community sample of both mothers and children during middle childhood.

Emotion Regulation: Definition

There is a lack of consensus on the definition of emotion regulation, although it is widely considered a multidimensional process involving numerous components (Bridges, Denham, & Ganiban, 2004; Cole et al., 2004; Eisenberg et al., 2007; Eisenberg & Spinrad, 2004; Gross, 2015; Thompson, 1994). Emotion regulation can be broadly conceptualized as the changes that follow the activation of specific emotions (Gross, 2013). These changes deal with the valence (positive or negative), intensity (high or low), or time course (duration) of emotional content, all of which were components of the behaviours measured in the present study. Emotion regulation behaviours include, but are not limited to, self-soothing, avoidance, and self-distraction (Mangelsdorf, Shapiro, & Marzolf, 1995). Since emotion regulation relates to abilities to cope with an emotional response, intentionality and goal-orientation are central (Eisenberg & Spinrad, 2004).

Under a given set of circumstances, an individual's attempt to modulate emotions (e.g., appear less startled, contain enthusiasm, reduce outward appearance of anger) is often achieved by manipulating the environment or engaging in activities that provide emotional relief (Silk, Shaw, Skuban, Oland, & Kovacs, 2006). The use of these strategies is associated with decreased distress and better psychological adjustment (Garber, Braafladt, & Zeman, 1991; Grolnick, Bridges, & Connell, 1996; Herman-Stahl & Petersen, 1996). Inflexibility in responding to environmental changes can result in maladaptive emotion regulation behaviour over time (Bridges et al., 2004). Consequently,

emotion regulation can be perceived as a dynamic concept necessitating change over time, and as one that is best examined within interpersonal interactions.

Due to the interpersonal nature of the development of emotion regulation, the present study was designed to observe how children and mothers regulate emotions as they interact while playing a cooperative game and as they engage in a conflictual discussion. This bi-directional focus on emotion regulation behaviours across two interaction contexts represents a major contribution of the present study, allowing us to examine strategies used by both members of the dyad and to determine how these are associated with historical (longitudinal) and concurrent behaviours.

Emotion Regulation: Process Model and Measurement

Based on the definitional features of emotion regulation, a major objective of the present study was to develop an observational tool to measure discrete behaviours that contribute to an individual's ability to regulate his or her emotions. These behaviours were examined within a dyadic context, aligning with the process model of emotion regulation, first proposed by Lazarus (1991) and expanded on by Thompson (1994), relating to primary and secondary emotional responses. The activation of an emotion can be considered a *primary* emotional response, while its regulation is considered a *secondary* one (Lazarus, 1991). Thus, an emotion regulation behaviour serves as a goal-oriented response to an activated emotion during an interaction with a partner. Dyadic mother-child interactions provide the opportunity to observe the emotion-eliciting cue (self- or partner-based) and subsequent goal-oriented regulatory response (Gross, 2013).

In order to measure the complex and intricate behaviours that take place within dyadic contexts, an observational measurement strategy was used in the present study.

Observational methods are often considered to be the gold standard in developmental research (Cummings, Davies, & Campbell, 2000) and allow for the collection of rich and layered data. Numerous studies on emotion regulation in children have called for the use of observational measures as an important future direction for this field (e.g., Cole et al., 2004; Eisenberg et al., 1998; Gross, 2015; Morris, Silk, Steinberg, Myers, & Robinson, 2007; Thompson, 1994). To our knowledge, this represents the first study to employ real-time (second-by-second) observational coding to examine emotion regulation strategies in middle-childhood during mother-child interactions in at-risk dyads. Our goal in creating this observational coding system was to explore outcomes associated with our direct observations. However, the two studies in this dissertation were not intended to be psychometric studies. While the measurement of infants' and preschoolers' emotion regulation often relies on observational methods (e.g., Jean & Stack, 2012; August et al., 2015), these methods are not often used in studies of children beyond the preschool age (Cole et al., 2004). The measurement of childhood and adolescent emotion regulation is heavily reliant on self-report measures (Adrian, Zeman, & Veits, 2011), only a handful of which have been validated (Eisenberg, Cumberland, & Spinrad, 1998). One such measure is the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). However, self-report measures may not always be ideal, since children have considerable difficulties reporting their emotional states (Cole et al., 2004). The paucity of observational tools has frequently been highlighted as a significant limitation in the emotion regulation literature (Campos, Frankel, & Camras, 2004; Cole et al., 2004; Eisenberg & Spinrad, 2004). Observable emotion regulation behaviours can be both adaptive and maladaptive, and include, but are not limited to, self-soothing, avoidance,

and self-distraction (Mangelsdorf et al., 1995). In the present work, emotion regulation behaviours were conceptualized under the three larger domains of approach, avoidance, and self-comfort behaviours. Within each of these domains, several specific behaviours were observed and are described in detail in the Methods section.

Emotion Regulation in Middle Childhood

Emotion regulation abilities are known to vary considerably across the lifespan (Gross, 2013) and their development is considered to occur dynamically across time (Fogel et al., 1992; Hoeksma, Oosterlaan, & Schipper, 2004; Hollenstein, 2007). During the elementary school years, children make advances in cognitive, language, and motor abilities, yielding the ability to mentally control undesirable emotional states (Eisenberg, Hofer, Sulik, & Spinrad, 2014). It is also at this time that children begin to navigate their own social relationships, necessitating skills learned from parent-child interactions to effectively modulate emotionally laden interactions with their peers. While past studies have examined emotion regulation in mother-child interactions during infancy and at the preschool-age (e.g., August et al., 2015; Hertenstein, 2002; Jean & Stack, 2012; Tronick, 1995), the examination of this ability in middle-to-late-childhood is limited (Zeman, Klimes-Dougan, Cassano, & Adrian, 2007). While research supports the importance of parents as primary external agents of emotion regulation in early childhood (Thompson & Meyer, 2007), less is known about parents' contribution to the development of emotion regulation in middle childhood and adolescence (Klimes-Dougan, & Zeman, 2007).

Emotion Regulation and Context

Throughout development, children adopt strategies of emotion regulation that emerge as a result of repeated interactions between biological factors and their broader

ecological context. Using rich observational data, the present study explored contextual factors that are linked to the development of emotion regulation. Bronfenbrenner's Ecological Systems Theory (1979; Bronfenbrenner & Morris, 2006) was used as a guiding framework to structure our understanding of the role played by the environment in the dynamic development of emotion regulation. Drawing from the Ecological Systems framework, the social environment created by parents is a part of the Microsystem and is critical to understanding the ecological context of children's emotion regulation (Denham et al., 2003). In addition, distal features of the environment strongly inform the proximate environment experienced by the child. Observation of emotion regulation in children of mothers of disadvantaged backgrounds, as part of the present study, captures important elements of both the Macroystem (e.g. socioeconomic status) and PPCT model (e.g., maternal histories of aggression). Furthermore, examining vulnerable groups is important to understanding the role of children's emotion regulation and the parenting characteristics integral to perpetuating risk or promoting adaptive social functioning across generations (Cicchetti & Toth, 2009). Employing an ecological model is practical in establishing when and how environments shape the development of positive emotion regulation practices, as the challenges presented to this system may be anticipated to vary across context, including contexts of risk.

Higher levels of cumulative risk in early-and middle-childhood are predictive of children's lower levels of competent emotion regulation (Evans & English, 2002; Lengua, 2002). Children growing up in poverty or low-SES homes are more likely to remain within the intergenerational cycle of economic, physical, and emotional hardship (Bird, 2007). Family poverty represents an important factor in the continuity of disadvantage

across generations (Conger & Donnellan, 2007). Children from lower socioeconomic backgrounds are also at a higher risk for experiencing social and emotional difficulties (Harden et al., 2000). In addition to the aforementioned psychosocial risk posed by socioeconomic disadvantage, maternal childhood behaviour problems may contribute to the cumulative risk experienced by their offspring. The focus on cumulative psychosocial risk, its potential intergenerational impact, and understanding the pathways to maladaptive and adaptive behaviours also renders the developmental psychopathology framework relevant to this study (Cichetti & Toth, 2009). One cumulative psychosocial risk factor that can be examined is maternal childhood behaviour problems, such as aggression.

Aggression is a frequently examined maternal childhood risk behaviour that has implications for parenting (Rubin, Coplan, & Bowker, 2009). Aggressive girls are at-risk for a host of negative adolescent and adult outcomes such as antisocial behaviour, at-risk sexual activity, and school dropout, which may compromise their offsprings' developmental environments (Serbin et al., 1998). Furthermore, maternal childhood aggression is directly associated with a variety of negative parenting strategies (Grunzeweig, Stack, Serbin, Ledingham, & Schwartzman, 2009; Harvey et al., 2016; Matte-Gagné, Harvey, Stack, & Serbin, 2015; Stack et al., in press).

This study's focus on maternal childhood histories of aggression rather than other maternal dispositions examined in the Concordia Project (e.g., maternal childhood histories of social withdrawal or likeability) was based on the theoretical rationale that observed emotion regulation behaviours were likely to be related to some forms of externalizing behaviours (Mullin & Hinshaw, 2007) and potentially internalizing

behaviours (Silk et al., 2003). In addition, we chose to focus on maternal histories of aggression because we were most interested in how this disposition would potentially impact maternal support and mothers' own emotion regulation behaviours. During middle childhood, children become more autonomous in regulating their own emotions. When they experience novel or challenging experiences and are not able to resort to previously successful strategies or to get help regulating their emotions from their parents, they may resort to more immature coping, including misbehaviour, aggression, and other externalizing behaviours (Cole, Michel, & Teti, 1994). Both the quality of individual and mutual mother-child emotion regulation have been associated with the course of conduct and externalizing problems in children (Cole, Teti, & Zahn-Waxler, 2003).

Based on our understanding of how maternal histories of aggression shape their offspring's developmental context, the influence of maternal histories of risk may be observed during interactions with their children via parenting (i.e., how mothers interact with their children and shape their emotion regulation abilities and processes). The developmental psychopathology framework posits that children whose parents have histories or symptoms of mental health problems are at a higher personal risk for psychopathology (e.g., Belsky & Jaffee, 2006; Enlow, Egeland, Carlson, Blood, & Wright, 2014). Within the Concordia Project, parents' symptoms of anxiety and depression were related to negative outcomes such as behavioural and emotional problems (e.g., Serbin, Stack, De Genna, Ledingham, & Schwartzman, 2004). Parents' emotional resources to attend to the needs of their children can be limited if they experience higher levels of stress and/or psychiatric symptoms (Stack et al., in press; Stack, Serbin, Schwartzman, & Ledingham, 2005). Given the bi-directional nature of

parent-child interactions, the quality of parenting may be linked to how adaptively parents are able to respond to their children (Stack et al., in press chapter). Higher parenting stress is related to poor emotion regulation in children (Papoušek & von Hofacker, 1998), whereas parental social support buffers the effects of parenting stress on maternal interactive behaviour (Crnic, Ragozin, Greenberg, Robinson, & Basham, 1983).

The present study examined maternal support (characterized by warmth, affection, and validation) in relation to children's emotion regulation behaviour, given the association between parental support in regulating their child's emotions and increased offsprings' social competence (Davis et al., 2001; Kliewer, Fearnow, & Miller, 1996). The maternal support variable was also included due it its potential buffering effect against the adversity presented by maternal histories of risk. Maternal support may increase the experience and expression of positive emotions, and positive emotions counteract some effects of negative emotions (e.g., Fredrickson, 2001; 2013). In addition to affecting aspects of parenting, childhood emotion regulation behaviours can be associated with a number of factors that are predictive of later success, such as cognitive abilities and behaviour problems.

Children's behaviours during interactions with their mothers may be predictive of their behaviours in other contexts (e.g., at school). Given that children's emotional experiences influence their motivation (Villavicencio & Bernardo, 2013) and their cognitive availability to learn in school, links between emotion regulation, problem behaviours, and cognitive abilities were also explored. This investigation allowed us to consider potential associations between emotion regulation and mental health problems.

Emotion Regulation: Association with Children's Problem Behaviours and Functioning

Adaptive emotion regulation is vital to mental health (Yap et al., 2008). Many contemporary theories of child and adolescent psychopathology conceptualize maladjustment as the result of difficulties regulating emotions (e.g., Bradley & Lang, 2007; Heleniak, Jenness, Vander Stoep, McCauley, & McLaughlin, 2016; Steinberg & Avenevoli, 2000). Clearer understanding of the role of emotion regulation abilities in early development may help us better predict the emergence of mental health problems later in the lifespan (Silk et al., 2003), since the frequency and intensity of early behaviour problems can be predictive of the development of internalizing and/or externalizing disorders. Maladaptive management of emotional states can be referred to as emotion *dysregulation,* which plays a role in both internalizing and externalizing disorders during adolescence (Aldao et al., 2016; Sheppes et al., 2015; Schäfer et al., 2017; Steinberg & Avenevoli, 2000). Internalizing disorders (e.g., depression) may involve difficulties in the down-regulation of negative emotions (Cole, Michel, & Teti, 1994) or with the up-regulation of positive emotions (Silk et al., 2003). Externalizing disorders (e.g., ADHD) also feature emotional dysreguation (Bradley, 2000). The present study set out to examine ratings of children's problem behaviours in relation to their observed emotion regulation abilities.

In addition to behaviour problems, children's cognitive abilities are an essential marker of their adaptive development during middle childhood. Emotional skill and executive functioning begin to become fully integrated by the time children are school-aged (Rueda, Posner, & Rothbart, 2004) and research examining early academic success

has focused on cognitive processes and skills central to executive function (e.g. memory and problem solving; Stipek & Ryan, 1997). The cognitive correlates of emotion regulation are frequently examined through the constructs of suppression and reappraisal (Gross 2001, 2002). Some cognitive emotion regulation strategies, such as cognitive flexibility, are associated with components of executive functioning (e.g., Gyurak et al., 2009). In addition, the use of cognitive reappraisal as an emotion regulation strategy is associated with relatively higher working memory capacity, shifting abilities, and abstract reasoning, but not with response inhibition or verbal fluency (McRae, Jacobs, Ray, John, & Gross, 2012). These findings suggest that the ability to effectively regulate emotion may be related to specific cognitive abilities.

Objectives of the Present Study

The overarching goal of the present study was to investigate emotion regulation behaviours in middle childhood as they relate to its measurement, the mother-child relationship, maternal support, and children's problem behaviours and cognitive functioning. The four specific objectives and their associated hypotheses are outlined below.

(1) To develop an observational measure of emotion regulation that could be applied to both school-age children and their mothers in different interaction contexts. This objective was exploratory in nature, but was not intended as a thorough psychometric evaluation. It was hypothesized that observational measures of child and mother emotion regulation would be significantly associated with maternal childhood histories of aggression and children's behaviour problem and cognitive abilities.

(2) To examine the relationship between maternal childhood histories of aggression and children and mothers' emotion regulation behaviours. It was hypothesized that mothers who were more aggressive as children would have children who used more approach and self-comfort behaviours. This hypothesis was based on the notion that these children may be more aggressive themselves as a result of their mothers' behaviour styles and/or be required to independently self-regulate more because of it. It was anticipated that maternal histories of aggression would be predictive of the use of more approach behaviours by mothers themselves during the interactions.

(3) To examine the relationship between concurrent maternal support and child emotion regulation. It was hypothesized that higher maternal support would be related to children using fewer self-comfort behaviours, since children would be required to independently regulate their emotions to a lesser extent.

(4) To examine the relationship between children's emotion regulation behaviours and their problem behaviours and cognitive abilities. In considering emergent patterns of risk for psychopathology, it was predicted that greater use of approach behaviours would be associated with children's externalizing problems, given that externalizing problems are directed toward the outward (or external) environment (Eisenberg et al., 2001; Hinshaw, 1992; Okado & Bierman, 2015). Since avoidance behaviours maintained across early development present an increased risk for the development of anxiety disorders (Fox, Henderson, & Marshall, 2001; Fox, Henderson, Marshall, Nichols, & Ghera, 2005), avoidance behaviours were predicted to be associated with internalizing problems. Finally, it was

hypothesized that children's approach and self-comfort behaviours would be associated with higher cognitive functioning, given that stronger emotion regulation abilities have been associated with higher intellectual ability.

Method

Identification of the Original Sample

The participants in the present study constitute a sub-sample of the Concordia Longitudinal Risk Project (Concordia Project), a prospective, longitudinal, intergenerational study that was initiated between 1976 and 1978 (Schwartzman, Ledingham, & Serbin, 1985; Serbin et al., 1998; Stack et al., in press). The sample is a large, community-based sample of children who attended 22 inner-city French schools in low socioeconomic neighbourhoods of Montréal, Québec. Initially, 4109 francophone boys and girls in first-, fourth-, and seventh-grade were screened along dimensions of aggression, social withdrawal, and likeability using a French translation of the Pupil Evaluation Inventory (PEI: Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976). This inventory, designed to assess childhood adjustment, is a peer nomination technique in which children are asked to nominate their peers on 34 items related to aggression (e.g., "those who start a fight over nothing"; "those who are mean and cruel to other children"), withdrawal (e.g., "those who are too shy to make friends easily"; "those who aren't noticed much"), and likeability (e.g., "those who everyone likes"; "those who are particularly nice"). The current study focused only on maternal histories of aggression.

The PEI is both a reliable (internal consistency above .70 for all factors) and valid (concurrent validity between .54 and .65) measure for the assessment of children's social behaviour. Children nominated up to four boys and (separately) four girls who best

matched each item on the PEI. Following the administration of the PEI, a total of 1,770 children (861 boys; 909 girls) met the inclusion criteria to make up the Concordia Project sample. Percentile cutoffs were used to establish which children had received extreme scores on aggression and withdrawal, compared with age- and sex-matched peers, allowing for each child to be scored according to relative norms for his or her own age and sex (Schwartzman et al., 1985). Using percentile cut-offs, children were identified as being at high psychosocial risk if they had extreme scores on dimensions of aggression (above the 95 percentile), withdrawal (above the 95th percentile), or both (above the 75th percentile). A normative comparison group of children who were low on these dimensions were included in the study as a comparison and were drawn from the same neighborhoods and schools at the same time. These children were followed into adulthood and parenthood. The Concordia Project provides a unique opportunity to study the intergenerational transfer of health and psychosocial risk during childhood, and to determine the processes and protective factors that predict positive outcomes for children within an ‘‘at-risk’’ population.

Present Sample

For the present study, 106 videotapes of mother-child dyads were reviewed for inclusion. Of the 106 videotapes, 83 mothers (mean age = 37.75 years, *SD* = 3.19) participated in the observational component of the present study with their 9- to 13-year-old children (mean age = 10.79 years, *SD* = 0.92; 55.6% girls). There were an additional 23 dyad videotapes that were excluded for observational coding due to videorecording issues (e.g., poor lighting; no sound; camera angle or set-up prevented a clear view of a dyad member’s face). Every child in the present sample had one parent (mother or

father) for whom a dimensional rating of childhood aggression was available. Maternal histories of aggression were used only in analyses examining the histories of risk in relation to current observed emotion regulation behaviours. Specifically, 55 of the 83 children in this study had mothers with childhood ratings of aggression (original participants in the Concordia Project), while the remaining 28 had fathers with ratings of aggression (spouses of original participants in the Concordia Project). Accordingly, for analyses examining maternal childhood histories of aggression as a variable, the sample size was 55 dyads, while for analyses not including this variable as a predictor the sample size was 83 dyads. As with past studies of the Concordia Project, scores for maternal childhood histories of aggression were treated as a dimensional rather than categorical predictor in order to maximize power (Kline 2004). Mothers in the present sample, who were original participants in the project corresponded to the full-range of aggression scores.

In addition to the observational component of this study, questionnaire measures were employed. Questionnaire measures were available for between 66 and 80 of the 83 dyads observed, depending on responses to each specific questionnaire (e.g., some participants completed the Child Behaviour Checklist (CBCL; Achenbach, 1991) but left items of the Parenting Dimentions Inventory (PDI; Power, 1993) blank). The number of participants included in analyses involving questionnaires is indicated in each table describing results.

To assess the representativeness of the current sample to those who did not participate but that are a part of the larger Concordia Project, the 83 original mothers and spouses of original fathers who participated in the present study were compared to a

larger sample of 367 participants in the project along the dimension of aggression, as well as level of education, family income, and age at birth of first child. Z-scores revealed no significant differences or these variables between the present subsample and the larger Concordia Project participants.

Procedure

The present study was part of a larger project in which interviews, questionnaires, and naturalistic observations were obtained over one home visit and two school visits. The home visit was conducted by a PhD-level experimenter and a research assistant; both were trained in the administration of the testing protocol and were blind to the mothers' childhood histories. Mothers were provided with a description of the procedure and provided informed consent (Appendix B). During the home visit, mothers and children were videotaped during several tasks and completed a range of questionnaires to assess socio-demographics, aspects of parenting, and child behavioural problems (see Stack et al., 2012, and Serbin et al., 1998 for more detail).

The current study focused on two dyadic interaction contexts: a game-playing task and a conflict task. For the game-playing task, dyads engaged in a four-minute game of Jenga. During a Jenga game (marketed by Parker Brothers), players take turns removing one block at a time from a tower constructed of 54 blocks. Each block removed is then balanced on top of the tower, the goal being to keep the progressively unstable structure standing. For the conflict task, dyads discussed an issue of conflict in their relationship. Prior to videotaping the conflict task, both mothers and their children completed a conflict questionnaire (Appendix C and D) in which they hierarchically rated topics they considered to be problematic in their relationship (e.g., bedtime, chores,

relationship with siblings). The common highest ranked item for each dyad was selected as the topic of discussion for the conflict task. This task was used to assess mother and child emotion regulation when faced with a potentially conflictual situation.

For the conflict task, each dyad was given six minutes to discuss and attempt to resolve the conflict at hand. Approximately half the dyads used the allotted 6 minutes to discuss the designated conflict (mean length of task = 5.26 minutes, range = 3-6 minutes). However, 42 dyads completed their discussion in fewer than 6 minutes in which case the recording was terminated when they stopped discussing the element of conflict (79 of the 83 dyads discussed the conflict for more than 4 minutes). Other dyads used additional time to complete their discussion, in which case coding discontinued at the 6-minute mark. In order to account for individual differences in completion time, proportion scores were created for data obtained from the conflict task (see below for more information on observational coding).

Questionnaire Measures

Demographic Information Questionnaire (DIQ). Mothers completed the DIQ in order to gather socio-demographic information about participating families. This questionnaire includes items concerning mother's current age, age at birth of first child, marital status, number of years of education, and occupational status. This measure has proven effective in collecting participant demographics and has been used in past studies of the Concordia Project (e.g., De Genna, Stack, Serbin, Ledingham, & Schwartzman, 2007; Grunzeweig et al., 2009; Martin, Stack, Serbin, Schwartzman, & Ledingham, 2012).

Parenting Dimensions Inventory (PDI). Parental support was measured using the Parenting Dimensions Inventory (Power, 1993). The Parenting Dimensions Inventory is a multidimensional tool measuring parental support, structuring and control, and is based on other child-rearing measures (e.g. Block, 1965; Rickel & Biasatti, 1982). The support dimension, which was used in this study and others in the Concordia Project (e.g., Serbin, Stack, & Kingdon, 2013), examines parents' nurturance, responsiveness to child input, and non-restrictive attitude. Scores on nurturance, responsiveness and non-restrictive attitudes were combined to create a total score for parental support. Low scores indicate lower levels of support, while high scores indicate higher levels of support. Internal consistency of the support dimension in our sample was acceptable ($\alpha = .74$).

Child Behaviour Checklist (CBCL). Mothers' ratings of children's social and behavioural problems were obtained using the parent report form (for ages 6-18) of the Achenbach Child Behavior Checklist (Achenbach & Rescorla, 2001). The CBCL is a standardized measure used to examine child behaviour in both research and clinical settings. Mothers rate the child on 113 categorical items ranging from 0 (*not true*) to 2 (*often/very true*). The ratings are then summed to create three problem behaviour scores (Total, Internalizing, and Externalizing) and these are considered reliable (internal consistency ranges from .78 to .97) and valid (discriminant analyses ranges from .80 to .88) measures of children's behavioural problems (see Achenbach & Rescorla, 2001). The Internalizing, Externalizing, and Total Problem scores were considered in the present study.

Wechsler Intelligence Test – 3rd Edition (WISC-III). The WISC-III was developed by Wechsler (1991) and is an individually administered standardized test of

intelligence for children aged 6-16 years. The WISC-III is composed of 10 core subtests that are equally weighted toward a Full Scale IQ score. In addition, the following four scales make up the WISC-III: the Verbal Comprehension Index, the Perceptual Reasoning Index, the Processing Speed Index, and the Working Memory Index. Only the Full Scale IQ (FSIQ) was used in the current analyses.

Observational Coding

Middle Childhood Emotion Regulation System (MCERS). The MCERS (August & Stack, 2013) is an observational measure of middle childhood emotion regulation behaviours that was applied to the game-playing (Jenga©) and Conflict tasks for both children and mothers in the dyads observed. The MCERS was developed for the purposes of the present study and is based in part on existing literature (Dennis, 2006; Grolnick, Bridges, & Connell, 1996; Lougheed & Hollenstein, 2012; Martin-Storey, Serbin, Stack, & Schwartzman, 2009) and in part on the Preschooler Self-Regulatory Scheme (August et al., 2015) and the Infant Self-Regulatory Scheme (ISRS; Millman, Jean, & Stack, 2007; adapted from Tronick & Weinberg, 1996). The MCERS was coded by a graduate student using Mangold Interact 9 software, a data logging software for video-based observation studies. It allows for the observation of a video record, while enabling coders to develop their own coding system and apply codes second-by-second, as the behaviour is observed. This code is then provided with a timestamp in a digital record. The software keeps track of assigned codes and allows for analyses involving duration and frequency. Brief operational definitions for codes in the MCERS can be found in Table 1, along with the reliability coefficients and percentage agreements (discussed below under Reliability).

Data Reduction

Following the completion of coding, scores of individual sub-codes (i.e., "self-talk", "self-soothe") were combined to make up overall regulatory categories in which they belong (i.e., "self-talk" and "self-soothe" fall under the larger overall category of "self-comfort"). Duration scores were divided by the exact length (to the millisecond) of both the Jenga and Conflict tasks and multiplied by 100 to obtain the percent duration of each emotion regulation behaviour for each of the tasks (See Table 1 and Table 2).

Reliability

Thirty-one percent of the sample was randomly selected and double coded by an undergraduate student who was blind to the study's hypotheses and to maternal risk status. Percentage agreement reliability (PA; agreements divided by the sum of total agreements and disagreements) and Cohen's kappa coefficients (r_k; Cohen, 1960) were calculated to assess the reliability of coded regulation behaviours. Cohen's kappa calculates the inter-observer agreement as a proportion of potential agreement following a correction made for chance agreements (Kaplan & Saccuzzo, 2001). The reliability statistics derived were considered to be very good levels of agreement above chance (Fleiss, 1981; see Table 3).

Results

Data Preparation

After coding was completed, the durations of individual behaviours within the seven emotion regulation categories were summed for each dyad, forming total duration scores. In order to account for individual differences in completion time of the Jenga and conflict tasks and ensure comparability across dyads, total duration values were then

converted to proportion scores. To obtain the percent duration for each emotion regulation behaviour in both the game-playing (Jenga) and conflict tasks, raw duration scores were divided by the exact time (in milliseconds) of the duration of the behaviour and multiplied by 100 (See Table 1 and Table 2). This procedure left us with the seven proportionalized coded behaviour categories described in Table 3.

Prior to conducting statistical analyses, data were double-checked by the first author and an undergraduate research assistant, in order to assure that there were no errors in initial data entry or transfer from the Mangold Interact coding program to the PASW Statistical software program. Following confirmation of the data's integrity, descriptive statistics were used to assess the normality of the distribution, skewness and kurtosis for each variable, and to identify outliers. Data screening was performed according to the guidelines described by Kline (2008) and Wilkinson and the Task Force on Statistical Inference (1999). Even after making the necessary alterations for outliers, some variables remained skewed. This was to be expected since many of these variables, such as exaggerated vocalizations (e.g., yelling, scolding) or negative touch (e.g., wrist grabbing, any form of physical aggression), were naturally infrequent, and are therefore not typically normally distributed. As such, the data did not undergo any transformations.

Statistical Analyses

Analyses were conducted using PASW Statistics 18.0 for Macintosh (formerly known as SPSS Statistics 18). Hierarchical regressions were conducted to examine the association of both child and mother emotion regulation behaviours with concurrent measures of maternal support, child behaviour, and cognitive abilities. All analyses conducted included a minimum of 10 participants per predictor variable, which is the

recommended minimum guideline for a hierarchical regression analysis (Tabachnick & Fidell, 1996). Significant models and main effects are reported in the text. Intercorrelations among all variables are provided in Tables 4 and 5.

In all regressions investigating maternal risk status, predictor variables were entered chronologically, with maternal childhood histories of aggression entered in Step 1. When the overall model was significant or tended toward significance, it was reported, as well as the significant step(s) (main effects; please see Tables 6-16 for summary regression analyses).

Maternal Childhood Histories of Aggression and their Association with Middle Childhood Emotion Regulation Behaviours

These analyses were conducted with the mothers who were original participants in the Concordia Project (n = 55). The variable of maternal childhood histories of aggression was entered as Step 1 in these analyses. Maternal level of education (calculated by number of years of education) was entered as Step 2; child sex was entered as Step 3; child age was entered as Step 4. Maternal level of education was included as it is a variable that is related to positive parent-child outcomes (e.g., Carr & Pike, 2011; Neitzel & Stright, 2004; Tamis-LeMonda, Briggs, McClowry, & Snow, 2009). Child emotion regulation behaviour categories (self-comfort, avoidance verbal, avoidance non-verbal, approach verbal negative, approach verbal positive, approach nonverbal negative, approach nonverbal positive; as detailed in Table 3) were examined as outcome variables. Separate analyses were conducted for the game playing and conflict tasks to examine the different behaviours across interaction contexts, and a final set of analyses examining the two tasks combined was also included. For clarity, results are reported in terms of

"game-playing", "conflict", or "combined" tasks. Individual tasks were examined in order to allow for the observation of variability of emotion regulation behaviours in a game-playing versus a conflict discussion. Although it may be assumed theoretically that an interaction context in which a conflict is discussed would yield a greater regulatory challenge than a game-playing task, to our knowledge, this has not been examined observationally to date. Examining the individual tasks provided valuable information prior to conducting subsequent analyses for the combined tasks. Analyses for combined tasks allowed for the examination of the full range of emotion regulation behaviours during the testing session.

I. Self-comfort. The model examining the duration of children's self-comfort in the conflict task was significant. Higher levels of maternal childhood aggression predicted children spending more time using self-comfort behaviour (*Beta* = .46, $p < .01$; Table 6).

II. Approach verbal positive. The final step in the regression examining maternal histories of aggression predicting children's approach verbal positive behaviour was significant. Lower levels of maternal aggression predicted more time spent using approach verbal positive behaviours in children in the combined tasks (*Beta* = -.32, $p < .05$; Table 7).

Maternal Histories of Aggression and their Association with Mothers' Emotion Regulation Behaviours in Interactions with Their Children

I. Approach verbal negative. There was a main effect (significant step) for higher levels of maternal aggression predicting longer durations of approach verbal negative behaviours in mothers in the game-playing task. Higher levels of maternal

aggression significantly predicted more time spent using approach verbal negative behaviours (e.g. sarcasm, mimicking, obnoxious) in mothers during interactions with their children (*Beta* = .26, $p < .05$; Table 8).

II. Approach verbal positive. The model examining the duration of mother's approach verbal positive behaviours in the game-playing task was significant. Lower levels of maternal aggression predicted mothers' spending more time using approach verbal positive behaviours (*Beta* = -.22, $p < .05$).

Maternal Support and its Association with Children's Emotion Regulation Behaviours

Parental Support (PDI Support Index). A series of regressions were run to examine the relationship between children's emotion regulation behaviours and parental support (measured by the PDI Support Index). Maternal education, child sex, and child age (Steps 1, 2, and 3) were control variables, and child emotion regulation behaviour was entered as the final step (Step 4). Child emotion regulation behaviour was considered for the combined tasks only, for two reasons. First, only combined tasks were considered in analyses that examined the association between emotion regulation and questionnaire data, given that responses on questionnaires are meant to address a range of behaviours over time. Second, the use of combined tasks reduced the number of analyses conducted, in the interest of not decreasing power.

The model examining the duration of children's self-comfort behaviours was significant whereby less time spent using self-comfort behaviours was associated with more maternal support (*Beta* = -.36, $p < .01$; Table 9).

Emotion Regulation Behaviours and their Association with Measures of Children's Behavioural and Cognitive Functioning

The following analyses concerned mother and child emotion regulation behaviours as they related to information gathered from the CBCL and the WISC-III conducted with the full sample of mothers and children (the 83 mothers coded; not solely the original 55 participants in the Concordia Project with histories of childhood risk) who participated in the observational component of the study. As such, maternal histories of risk were not included as a predictor in these analyses, given that not all mothers had a childhood history of aggression (28 mothers were spouses of original male Concordia Project participants) although all were disadvantaged at the original time of recruitment. Maternal education, child sex, and child age (Steps 1, 2, and 3) were control variables, and child emotion regulation behaviour was entered as the final step (Step 4). As noted above, the game-playing and conflict task data were combined for these analyses to reduce the number of discrete linear regression models run in the investigation of these questions. CBCL data was available for 75 of the 83 dyads and WISC-III data was available for 73 of the dyads observed.

Behaviour problems. A series of regressions were run to examine the relationship between children's emotion regulation behaviours in the dyadic interaction tasks and their behaviours as rated by their mothers. As noted above, maternal education, child sex, and child age (Steps 1, 2, and 3) were control variables, and child emotion regulation behaviour was entered as the final step (Step 4). Outcome variables were maternal ratings of their children on Internalizing, Externalizing, and Total Problem scores for the CBCL.

I. Internalizing problems. There were no significant findings for the duration of approach verbal positive behaviours predicting mother-rated internalizing problems.

II. Externalizing problems. The model examining the duration of children's approach verbal positive behaviours in their prediction of externalizing problems rated by mothers was significant. Less time spent using approach verbal positive behaviours predicted higher externalizing scores (*Beta* = -.32, $p < .01$; Table 10).

III. Total problems. There was a model trend and main effect for approach verbal positive predicting mothers' higher ratings of Total Problems. Less time spent using approach verbal positive behaviours predicted higher mother-rated total problem behaviour scores (*Beta* = -.20, $p < .05$; Table 11).

Cognitive functioning. A series of regressions were run to examine the relationship between children's emotion regulation behaviours in the dyadic interaction tasks and their cognitive functioning (measured by the WISC-III). Only the total WISC-III scores (FSIQ) were evaluated as outcome variables.

Across this series of analyses, there was a consistent and significant step for higher maternal histories of education predicting higher WISC-III scores.

The model examining the duration of children's self-comfort behaviours was significant. Less time spent using self-comfort behaviours predicted higher WISC-III total scores (*Beta* = -.22, $p < .05$; Table 12). That is, children who engaged in less self-comfort behaviour had higher cognitive functioning scores.

The next set of regressions explored the association between avoidance behaviour and FSIQ. Starting with avoidance verbal behaviours, the model examining the duration of children's avoidance verbal behaviours was significant. More time spent using

avoidance verbal behaviours tended to predict lower WISC-III total scores (*Beta* = -.20, $p < .10$; Table 13). The subsequent model explored avoidance non-verbal behaviours. The model examining the duration of children's avoidance non-verbal behaviours was significant. More time spent using avoidance non-verbal behaviours significantly predicted lower WISC-III total scores (*Beta* = -.23, $p < .05$; Table 14). In both cases, avoidance behaviours (both verbal and non-verbal) were negatively associated with FSIQ.

The final set of regressions explored the link between approach behaviours and FSIQ. Beginning with approach verbal, the model examining the duration of children's approach verbal behaviours was significant. More time spent using approach verbal negative behaviours tended to predict higher WISC-III total scores (*Beta* = .20, $p < .10$; Table 15). The next model explored approach nonverbal behaviours. The model examining the duration of children's approach nonverbal negative behaviours was significant. More time spent using approach non-verbal negative behaviours predicted higher WISC-III total scores (*Beta* = .31, $p < .01$; Table 16). Contrary to what was found with avoidance behaviours, approach behaviours were positively associated with FSIQ.

Discussion

The foremost strength and unique contribution of this study was its focus on the application of a tool developed to measure emotion regulation behaviours observationally during middle childhood and across two interaction contexts. With the exception of a few more recent works (e.g., Lougheed, Hollenstein, Lichtwarck-Aschoff, & Granic, 2015; Penela, Walker, Degnan, Fox, & Henderson, 2015), emotion regulation in the majority of studies in childhood and adolescence has been measured predominantly by responses to questionnaire measures (e.g., Eisenberg, Fabes, Guthrie, & Reiser, 2000; Fox,

Henderson, Rubin, Calkins, & Schmidt, 2001; Rothbart, 1989; Rydell, Berlin, & Bohlin, 2003; Thompson, 1994). The Middle Childhood Emotion Regulation System (August & Stack, 2013) was applied to a sample of school-aged children and their mothers across two interaction contexts (game-playing and conflict tasks). This objective allowed us to examine different interaction contexts of the proximate environment (Ecological Systems Theory; Bronfenbrenner, 1979), in which maternal behaviours are used to socialize adaptive emotional development and regulation in children (Denham et al., 2003).

We also sought to explore the association between mothers' histories of aggression and children's as well as mothers' emotion regulation behaviours. These associations were examined for both members of the dyad to better understand mutual and transactional processes of change as described in the developmental psychopathology framework (e.g., Cicchetti 2003; Crouter & Booth, 2003). Higher levels of maternal childhood histories of aggression predicted children (but not mothers) spending more time using self-comfort behaviours (e.g., self-soothing) in the conflict and combined tasks. This finding may suggest that elements of mothers' aggressive style or tendencies were maintained over time and were associated with their parenting and/or response styles in interactions with their children, highlighting a potential cycle of risk. Once aggressive girls become mothers, they may be more likely to employ aggressive behaviours within their families, increasing the potential for negative outcomes in their children (Serbin & Karp, 2004; Serbin, Peters, McAffer, & Schwartzman, 1991). It is well supported that emotion socialization behaviours influence ways in which parents teach children how to express and control their emotions (Eisenberg et al., 1998; Eisenberg & Fabes, 1994; Zeman, Cassano, & Adrian, 2013). Problematic parenting

behaviours, such as elevated levels of hostility, sarcasm, unresponsiveness, and irritability with offspring are sometimes present among mothers with histories of aggression and/or social withdrawal (Stack et al., 2012). When mothers with histories of aggression integrate these maladaptive strategies into their parenting style, children may turn to using more self-comfort behaviours to regulate their emotions during conflictual interactions. The association between mothers' childhood histories of aggression and problematic parenting practices (i.e., increased hostility; Stack et al., 2012) is consistent with and may provide further evidence for the stability of aggression over time (Ruttle et al., 2011). The presence of maternal childhood histories of aggression influences how children and parents interact over time (e.g., Patterson, 2002; Serbin, Kingdon, Ruttle, & Stack, 2015; Stack, Serbin, Mantis, & Kingdon, 2015).

Lower levels of maternal childhood aggression predicted more time spent using approach verbal positive behaviours in both mothers and their children. In addition, mothers with higher levels of childhood aggression spent more time using approach verbal negative strategies during interactions with their children. These findings highlight the transactional nature of dyadic interactions, underscoring how the emotion regulation behaviours of each partner may impact one another. These findings also underscore the notion that the absence of positive behaviour is not equivalent to the presence of negative behaviour (Landry, Smith, & Swank, 2006). From a clinical standpoint, attenuated positive affect, rather than excessive negative affect, may be an early vulnerability factor for depression in at-risk children (Olino et al., 2011). Ultimately, our coding system demonstrated the importance of considering positive and negative

verbal behaviours along different continua (Durbin, Klein, Hayden, Buckley, & Moerk, 2005).

As hypothesized, maternal childhood histories of aggression were not related to avoidance behaviours in their offspring or in themselves. Histories of aggression were anticipated to be more strongly associated with approach behaviours, given the outward nature of these behaviours. However, avoidance behaviours were also not related to internalizing problems, as we may have expected. It is possible that the tasks observed were not ideal for studying avoidance behaviours, or that more avoidance behaviours may have emerged had the tasks lasted for a longer period of time. From an observational perspective, it is considerably more difficult to reliably code avoidance behaviour, as it frequently reflects the absence of behaviour or a more subtle form of behaviour. The subtlety of these behaviours often rely on cognitive constructs such as attention shifting or redirecting, and may be more difficult to capture in observational measures compared to self- or other-report questionnaire mesaures. In addition to maternal childhood histories, a specific aspect of parenting practice (parental support) was examined in relation to children's emotion regulation behaviours.

Children's Emotion Regulation Behaviours: Relation to Parental Support

Parents are sometimes considered to be their children's 'emotional coaches' (Saarni, 1999). By being supportive of and validating children's emotions, parents communicate to children that their emotions are worthy of discussion and may simultaneously help children learn to label their emotions (Gottman, Kats, & Hooven, 1996). Given the potential longitudinal implications of the influence of maternal childhood risk on parenting practices (discussed earlier in the Discussion), we examined

the association between parental support and children's emotion regulation. Parental support on the PDI, defined as parents' nurturance, responsiveness to child input, and non-restrictive attitude was examined in relation to children's emotion regulation. As anticipated, higher parental support was related to less observed child self-comfort behaviours. In other words, in cases in which parents were more supportive, their children needed to engage in less independent regulation. In addition to greater parental support being associated with better outcomes in children's social competence (Davis et al., 2001), parental coercion is associated with poorer social competence in children (Rollins & Thomas, 1979). A recent study within the Concordia Project (Serbin et al., 2015) also highlighted the importance of parental support as a key element of authoritative parenting style, demonstrating that less parental support of school-aged children was predictive of higher levels of externalizing problem in these same children three years later.

The association between parental support and child self-comfort behaviours may reflect the centrality of the dyadic relationship between parents and children in the development of emotion regulation (Jean, Stack, & Fogel, 2009). Co-regulation between parents and children first develops between the ages of two and five years (Doiron & Stack, in press; Eisenberg & Spinrad, 2004), and remains extremely important during middle childhood (Evans & Porter, 2009; Cole et al., 2004). The present findings link the current study to a broader literature on the role of parental support in enabling children's positive emotional adaptation (e.g., Sanders, 2012; 'Triple P-Positive Parenting Program'). In addition, results from studies report that children who benefit from more parental support in regulating emotion are more socially competent (Kliewer et al., 1996).

While some evidence suggests that emotion dysregulation plays a greater role in child and adolescent internalizing than externalizing problems (Garnefski, Kraaij, & van Etten, 2005; McLaughlin, Hatzenbuehler, Mennin, & Nolen-Hoeksema, 2011), this was not supported by our observational findings. Our findings generally suggested links between observed emotion regulation behaviours and externalizing and total problems, but not with internalizing problems. Children who spent less time using approach verbal positive behaviours were rated by their mothers as having more externalizing problems. This finding was also observed as a trend with regards to total problem behaviours. This divergence from the existing literature may reflect the fact that relatively little research has investigated the relation between emotion dysregulation and externalizing problems in middle childhood (preadolescents) and adolescents, and this is particularly the case in observational studies. Internalizing problems in 9-12-year olds may also invoke less supportive parenting than that observed for younger children (Serbin et al., 2015). In addition, the specific emotion regulation behaviour coded may not have mapped directly onto the items used to measure internalizing problems on the CBCL.

Along with behaviour problems, children's adaptive development and success is often measured by their cognitive abilities. There is some evidence that emotion regulation facilitates performance on cognitive tasks, particularly in adults (Phillips, Bull, Adams, & Fraser, 2002). Our investigation of the association between observed emotion regulation behaviours and cognitive functioning revealed three general findings relating to self-comfort, avoidance behaviour and approach behaviour. First, self-comfort was negatively associated with full scale intellectual functioning on a standardized assessment instrument. Children who used more self-comfort behaviours had lower overall cognitive

functioning. This finding differs somewhat from our initial expectation, but gives rise to several potential explanations. It is possible that these children used more self-comfort behaviours because they were more dysregulated to begin with or less efficient at regulating their own emotions and thus spent more time doing so. While self-comforting strategies are helpful for children to calm themselves down and be able to focus, it is possible that those who needed to self-comfort to greater extents were less attentionally or cognitively available to perform during the administration of the intellectual tool. The current findings, by focusing on intellectual functioning, rather than general academic achievement may be tapping into a fundamentally different mechanism. The kinds of tasks employed in this study (e.g., game-playing and conflict tasks) may be inherently more stressful for children with lower cognitive abilities, thus eliciting greater need for self-comfort. Future studies assessing children's self-perceived stress in these tasks may clarify the current findings. It is also possible that self-comforting behaviours, rather than a variety of broader emotion regulation behaviours, are used under specific circumstances such as these.

Secondly, a negative association was evident between avoidance behaviours and Full Scale IQ (FSIQ). This finding is in line with previous research suggests that higher levels of avoidance are related to lower intellectual functioning for boys and girls from disadvantaged families (Glutting, Oakland, & Konold, 1994). These findings may suggest that for children with lower cognitive abilities, avoidant strategies, or strategies that are less cognitively demanding may be more frequently used. In addition, children who are more likely to use avoidance strategies and who have lower cognitive abilities may engage in patterns of avoidance with regards to school work and educational

opportunities that may perpetuate academic delays or failure. At its extreme, this cycle of schoolwork avoidance in children with cognitive deficits is perhaps best illustrated in the well-established academic difficulties of children with ADHD and learning disorders (e.g., Cuffe et al., 2015; Loe & Feldman, 2007; Swanson, Harris, & Graham, 2014). It may also reflect the way in which avoidant behaviours can limit children's performance on cognitive evaluations more generally, however these speculations require further investigation.

Conversely, the third set of findings linked approach negative behaviours (both verbal and non-verbal) with higher Full Scale IQ scores. That is, children with higher cognitive abilities were also more likely to spend more time using behaviours such as sarcasm, eye rolling, non-affectionate touch, and yelling. This finding is somewhat surprising, given that there is very little literature linking these types of behaviours, which are usually perceived as disruptive in home and classroom environments, to stronger cognitive abilities. In fact, in their extreme form, these types of behaviours can manifest themselves in the form of conduct disorder and attention-deficit disorder, which have been reliably related to lower cognitive abilities (Bradley, 2003). However, in their milder forms, these types of behaviours may manifest themselves more as children's direct verbal communication abilities or assertiveness, which would more typically be associated with higher cognitive functioning (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996). Moreover, a combination of aggressive-type behaviours and higher level cognitive functioning has been associated with children having a greater propensity to engage in bullying behaviours (Rodkin & Roisman, 2010).

Limitations and Future Directions

By using a second-by-second detailed observational measure rather than examining more cognitively based aspects of emotion regulation, the current findings offer a valuable new perspective on the processes that contribute to emotion regulation in school-aged children and highlight how emotion regulation is linked to important behavioural and cognitive outcomes. This study is innovative through its development and application of an observational system that was used to examine emotion regulation behaviours in both children and their mothers during a dyadic interaction. Moreover, this study allowed for the unique examination of emotion regulation in a non-clinical but at-risk community population.

While it has its strengths, our study is not without limitations. Despite the considerable value of using an observational tool to measure emotion regulation, the current observations may have been even richer if they had been complemented by physiological measures (e.g., vagal tone, heart rate), self-report, and convergent evidence (Cole et al., 2004). In recent years, studies of emotional development have increasingly incorporated innovative assessments of biological activity to better understand emotional processes (e.g., Dennis, Buss, & Hastings, 2012; Hastings, Kahle, & Han, 2014). The inclusion of physiological measures, such as vagal tone or cortisol reactivity, allow for a more complete understanding of the physiological underpinnings of emotion regulation (Hastings et al., 2008; Porges, 2001). In addition, the ability to incorporate self-report measures of emotion regulation may have yielded more findings with regards to the avoidance dimension of the coding system. At present, no single study on child or adolescent emotion regulation that we know of has incorporated observational,

physiological and self-report measures, but we believe that this is an important future direction.

The current study examined emotion regulation and associated outcomes within a at-risk, longitudinal, intergenerational sample. Findings linking maternal histories of risk to offspring outcomes have been demonstrated in this and other longitudinal, intergenerational studies of at-risk children (e.g., DeGenna et al., 2006; Grunzeweig et al., 2009; Huesmann, Eron, Lefkowitz, & Walder, 1984; Serbin et al., 1998). These processes, however, may differ in a typically developing sample of families. Future work with this measure with a broader range of families may provide additional insight into the development of emotion regulation and the application of the coding system.

The current study explored emotion regulation across two different tasks, representing interaction contexts. Both of these contexts, however, were in the home environment. Ecological systems theory posits that child outcomes (e.g. emotion regulation abilities) stem from an interaction between child characteristics and the differing layers of the environment. Observing children's emotion regulation in other contexts (e.g. the classroom environment, in interactions with other children) may serve to enrich the current findings, since understanding the contextual and social demands of a task is essential to consider in evaluating emotion regulation (Bridges et al., 2004). Discrepancies in children's emotions and behaviours have been observed in different contexts (e.g., home or school) and with different adults (e.g., parents or teachers; Achenbach, McConaughy, & Howell, 1987; De Los Reyes and Kazdin; 2005), or other children (e.g. siblings; Howe, Brody, & Recchia, 2006).

Conclusions

Taken together, findings from the present study substantiate and add to several domains of emotion regulation research. First, this study represents an important advancement with regards to the design of an observational measure to examine school-aged children's emotion regulation behaviours. Second, linking emotion regulation behaviours with maternal histories of aggression suggests that emotion regulation may be one of the mechanisms explaining the intergenerational transfer of problem behaviours. In addition, mothers' own emotion regulation behaviours may be associated with their parenting practices, and an association was found between parental support and more adaptive emotion regulation behaviours in children. Third, linking observer-rated emotion regulation to children's behavioural and cognitive outcomes, suggests that observable characteristics of regulation have real world consequences for child development. Together, our results speak to the importance of helping children develop adaptive regulatory skills from a young age and have implications for the design of preventive intervention programs to foster children's socio-emotional competence, particularly in the context of at-risk and vulnerable families. Finally, the findings contributed to our understanding of emotion regulation behaviours in both children and their mothers during mother-child interactions in middle-childhood.

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Table 1

Proportionalized Duration of Child Emotion Regulation Variables on the MCERS

	Game-Playing Task		Conflict Task		Combined Tasks	
	(*n* = 81)		(*n* = 78)		(*n* = 78)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Self-Comfort	.3%	.04	42%	.33	43%	.33
Avoidance Verbal	1%	.00	1%	.01	1%	.01
Avoidance Non-Verbal	1%	.01	2%	.07	1%	.08
Approach Verbal Negative	3%	.01	1%	.01	1%	.01
Approach Verbal Positive	18%	.18	12%	.06	29%	.12
Approach Non-Verbal Negative	2%	.01	3%	.02	2%	.02
Approach Non-Verbal Positive	1%	.01	2%	.12	2%	.12

Note. To obtain the percent duration for each emotion regulation behaviour in each task, raw duration scores were divided by the exact time (in milliseconds) of the duration of the tasks and multiplied by 100.

Table 2

Proportionalized Duration of Mother Emotion Regulation Variables on the MCERS

	Game-Playing Task		Conflict Task		Combined Tasks	
	(*n* = 82)		(*n* = 79)		(*n* = 79)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Self-Comfort	1%	.01	24%	.18	24%	.18
Avoidance Verbal	0%	.00	1%	.01	1%	.01
Avoidance Non-Verbal	0%	.00	1%	.01	1%	.01
Approach Verbal Negative	1%	.01	4%	.02	4%	.02
Approach Verbal Positive	16%	.12	8%	.14	25%	.14
Approach Non-Verbal Negative	4%	.02	2%	.02	2%	.02
Approach Non-Verbal Positive	0%	.00	1%	.03	1%	.03

Note. To obtain the percent duration for each emotion regulation behaviour in each task, raw duration scores were divided by the exact time (in milliseconds) of the duration of the tasks and multiplied by 100.

Table 3

Brief Operational Definitions and Reliability Coefficients for the Middle Childhood Emotion Regulation System (MCERS; August & Stack, 2015)

Emotion Regulation Behaviour Category	**Behaviours Included**	**Cohen's Kappa (r_k)**	**Percent Agreement (%)**
Self-Comfort	Self-soothe (e.g., repeated ear rubbing; fiddling with an article of clothing) Self-talk (e.g., self-talk; humming to self)	0.96	99.5
Approach Non-Verbal		0.89	95.1
Positive	Affectionate touch (e.g., rubbing mother's hand softly) Leaning toward (e.g., physically getting closer to partner)		
Negative	Non-affectionate Touch (e.g., grabbing partner) Deep sigh Sharp/pointed gesture (e.g., fingers or hands are rigid) Rolling eyes Distorting face (e.g., frowning, scrunching nose)		
Approach Verbal		0.86	94.5
Positive	Positive emotional expression (e.g., laughing, smiling)		
Negative	Exaggerated vocalizations (e.g., raising voice, yelling) Mimicking/sarcasm/obnoxious (e.g., speaking in a tone to mock partner)		
Avoidance Non-Verbal	Decreased proximity (e.g., any physical movement made to increase the distance between partners) Slouching (e.g., downward vertical movement toward table) Avoiding eye contact (e.g., changing head position to avert gaze away from partner) Lack of response (e.g., not answering partner's question/statement)	0.89	96.3
Avoidance Verbal	Uninformative response (e.g., short utterance of two words or less) Changing topic (e.g., change conversation topic during emotionally charged moment)	0.82	88.2

Table 4

Intercorrelations between Maternal History of Aggression, and Mother and Child Emotion Regulation Variables

		Child Emotion Regulation Variables (2-8)						
	1	2	3	4	5	6	7	8
Maternal Childhood History of Risk								
Maternal History of Aggression (1)	---	0.32**	-0.01	-0.02	-0.13	-0.25*	-0.01	-0.07
Mother Emotion Regulation Variables								
Self-Comfort (2)	0.03	0.05	0.03	-0.05	0.05	0.22	-0.14	0.09
Avoidance Verbal (3)	-0.11	0.10	-0.07	-0.03	0.43***	-0.09	-0.05	-0.02
Avoidance Non-Verbal (4)	0.12	-0.01	0.13	0.05	0.13	-0.10	0.04	-0.03
Approach Verbal Negative (5)	0.12	-0.08	0.35**	-0.01	0.11	-0.21	0.26*	-0.06
Approach Verbal Positive (6)	-0.12	-0.08	-0.17	0.06	0.01	0.39***	-0.19	0.14
Approach Non-Verbal Negative (7)	0.13	0.13	-0.02	0.06	0.23*	0.03*	0.13	0.05
Approach Non-Verbal Positive (8)	0.04	0.06	-0.07	-0.06	-0.06	0.33**	-0.09	0.74***

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

Table 5

Intercorrelations between Child Emotion Regulation Variables, and CBCL and WISC-III Scores

	1	2	3	4	5	6	7	8	9	10	11
Self-Comfort (1)	--										
Avoidance Verbal (2)	-0.08	--									
Avoidance Non-Verbal (3)	-0.07	-0.04	--								
Approach Verbal Negative (4)	0.02	0.07	-0.02	--							
Approach Verbal Positive (5)	-0.09	-0.17	0.09	-0.17	--						
Approach Non-Verbal Negative (6)	-0.20	-0.07	-0.05	0.35**	-0.26	--					
Approach Non-Verbal Positive (7)	0.08	-0.07	0.11	-0.04	0.08	-0.07	--				
CBCL Internalizing (8)	0.01	0.11	0.01	-0.12	-0.10	0.11	0.01	--			
CBCL Externalizing (9)	0.25*	-0.05	0.05	0.11	-0.28*	0.34**	-0.06	0.54***	--		
CBCL Total (10)	0.12	0.08	0.05	-0.02	0.18	0.25*	-0.03	0.86***	0.84***	--	
WISC Total (11)	-0.22	-0.20	0.09	0.23*	0.05	0.32**	0.08	-0.21*	-0.13	-0.19*	--

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

Table 6

Maternal Childhood Levels of Aggression Predicting Self-Comfort Behaviour in the Conflict Task (N=82)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.09	7.54**
Childhood Aggression	0.10**	0.09	0.30		
Step 2				0.03	0.22
Childhood Aggression	0.10**	0.09	0.31		
Maternal Education	0.07	0.00	0.05		
Step 3				0.02	1.72
Childhood Aggression	0.11**	0.10	0.32		
Maternal Education	0.01	0.00	0.05		
Sex of Child	-0.09	0.02	-0.14		
Step 4				0.01	0.50
Childhood Aggression	0.10**	0.09	0.31		
Maternal Education	0.01	0.00	0.06		
Sex of Child	-0.09	0.02	-0.13		
Age of Child	0.03	0.01	0.08		
		R = .35	R^2_{Adj} = 0.07	F = 2.47*	

$^t p < 0.10$, $^* p < 0.05$, $^{**} p < 0.01$, $^{***} p < .001$

Table 7

Maternal Childhood Levels of Aggression Predicting Approach Verbal Positive in Combined Tasks (N=77)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.09	5.12*
Childhood Aggression	-0.25*	0.06	-2.26		
Step 2				0.00	0.93
Childhood Aggression	-0.25*	0.06	-2.21		
Maternal Education	0.01	0.00	0.09		
Step 3				0.02	0.18
Childhood Aggression	-0.23*	0.05	-2.07		
Maternal Education	0.01	0.00	0.10		
Sex of Child	-0.15	0.02	-1.37		
Step 4				0.00	0.66
Childhood Aggression	-0.24*	0.06	-2.11		
Maternal Education	0.01	0.00	0.11		
Sex of Child	-0.14	0.03	-1.25		
Age of Child	0.05	0.00	0.44		
		R = .30	R^2_{Adj} = 0.04	F = 1.78	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 8

Maternal Childhood Levels of Aggression Predicting Mother Approach Verbal Negative Game Playing Task (N=77)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.08	6.98**
Childhood Aggression	0.28**	0.08	2.64		
Step 2				0.01	1.26*
Childhood Aggression	0.27*	0.07	2.47		
Maternal Education	-0.12	0.02	-1.12		
Step 3				0.00	0.02*
Childhood Aggression	0.27*	0.07	2.42		
Maternal Education	-0.12	0.02	-1.12		
Sex of Child	0.02	0.00	0.14		
Step 4				0.00	0.13^t
Childhood Aggression	0.26 *	0.06	2.30		
Maternal Education	-0.12	0.02	-1.09		
Sex of Child	0.02	0.00	0.20		
Age of Child	0.04	0.00	0.36		
		R = .31	$R^2_{Adj} = 0.05$	F = 2.05^t	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 9

Child Self-Comfort Predicted by Maternal Support (N=75)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.00	0.31
Maternal Education	0.07	0.00	0.56		
Step 2				0.03	2.16
Maternal Education	0.07	0.00	0.57		
Child Sex	0.17	0.03	1.47		
Step 3				0.00	0.17
Maternal Education	0.06	0.00	0.55		
Child Sex	0.16	0.03	1.37		
Child Age	-0.05	0.00	-0.41		
Step 4				0.12	10.15**
Maternal Education	0.07	0.00	0.68		
Child Sex	0.13	0.02	1.12		
Child Age	0.01	0.00	0.06		
Child Self-Comfort	-0.36**	0.13	-3.19		
		R = .40	R^2_{Adj} = 0.11	F = 0.00*	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 10

Association between Approach Verbal Positive and Child Externalizing Problems (mother-rated) (N=75)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.01	0.80
Maternal Education	-0.10	0.01	-0.90		
Step 2				0.05	3.86
Maternal Education	-0.10	0.01	-0.91		
Child Sex	-0.22*	0.05	-1.96		
Step 3				0.01	0.79
Maternal Education	-0.10	0.01	-0.86		
Child Sex	-0.21*	0.04	-1.82		
Child Age	0.10	0.01	0.89		
Step 4				0.10	8.41**
Maternal Education	-0.09	0.01	-0.79		
Child Sex	-0.26	0.07	-2.34		
Child Age	0.09*	0.01	0.84		
Child Approach Verbal Positive	-0.32**	0.10	-2.90		
		R = .40	$R^2_{Adj} = 0.11$	F = 0.00*	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 11

Association between Approach Verbal Positive and Child Total Problems (mother-rated) (N=75)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				-0.01	0.01
Maternal Education	-0.08	0.01	-0.07		
Step 2				0.02	1.06
Maternal Education	-0.09	0.01	-0.07		
Child Sex	-0.17	0.02	-1.45		
Step 3				0.02	1.06
Maternal Education	-0.00	0.01	-0.02		
Child Sex	-0.15	0.02	-1.29		
Child Age	0.12	0.03	1.03		
Step 4				0.03	1.60^t
Maternal Education	0.01	0.01	0.49		
Child Sex	-0.18	0.02	-1.58		
Child Age	0.11	0.03	0.98		
Child Approach Verbal Positive	-0.20^t	0.01	-1.77		
		R = .29	$R^2_{Adj} = 0.03$	F = 0.18	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 12

Association between Child Self-Comfort Behaviours and WISC-III Full Scale IQ Scores (N=73)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.13	10.69**
Maternal Education	0.36**	0.13	3.27		
Step 2				0.01	5.51**
Maternal Education	0.36**	0.13	3.26		
Child Sex	0.71	0.01	0.05		
Step 3				0.00	3.62**
Maternal Education	0.36**	0.13	3.23		
Child Sex	0.70	0.01	0.63		
Child Age	-0.01	0.00	-0.05		
Step 4				0.47	3.83**
Maternal Education	0.36**	0.13	3.33		
Child Sex	0.53	0.28	0.49		
Child Age	0.25	0.06	0.23		
Child Self-Comfort	-0.22*	0.05	-2.00		
		R = .42	R^2_{Adj} = 0.13	F = 3.83**	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 13

Association between Child Avoidance Verbal Behaviours and WISC-III Full-Scale IQ Scores (N=73)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.13	10.69**
Maternal Education	0.36**	0.13	3.27		
Step 2				0.01	5.51**
Maternal Education	0.36**	0.13	3.26		
Child Sex	0.71	0.01	0.65		
Step 3				0.00	3.62**
Maternal Education	0.36**	0.13	3.23		
Child Sex	0.70	0.01	0.63		
Child Age	-0.01	0.00	-0.05		
Step 4				0.04	3.54*
Maternal Education	0.36**	0.13	3.26		
Child Sex	0.04	0.00	0.34		
Child Age	0.04	0.00	0.32		
Child Avoidance Verbal	-0.20*	0.04	-1.73		
		R = .41	R^2_{Adj} = 0.12	F = 3.54*	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 14

Association between Child Avoidance Non-Verbal Behaviours and WISC-III Full Scale IQ Scores (N=73)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.13	10.69**
Maternal Education	0.36**	0.13	3.27		
Step 2				0.01	5.51**
Maternal Education	0.36**	0.13	3.26		
Child Sex	0.71	0.01	0.65		
Step 3				0.00	3.62**
Maternal Education	0.36**	0.13	3.23		
Child Sex	0.70	0.01	0.63		
Child Age	-0.01	0.00	-0.05		
Step 4				0.04	2.97*
Maternal Education	0.36**	0.13	3.29		
Child Sex	0.06	0.37	0.56		
Child Age	-0.02	0.00	-0.19		
Child Avoidance Non-Verbal	-0.23	0.02	1.00		
		R = .38	R^2_{Adj} = 0.10	F = 2.97*	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 15

Association between Child Approach Verbal Negative Behaviours and WISC-III Full Scale IQ Scores (N=73)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.13	10.69**
Maternal Education	0.36**	0.13	3.27		
Step 2				0.01	5.51**
Maternal Education	0.36**	0.13	3.26		
Child Sex	0.71	0.01	0.65		
Step 3				0.00	3.62**
Maternal Education	0.36**	0.13	3.23		
Child Sex	0.70	0.01	0.63		
Child Age	-0.01	0.00	-0.05		
Step 4				0.04	3.54*
Maternal Education	0.34**	0.11	3.07		
Child Sex	0.03	0.00	0.22		
Child Age	-0.03	0.00	-0.23		
Child Approach Non-Verbal	0.20^t	0.04	1.73		
		R = .41	R^2_{Adj} = 0.12	F = 3.54*	

$^t p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < .001$

Table 16

Association between Child Approach Non-Verbal Negative Behaviours and WISC-III FSIQ Scores (N=73)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.13	10.69**
Maternal Education	0.36**	0.13	3.27		
Step 2				0.01	5.51**
Maternal Education	0.36**	0.13	3.26		
Child Sex	0.71	0.01	0.65		
Step 3				0.003	3.62**
Maternal Education	0.36**	0.13	3.23		
Child Sex	0.70	0.01	0.63		
Child Age	-0.01	0.00	-0.05		
Step 4				0.10	8.73**
Maternal Education	0.35**	0.12	3.34		
Child Sex	0.06	0.00	0.58		
Child Age	0.01	0.00	0.10		
Child Approach Non-Verbal	0.31**	0.10	2.96		
		R = .48	R^2_{Adj} = 0.10	F = 5.20**	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Chapter 3: Transition Statement between Study 1 and Study 2

Results from Study 1 contributed to the extant literature by expanding our understanding of school-aged children's emotion regulation behaviours through the design of an innovative observational measurement tool. It also yielded findings pointing to the intergenerational transfer of risk, with maternal childhood histories of aggression linked to their children's emotion regulation behaviours. Finally, Study 1 examined the association between observer-rated emotion regulation to school-aged children's concurrent behavioural and cognitive functioning, demonstrating that observable characteristics of regulation have real world implications for child development.

Consistent with Study 1, Study 2 was designed to focus on obtaining second-by-second observational data on mothers' and children's emotion regulation behaviours during dyadic interactions. While Study 1 focused on how observed emotion regulation behaviours were associated with concurrent factors such as parental support, child behaviour problems, and child cognitive abilities, Study 2 was designed to extend these findings by examining the longitudinal associations of emotion regulation behaviours during middle childhood into adolescence.

Several of the factors examined in Study 1 were also a focus of Study 2 (e.g., maternal histories of risk, concurrent problem behaviours). The rationale for this overlap was twofold. First, Study 1 was the first to use the observational measure designed for this dissertation, thus, Study 2 served as a platform to apply this tool with a different sub-sample of dyads from the Concordia Project and examine the replicability of some of the observational findings. Second, Study 2 sought to examine emotion regulation behaviours in a higher risk sample. The sample was considered to be higher risk based

on a lower mean maternal age in the cohort. Young motherhood has consistently been demonstrated to be a risk factor in children's development (e.g., Cairns et al., 1998; Pryce & Samuels, 2010; Serbin et al., 1998). Mothers in Study 2 were approximately five years younger than the Canadian national mean at the time that their first child was born (Milan, 2013).

The longitudinal component of Study 2 was designed to further extend the contribution of the research and complement Study 1 through examining the potential outcomes of regulatory challenges in early childhood. Maladaptive (or dysregulated) emotion regulation abilities in children have been associated with higher internalizing (e.g. depression, social anxiety) and externalizing (e.g. aggression, impulsivity) behaviours both concurrently and later in development (Eisenberg et al., 1995; Lougheed & Hollenstein, 2012; Silk et al., 2003). Adolescents displaying symptoms of problem behaviours are more likely to engage in health risk behaviours, such as cigarette smoking, alcohol consumption, drug use, and risky sexual behaviour (e.g., Lansford et al., 2010; Neppl, Dhalewadikar, & Lohman, 2015). Thus, from a developmental perspective, adaptive emotion regulation behaviours learned in childhood interactions (with both parents and peers) may protect children from engaging in unhealthy and risky behaviours during adolescence. Study 2, as a longitudinal study that also crossed two generations, was designed to explore the potential long-term outcomes of early socio-emotional challenges in greater depth.

Chapter 4: Dissertation Study 2

Emotion Regulation in Mother-Child Dyads during Middle-Childhood: Relation to Maternal Childhood Histories of Aggression and Longitudinal Risk Behaviours

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ABSTRACT

Emotion Regulation in Mother-Child Dyads during Middle-Childhood: Relation to Maternal Childhood Histories of Aggression and Longitudinal Risk Behaviours

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The present study was designed to examine emotion regulation behaviours in high-risk school-aged children using a systematic observational tool. Objectives were to: (1) use an observational measure to examine emotion regulation in both school-age children and their mothers with childhood histories of aggression; (2) examine the relationship between concurrent maternal stress and child emotion regulation; and (3) examine children's emotion regulation behaviours as they relate to child problem behaviours; and (4) to examine the longitudinal association between middle childhood emotion regulation behaviours and adolescent health risk behaviours. Participants were drawn from the Concordia Project, a longitudinal, intergenerational study of disadvantaged children screened along dimensions of aggression and social withdrawal, and followed into parenthood. The current sample of 59 mothers and their 5-to-12-year-old children engaged in a conflict task (discussion of topic rated as conflictual by the dyad). Emotion regulation behaviours (e.g. self-soothing, avoiding eye contact, turning away) for mother and child were observationally coded using the Middle Childhood Emotion Regulation System, a reliable and systematic coding system. Observational codes loaded onto three overall dimensions: avoidance, approach, and self-comfort. Results revealed a trend linking maternal childhood histories of aggression to mothers' observed approach negative behaviours. Less time spent using approach positive

behaviours in both mothers and children predicted higher parental stress. Less time spent using approach positive behaviours also predicted more internalizing, externalizing, and total problems in children. Avoidant behaviour in childhood was longitudinally associated with more marijuana and methamphetamine use in adolescence. Together, findings contribute to our understanding of how emotion regulation behaviours in children are intergenerationally, concurrently, and longitudinally associated. Results have implications for the design of preventative interventions for both individuals and families to target the development of adaptive emotion regulation behaviours.

Emotion Regulation in Mother-Child Dyads during Middle-Childhood: Relation to Maternal Histories of Aggression and Longitudinal Risk Behaviours

The development of adaptive emotion regulation abilities in childhood has increasingly been hailed as a crucial aspect of both emotional competence and social development (e.g., Deater-Deckard, Li, & Bell, 2016; Gross, 2014). The ability to regulate one's emotions is an essential component of managing day-to-day activities, ranging in children from displaying appropriate classroom and playground behaviours to interpersonal interactions with parents, siblings, and peers. Emotion regulation behaviours and strategies first emerge in the parent-child relationship during infancy (Jean & Stack, 2009), and evolve throughout childhood, during which parents serve to inform and shape adaptive emotional development in their offspring (Denham et al., 2003).

In order to successfully trace the development of emotion regulation from infancy through adolescence, the construct itself warrants definitional consideration. Although there is no gold standard definition of emotion regulation, it has been linked to many facets of socio-emotional development (Bridges, Denham, & Ganiban, 2004). Emotion regulation is a multidimensional concept (Cole, Martin, & Dennis, 2004; Eisenberg & Spinrad, 2004; Eisenberg, Champion, & Ma, 2007) that relates to the series of appraisals, reactions, and responses that follow the activation of emotional content (Gross, 2013). Emotion regulation behaviours can be both adaptive and maladaptive, and include, but are not limited to, self-soothing, avoidance, and self-distraction (Mangelsdorf, Shapiro, & Marzolf, 1995). In the present study, these behaviours were conceptualized with regards to some of these concepts, but more globally under the wider-reaching dimensions of

approach, avoidance, and self-comfort behaviours. Both intrinsic and extrinsic processes interact throughout development, to give rise to the different facets of emotion regulation, including the skills and strategies used to modulate affective experiences (e.g., Calkins & Fox, 2002; Caspi et al., 2003; Rutter, Moffitt, & Caspi, 2006).

Interpersonal interactions lead to the activation and subsequent regulation of emotional responses (Gross, 2013). As a result, the development of emotion regulation can be considered a dyadic process. Given the interpersonal nature of the development of emotion regulation, the present study was designed in part to observe how children and mothers regulate emotions when they are faced with discussing challenging or conflictual topics. From a very young age, caregivers begin to teach their children how to manage distress and dampen overly positive reactions by talking through emotionally eliciting situations and teaching children to appropriately communicate their experience of high intensity emotional responses (Calkins, 1994). Through this teaching and socializing, not only do children become aware of their emotional reactions, but they also acquire the capacity to understand that they can be proactive in changing their experiences (Kopp, 1989). For example, a study by Denham and colleagues (2000) found that preschoolers with mothers who responded to their emotions and behaviours in adaptive ways, such as by teaching emotion regulation strategies, displayed healthier emotional functioning in later childhood. Conversely, preschoolers with mothers who primarily modeled anger in response to challenging situations later expressed greater levels of negative emotions and behaviours (Denham et al., 2000).

As children's cognitive, memory and attention abilities develop during early and middle childhood, they form an increasingly large repertoire of strategies to manage

emotions with regards to situational and/or social demands (Zeman, Cassano, Perry-Parrish, & Stegall, 2006). While parents serve as primary external agents of emotion regulation in early childhood (Thompson & Meyer, 2007), less is known about parents' contribution to the development of emotion regulation in middle childhood and adolescence (Klimes-Dougan & Zeman, 2007). Middle-childhood is a significant period in which children become more effective at self-regulating emotions, rather than relying on external assistance (e.g., external regulation or co-regulation). The present study sought to better understand the emotion regulation behaviours that children commonly use during interactions at this stage of development. Understanding these early behaviours may help illuminate their link to later problematic behaviours and/or mental health problems, and also to well-being.

A number of mental health problems, such as depression and anxiety (e.g., D'avanzato, Joormann, Siemer, & Gotlib, 2013), eating disorders (e.g., Brockmeyer et al., 2014), and borderline personality disorder (e.g., Gratz, Moore, & Tull, 2016), are related to difficulties with emotion regulation. Maladaptive (or dysregulated) emotion regulation abilities in children are associated with higher internalizing (e.g., depression, social anxiety) and externalizing (e.g., aggression, impulsivity) behaviours (Eisenberg et al., 1995; Lougheed & Hollenstein, 2012; Silk, Steinberg, & Morris, 2003). Difficulties with emotion regulation abilities are increasingly cited as a "transdiagnostic feature" underlying numerous forms of psychopathology (e.g., American Psychiatric Association, 2013; Leahy, Tirch, & Napolitano 2011). Regardless of the specific clinical profile presented by a person seeking mental health services, the clinical treatment plan often incorporates elements that address emotion dyresgulation (Leahy et al., 2011). Thus, the

ability to understand concurrent and long-term behaviours linked to early emotion regulation abilities becomes inherently relevant from a developmental psychopathology perspective.

Difficulties with the adaptive regulation of both positive (e.g., excitement) and negative (e.g., sadness) emotions may underlie internalizing disorders such as depression or anxiety disorders (Cole, Michel, & Teti, 1994). Adolescents who report experiencing both increased negative emotionality and emotional lability suffer from high levels of depressive symptomology (Larson, Raffaelli, Richards, Ham, & Jewell, 1990; Silk et al., 2003). The inability to successfully regulate negative affect is associated with higher scores in depressive symptomology and problem behaviour in adolescents (Silk et al., 2003). Yap, Allen, and Sheeber (2007) suggested that the link between negative emotionality and internalizing problems exists in part because children with more negative emotionality are more susceptible to experiencing negative emotions, and this may place a greater strain on a child's ability to regulate their emotions in every day life.

Externalizing disorders are marked by dysregulated affect as well, particularly anger (Bradley, 2000; Dearing et al., 2002). In general, irritability, frustration, aggression, and anger have been hypothesized to predict externalizing problems, whereas sadness, anxiety, fear, and distress are posited to be predictive of internalizing problems (Eisenberg et al., 2001). Social withdrawal and/or shyness are also linked to internalizing problems. Rather than being diametrically opposite ends of a spectrum, internalizing and externalizing problems tend to be positively related (Eisenberg et al., 2001). In other words, experiencing symptoms of externalizing problems (such as oppositional behaviour, yelling, aggressivity) makes individuals more likely to experience symptoms of

internalizing problems, and vice versa (Colder et al., 2013; Wang, Eisenberg, Valiente, & Spinrad, 2016).

The present study sought to explore children's emotion regulation abilities during middle childhood as they relate to maternal histories of risk and concurrent maternal emotion regulation abilities, as well as the longitudinal association between childhood emotion regulation behaviours and health risk behaviours during adolescence. Given the importance of the development of adaptive emotion regulation strategies over time, our study aimed to expand our understanding of several factors that may potentially negatively impact this development.

Emotion regulation behaviours were examined within a high-risk sub-sample of the Concordia Longitudinal Risk Project (Concordia Project); this Project has provided consistent evidence of the associations between problematic parenting practices, low SES, low maternal education, and maternal childhood histories of aggression and/or social withdrawal (see Serbin et al., 2011 and Stack et al., in press, for reviews). Despite the reality of these associations, the concept of risk is probabilistic, such that some individuals from moderate to high-risk backgrounds, even given their status of disadvantage in infancy or early childhood, are likely to develop into functioning individuals (Masten, 2001). Our study aimed to investigate risk factors such as maternal aggression, parenting stress, and child behaviour problems and their potential to impact children's emotion regulation abilities and adolescent outcomes.

The current sample of the Concordia Project focused on mothers with childhood histories of aggression. Aggression is a construct defined by the manifestation of intentionally hurtful behaviours such as bullying, fighting, or teasing (Moskowitz & Schwartzman, 1989). Aggressive girls are particularly at-risk for a host of negative

adolescent and adult outcomes such as antisocial behaviour, high-risk sexual activity, and school dropout (Serbin et al., 1998). There is evidence that aggressive response styles remain fairly stable over time (Elder, Caspi, & Downey, 1986), suggesting that when aggressive girls become mothers, they may be more likely to be aggressive in the home, increasing the potential for negative outcomes in their children (Serbin & Karp, 2003).

Mothers' age was an additional risk factor present for in this study. Mothers in the present study were approximately five years younger than the Canadian national mean at the time that their first child was born (Milan, 2013). Young motherhood has consistently been demonstrated to be a risk factor in children's development (e.g., Cairns, Cairns, Xie, Leung, & Hearne, 1998; Pryce & Samuels, 2010; Serbin et al., 1998). In addition, having children at a younger age is associated with mothers having spent fewer years in school. Maternal levels of education act as a protective factor, moderating the potential effects of adversity (Magnuson, 2007). In fact, higher levels of maternal education may help mothers and their offspring alike in overcoming the probabilistic nature of risk (Lansford et al., 2006). Findings from several Concordia Project studies indicated that higher levels of maternal education may buffer against adverse circumstances of mothers from disadvantaged background and/or with histories of risk (e.g., Martin, 2016; Martin, Stack, Serbin, Schwartzman, & Ledingham, 2012; Saltaris et al., 2004; Stack et al., 2015).

Given the potential longitudinal influence of maternal childhood histories of aggression and disadvantage, effects of these early risk factors may be observed during interactions with their children via parenting, specifically how mothers interact with their children and help shape their emotion regulation processes and strategies. Poor emotion

regulation is associated with higher parenting stress (Papoušek & von Hofacker, 1998), although parenting stress can be buffered by increased social support (Crnic, Greenberg, Ragozin, Robinson, & Basham, 1983). The present study included an index of parenting stress and examined an overall measure of self-reported parenting stress in relation to parents' own emotion regulation during a conflict discussion with their children and in relation to their children's emotion regulation abilities. In addition to examining a number of important factors (e.g., maternal histories of risk, maternal age, parenting stress) that may impact emotion regulation abilities during middle childhood, it was of interest to examine concurrent behavioural difficulties experienced by these children as well as their longitudinal behavioural outcomes.

A sizable literature on psychopathology and problem behaviour in children and adolescents suggests that children's self-regulation abilities (emotional, behavioural, and cognitive) may either be directly linked to the development of antisocial behaviour (e.g., Hirschi, 2004) or serve as a moderating factor in the development of these behaviours (e.g., Dishion & Patterson, 2006; Wills & Dishion, 2004). Behaviours such as defiance or poor regulation (not limited to emotion regulation) in early childhood are predictive of antisocial behaviours in elementary school (Shaw, Gilliom, Ingoldsby, & Nagin, 2003). Adolescents with more adaptive emotion regulation abilities are less likely to be influenced by deviant peers in peer pressure situations, making the ability to self-regulate an important source of resilience (Luthar, 2006). Adolescents who are more influenced by deviant peers are more likely to engage in health risk behaviours, such as cigarette smoking, alcohol consumption, drug use, and risky sexual behaviour (e.g., Lansford et al., 2010; Neppl, Dhalewadikar, & Lohman, 2015). Thus, from a developmental perspective,

adaptive emotion regulation behaviours learned in childhood interactions (with both parents and peers) may protect children from engaging in unhealthy and risky behaviours during adolescence. Healthy environments during the school-age period provide children not only with a safe physical space, but more importantly with a sense of emotional security that allows for the development of effective self-regulation (Repetti, Taylor, & Seeman, 2002). These types of healthy emotional and physical environments may later model the physical spaces that adolescents seek as they become freer to choose the environments in which they spend time.

With regards to both mothers and their children, it is critical to examine a range of emotion regulation behaviours to best understand the types of behavioural and emotional outcomes with which they are associated. This genre of investigation is still in its infancy, given the paucity of observational studies in the emotion regulation literature (Cole et al., 2004). Nevertheless, understanding what observable and measurable behaviours *look like* in school-aged children may help elucidate how to predict later difficulties (Bridges et al., 2004). In order to best capture the intricacies of behaviours that take place within dyadic contexts, an observational measurement strategy was used in the present study. Observational methods are often considered to be the gold standard in developmental research (Cole et al., 2004; Cummings, Davies, & Campbell, 2000; Lamb, Lerner, & Bonner, 2015) and allow for the collection of rich and layered data. In the present study we used rich observational data to address questions concerning the factors that may thwart the development of emotion regulation abilities in middle childhood, as well as describe the behavioural outcomes of these early abilities.

The Present Study: Objectives and Hypotheses

This study was designed to address four main research objectives within a subsample of mothers and their children from the Concordia Project, using observational and questionnaire measures.

1. The first objective was to implement a newly developed observational tool to measure mothers' and children's emotion regulation behaviours (e.g., self-comfort, approach verbal, approach non-verbal, avoidance verbal, avoidance non-verbal). The use of this tool aimed to contribute to the literature on the intergenerational transfer of risk, by observing interactions between school-aged children and mothers with childhood histories of aggression. Maternal childhood histories of aggression were expected to predict more time spent using negative types of approach behaviours in both offspring and mothers themselves, given the established relationship between maternal and child emotionality (Denham et al., 2003), as well as aggression over time (Serbin & Karp, 2003).
2. The second objective was to examine the link between emotion regulation behaviours (of both children and their mothers) and parenting stress. It was hypothesized that more time spent using approach negative and less time spent using approach positive behaviours (on the parts of both mother and child) would be associated with of higher levels of parenting stress (Papoušek & von Hofacker, 1998).
3. The third objective was to examine children's emotion regulation behaviours as they related to problem behaviours. As aforementioned, difficulties with children's adaptive emotion regulation behaviours have been linked to both

internalizing and externalizing problems (Bradley, 2000; Dearing et al., 2002; Eisenberg et al., 2001). It was hypothesized that children who spent more time using approach negative behaviours would be rated as having more externalizing problems, while children who spent more time using avoidance behaviours would be rated as having more internalizing problems.

4. Building on the third objective, the fourth and final objective sought to examine the longitudinal association between middle childhood emotion regulation behaviours and adolescent health risk behaviours (e.g., alcohol consumption, tobacco use, and drug use). It was hypothesized that children who spent more time using approach negative behaviours would endorse the greatest level of health risk behaviours, given the link between externalizing problems (which were hypothesized to be linked to approach negative behaviours) and delinquent behaviours such as drug use (e.g., Dishion, Véronneau, Stormshak, & Kavanagh, 2015; Gardner, Dishion, & Connell, 2008).

Method

Identification of the Original Sample

Similar to Study 1, the current study included a sub-sample of mothers participating in the Concordia Longitudinal Risk Project (Concordia Project; Schwartzman, Ledingham, & Serbin, 1985; Serbin et al., 1998). Original participants of this study were recruited in 1976-1978. At this time, 4,109 students (in 1st, 4th, or 7th grade) were recruited from inner-city Francophone schools found in low socioeconomic neighbourhoods in Montréal, Québec. This is considered an at-risk community-based sample, given that the original participants mostly came from disadvantaged

neighbourhoods and their average family socioeconomic status was below population means at the time. With regards to related components of disadvantage, 30% of mothers in this sample had a Grade 9 education or lower, compared to an average of 17.8% of women in Montreal at the approximate time of sample collection; 22% came from single parent families, as compared to the Montreal average of 17% (Montreal averages; Milan, 2013). Boys and girls (n = 4109) were rated by their peers along dimensions of aggression and social withdrawal using a French translation of the Pupil Evaluation Inventory (PEI: Pekarik, Prinze, Liebert, Weintraub, & Neale, 1976). This inventory, designed to assess childhood adjustment, is a peer nomination technique in which children are asked to nominate their peers on 34 items related to aggression (e.g., "those who start a fight over nothing"; "those who are mean and cruel to other children"), withdrawal (e.g., "those who are too shy to make friends easily"; "those who aren't noticed much"), and likeability (e.g., "those who everyone likes"; "those who are particularly nice"). The current study focused only on maternal histories of aggression.

The PEI is both a reliable (internal consistency above .70 for all factors) and valid (concurrent validity between .54 and .65) measure for the assessment of children's social behaviour. Oversampling at the extremes of the sample (i.e., the upper tails of the aggression and withdrawal dimensions) rendered a final sample of 1,770 (861 boys; 909 girls), allowing for a range of scores, including children from across the continuum on aggression and withdrawal drawn from the same schools and neighbourhoods. The current study focuses on maternal histories of aggression. The Concordia Project provides a unique opportunity to study the intergenerational transfer of health and psychosocial risk during childhood, and to determine the processes and protective factors that predict

positive outcomes for children within an ‘‘at-risk’’ population. For a detailed description, see Stack et al. (in press), Serbin et al. (1998) and Schwartzman et al. (1985).

Present Sample

Observational data for the present sample were collected in 1993-1995. Sixty mothers (mean age = 28.92 years; *SD* = 2.04 years) participated in the observational component of the present study with their 5- to 12-year-old children (mean age = 7.59 years; *SD* = 1.78; 60% girls). Mothers' mean age at the birth of their first child was 21.34 years (minimum age = 16.42 years; maximum age = 25.81 years; *SD* = 2.24 years). This is below the Canadian national mean age of 26.2 years for mothers giving birth to their first child in 1993-1994 (Milan, 2013), and represents an additional risk factor in this sample. Every child in the present sample had a biological mother for whom a dimensional rating of childhood aggression was available. There were an additional eight dyadic observations that could not be included due to videotaping issues (e.g., poor lighting; no sound; camera angle or set-up prevented a clear view of a dyad member's face). As with past studies of the Concordia Project, scores for maternal childhood histories of aggression were treated as a dimensional rather than a categorical predictor in order to maximize power (Kline, 2008). Mothers in the present sample corresponded to the full-range of aggression scores.

In addition to the observational component of this study (Time 1), questionnaire measures were employed to address the longitudinal objectives. Questionnaire measures were available for 59 of the 60 mothers observed in this study (Time 2). One mother participated in the observational wave of data collection but could not be reached upon the subsequent wave of questionnaire data collection. The number of participants

included in analyses involving questionnaires is indicated in the title for each table of findings.

To assess the representativeness of the current sample compared to those who did not participate in this wave of research but that are a part of the larger Concordia Project, the 60 mothers who participated in the present study were compared to a larger subsample of 474 mothers participating in the project in 1995-1996. Based on comparisons of maternal level of aggression there were no significant differences between the mothers in this study and the larger sample of mothers. However, based on comparisons of maternal level of education, mothers in the present sample had significantly ($p < .05$) fewer years of schooling (11.21 years) compared to mothers in the larger sample (12.3 years).

Procedure

The present study was part of a larger project in which interviews, questionnaires, and semi-naturalistic observations were obtained over one home visit and two school visits. The home visit was conducted by a PhD-level experimenter and a research assistant, both of whom were trained in the administration of the testing protocol and were blind to the mothers' childhood histories. Mothers were provided with a description of the procedure and provided informed consent (Appendix E). During the home visit, mother and child were videotaped during several tasks and completed a range of questionnaires to assess socio-demographics, parenting practices, and child behavioural problems (refer to Stack et al., 2012 and Serbin et al., 1998, for more detail).

The current study focused on the observation of a dyadic interaction during a conflict task. Prior to the observed interaction, mother and child were briefly separated in

order to complete the Potential Parent-Child Conflict Questionnaire (PPCCQ; Granger, Weisz, & Kauneckis, 1994; see Appendices C and D), a 14-item questionnaire used to rate topics on which parents and their children often disagree. Examples of topics include disagreements regarding bedtime, orderliness of the child's room, and differences of opinion regarding appropriate friends and peer groups. The mother and child then engaged in the conflict task, a filmed discussion of approximately six minutes about the highest ranked subject that both individuals mutually rated as a common area of discord on their responses to the PPCCQ, with the objective of resolving the conflict at hand. The task was filmed using a Sony video-8 camera and the experimenter was in an adjacent room for the duration of the interaction. Mothers and children were compensated for their participation. The majority of dyads observed used the allotted 6-minutes to discuss the designated conflict (mean length of task = 4.97 minutes). However, some dyads completed their discussion in fewer than 6 minutes, in which case the recording was terminated when they stopped discussing the element of conflict. Other dyads used additional time to complete their discussion, in which case coding discontinued at the 6-minute mark. In order to account for individual differences in completion time, proportion scores were created for data obtained from the conflict task (see below for more information on observational coding).

Questionnaire Measures

Demographic Information Questionnaire (DIQ). The DIQ was employed to collect participating families' socio-demographic information, such as number of years of education, age, occupational status, and family composition. This measure, which has proven effective in collecting participant demographics, has been successfully used in

past studies of the Concordia Project (e.g., De Genna, Stack, Serbin, Ledingham, & Schwartzman, 2006; Grunzeweig, Stack, Serbin, Ledingham, & Schwartzman, 2009; Martin et al., 2012).

Health Behaviour Questionnaire (HBQ). The HBQ was designed by the primary investigators of the Concordia Project and has been employed in numerous studies associated with the project (e.g., Cooperman, 1996; De Genna et al., 2006). Items in this self-report measure are rated on a scale (e.g. How many alcoholic beverages have you consumed in the past month? Response options: "1/month; 2-3/month; 1/week; 2-3/week; 4-6/week"; How many times have you smoked marijuana in the past month? How many times have you consumed substances other than alcohol or marijuana in the past month?; How often have you taken methamphetamines in the past month [also known as speed, cristal meth, amphé, chalk, ice, or glass] ? Response options: "never ; 1-2 times ; 3-9 times ; 10-19 times ; 20-30 times ; 40 times or more"). For the purposes of the present study, questions related to tobacco, alcohol, and drug use were analyzed in relation to observational and other questionnaire based data (refer to Appendix F for the specific items from the HBQ that were used in the present study).

Child Behaviour Checklist (CBCL). Mothers completed the Achenbach Child Behaviour Checklist (Achenbach & Rescorla, 2001) to obtain ratings of children's social and behavioural problems. The CBCL is a standardized measure used to examine child behaviour in both research and clinical settings. The measure is comprised of 118 categorical items and responses to each item range from 0 (*not true*) to 2 (*often/very true*). Ratings are summed to create three problem behaviour scores (Total, Internalizing, and Externalizing) and are considered to provide reliable (internal consistency ranges

from .78 to .97) and valid (discriminant analyses ranges from .80 to .88) measures of children's behavioural problems (see Achenbach & Rescorla, 2001). The Internalizing, Externalizing, and Total Problem scores were considered in the present study.

Parental Stress Index. The Parental Stress Index – Short form (PSI-SF; Abidin, 1995) is a 36-item self-report inventory designed to assess psychological distress associated with parenting demands (Reitman, Currier, & Stickle, 2002). It is a Likert-type (1 = *strongly disagree* to 5 =*strongly agree)* parent self-report questionnaire comprised of parent-focused and child-focused items. The Short Form contains three subscales of 12 items each: Parental Distress (e.g., perceived competence as a parent, social support, spousal conflict, etc.), Parent-Child Dysfunctional Interaction (e.g., child is not meeting parent's expectations, interactions with child that are not reinforcing), and Difficult Child (e.g., parent's perception of his/her child's temperament, defiance, noncompliance, and demandingness). Use of this measure with low socioeconomic populations has been supported by previous research (Reitman et al., 2002) and its psychometric properties, including concurrent validity and internal consistency, are excellent (Abidin, 1995).

Observational Coding

Middle Childhood Emotion Regulation System (MCERS). The MCERS (August & Stack, 2013) is an observational coding system of middle childhood emotion regulation behaviours that was applied during the conflict task for both children and mothers in the dyads observed. The MCERS was developed for the purposes of the present study and is based in part on existing literature (Dennis, 2006; Lougheed & Hollenstein, 2012; Grolnick, Bridges, & Connell, 1996; Martin-Storey, Serbin, Stack, &

Schwartzman, 2009) and in part on the Preschooler Self-Regulatory System (August et al., 2015) and the Infant Self-Regulatory System (ISRS; Jean, A. D., Stack, D. M., & Fogel, A., 2009; Millman, Jean, & Stack, 2007; adapted from Tronick & Weinberg, 1996). The MCERS was coded using Mangold Interact 9 software, a data logging software for video-based observation studies. It allows for the observation of a video record, while enabling coders to develop their own coding system and apply codes second-by-second, as the behaviour is observed. This code is then provided with a time stamp in a digital record. The software keeps track of assigned codes and allows for analyses involving duration and frequency. The five coded categories of emotion regulation behaviours in the MCERS were as follows: self-comfort, approach verbal (positive and negative), approach non-verbal (positive and negative), avoidance verbal, and avoidance non-verbal. Brief operational definitions for codes in the MCERS can be found in Table 1, along with the reliability coefficients and percentage agreements (discussed below under reliability).

Data Reduction

Following the completion of coding, scores of individual sub-codes (i.e., self-talk, self-soothe) were combined to make up overall regulatory categories in which they belong (i.e., self-comfort). Duration scores were divided by the exact length (to the millisecond) of the conflict task to obtain the percent duration of each emotion regulation behaviour observed during the task (Table 2 and Table 3).

Reliability

Thirty percent of the sample (n = 18) was randomly selected and coded using the MCERS by a trained coder who was blind to maternal risk status. Percentage agreement reliability (PA; agreements divided by the sum of total agreements and disagreements)

and Cohen's kappa coefficients (r_k; Cohen, 1960) were calculated to assess the reliability of coded emotion regulation behaviours for both mothers and their children. Cohen's kappa calculates the inter-observer agreement as a proportion of potential agreement following a correction made for chance agreements (Kaplan & Saccuzzo, 2001). According to Fleiss (1981) both the Cohen's kappa and percentage agreement values are good measures of reliability for observationally coded data. All Cohen's kappa and percent agreement values obtained were considered to be excellent. Individual coefficients can be found in Table 1.

Results

Prior to conducting statistical analyses for the current study, data were double-checked in order to assure that there were no errors in initial data entry or data transfer from the Mangold Interact coding program to the PASW Statistical 18.0 for Macintosh software program. Following confirmation of the data's integrity, descriptive statistics were used to assess the normality of the distribution, skewness and kurtosis for each variable, and to identify outliers. Data screening was performed according to the guidelines described by Kline (2008) and Wilkinson and the Task Force on Statistical Inference (1999). Even after making the necessary alterations for outliers, some variables remained skewed. This was to be expected since many of the discrete variables, such as exaggerated vocalizations (e.g., yelling, scolding) or negative touch (e.g., wrist grabbing, any form of physical aggression), are naturally infrequent, and are therefore not typically normally distributed. As such, the data did not undergo any transformations.

Factor Analyses of Emotion Regulation Behaviours

In order to reduce the number of hierarchical regression analyses and maximize power, a factor analysis was conducted to create scores reflecting the emotion regulation behaviours measured by the observational coding system. A principal components factor analysis with Varimax rotation (using eigenvalues greater than 1 criterion) was conducted on the following child emotion regulation categories: self-comfort; approach verbal positive; approach verbal negative; approach non-verbal positive; approach non-verbal negative; avoidance verbal; and avoidance non-verbal. Five factors were retained. approach verbal negative and approach non-verbal negative held together (factor loading: .81, explaining 65.48% of the variance), creating the factor we labelled 'approach negative'. Approach verbal positive and approach non-verbal positive also held together (factor loading: .75, explaining 55.49% of the variance), creating the factor we named 'approach positive'. Based on the factor analysis, the coded categories of self-comfort, avoidance verbal and avoidance non-verbal held as unique factors, and were thus treated as such in the analyses.

A second factor analysis was conducted with the maternal emotion regulation categories. Similarly, a principal components factor analysis with Varimax rotation (using eigenvalues greater than 1 criterion) was conducted on the same emotion regulation categories listed above and the same five factors were retained: approach negative (factor loading: .80, explaining 63.17% of the variance) approach positive (factor loading: .85, explaining 72.93% of the variance); and self-comfort, avoidance verbal, and avoidance non-verbal held as unique factors.

Objective 1: Maternal Histories of Aggression and Emotion Regulation Behaviours

The first set of analyses examined the association between maternal histories of aggression and emotion regulation in (a) children and (b) their mothers during interactions in the conflict task through hierarchical multiple regressions. For all regressions in this objective, predictor variables were entered chronologically, with maternal childhood histories of aggression entered as Step 1. The demographic variables of maternal education and child sex and child age were included as control variables in Steps 2 through 4 respectively. Previous studies conducted with participants from the Concordia Project have shown associations between these demographic variables and parenting and child outcomes (e.g., Stack et al., 2012). When the overall model was significant or tended toward significance, it was reported as well as the significant step(s). When the overall model was not significant, only the significant steps were reported if they were consistent with the hypotheses.

(a) Maternal histories and child emotion regulation behaviours. Discrete hierarchical multiple regressions were conducted with each of the five child emotion regulation categories as outcomes: self-comfort; approach positive; approach negative; avoidance verbal; and avoidance non-verbal. None of these models were significant, nor did the coded behaviours yield significant steps. As such, maternal histories of aggression did not predict above chance the use of specific emotion regulation behaviours in children, coded during the conflict task.

(b) Maternal histories and mother emotion regulation behaviours. Five additional regression models were run to examine maternal histories of aggression as they predicted mothers' present emotion regulation behaviours during the conflict task. There

was a trend for higher levels of maternal childhood aggression predicting more time spent using approach negative behaviours (e.g., sarcasm, mimicking, obnoxious; *Beta* = .24, $p < .10$). The four other observed maternal emotion regulation categories (self-comfort, approach positive, avoidance verbal, avoidance non-verbal) were not significantly associated with maternal childhood histories of aggression. However, one secondary finding relating to control variables in these analyses was that mothers of older children spent significantly more time using self-comfort behaviours than those with younger children in the conflict task (*Beta* = .45, $p < .001$).

Objective 2: Emotion Regulation Behaviours and Parenting Stress

The second set of questions examined the link between (a) mothers' and (b) children's emotion regulation behaviours and concurrent maternal parenting stress, as measured by mother report on the domain stress score of the Parenting Stress Inventory (PSI). Predictor variables were again entered chronologically, with maternal childhood histories of aggression entered as Step 1. The demographic variables of maternal education and child sex and child age were included as control variables in steps 2 through 4 respectively. Child or mother emotion regulation behaviour was entered as step 5, depending on the sub-set of analyses. Generally, it was revealed that maternal histories of aggression were significantly related to total mother stress, in that lower levels of maternal education predicted significantly higher stress for all models run.

(a) Mother emotion regulation behaviours and maternal stress. Mothers who spent less time using approach positive behaviours in their interactions with their children during the conflict task self-reported significantly higher parent domain stress scores on the PSI ($F = 3.18$, $p < .05$; Table 4).

(b) Child emotion regulation behaviours and maternal stress. With regards to children's behaviours, there was a parallel finding. Children who spent less time using approach positive behaviours in their interactions with their mothers during the conflict task, had mothers who self-reported significantly higher parent domain stress scores on the PSI ($F = 3.09$, $p < .05$; Table 5).

Objective 3: Emotion Regulation Behaviours and their Association with Parent-Rated Child Behaviour Problems

A series of regressions were run to examine the relationship between children's emotion regulation behaviours in the conflict task and their concurrent problem behaviours as rated by their mothers. Maternal childhood histories of aggression were entered as the first step (Step 1) and maternal education, child sex, and child age (Steps 2, 3, and 4) were entered as control variables. Child emotion regulation behaviour was entered as the final step (Step 5). Outcome variables were mothers' ratings on Internalizing, Externalizing, and Total Problem scores for the CBCL. Overall, mothers with lower levels of education were significantly more likely to rate their children as having behaviour problems (Internalizing, Externalizing, and Total Problems) relative to mothers with higher levels of education. In addition, mother-reported problem behaviours were consistently negatively related to the approach positive coded category.

I. Internalizing Problems. The model examining the duration of children's approach positive behaviours in their prediction of internalizing problems rated by mothers was significant. Children who spent less time using approach positive behaviours and had mothers with lower levels of education had significantly higher internalizing problems, as rated by their mothers ($F = 2.46$, $p < .05$; Table 6).

II. Externalizing Problems. Children who spent less time using approach positive behaviours and had mothers with lower levels of education had significantly higher externalizing problems, as rated by their mothers ($F = 3.26$, $p < .01$; Table 7). Children who spent less time using avoidance verbal behaviours and had mothers with lower levels of education had significantly higher externalizing problems, as rated by their mothers ($F = 2.44$, $p < .05$).

III. Total Problems. Children who spent less time using approach positive behaviours and had mothers with lower levels of education had significantly higher Total Problems, as rated by their mothers ($F = 2.89$, $p < .05$; Table 8).

Objective 4: Middle Childhood Emotion Regulation Behaviours: Longitudinal Association with Adolescent Health Risk Behaviours

In order to examine the longitudinal relationship between middle childhood emotion regulation behaviours and later adolescent health risk behaviours, observed behaviours were examined in relation to select items from the Health Behaviour Questionnaire (HBQ). The specific health risk behaviours explored were: alcohol consumption, tobacco use, marijuana use, and methamphetamine use.

Middle childhood emotion regulation behaviours were not significantly associated with adolescents' alcohol consumption or tobacco use for any of the models examined.

Children who spent more time using avoidance verbal behaviours during middle childhood were significantly more likely to have used more marijuana in the past month than those who spent less time using avoidance verbal behaviours in the conflict task ($F = 5.20$, $p < .01$; Table 9).

Children who spent more time using avoidance verbal behaviours during middle childhood were significantly more likely to have used more methamphetamine use in the past month than those who spent less time using avoidance verbal behaviours in the conflict task ($F = 10.79$, $p < .001$; Table 10).

Discussion

The main contributions of the study were fourfold. First, this study succeeded in applying a detailed observational measure of emotion regulation behaviours to school-aged children and their mothers, examining concurrent and longitudinal outcomes related to observed behaviours, supporting Study 1. Second, we demonstrated an association between both mother and child emotion regulation behaviours and overall levels of maternal parenting stress. Third, a link was revealed between children's emotion regulation behaviours and their internalizing, externalizing, and total problem behaviours. Finally, results demonstrated a longitudinal association between middle childhood emotion regulation behaviours and adolescent marijuana and methamphetamine use. These findings, derived from observational and questionnaire measures and using concurrent and longitudinal data, represent unique advancements to the literature on the development of emotion regulation.

A principal strength of this study was its focus on the application of a tool to measure emotion regulation behaviours observationally during middle childhood. This tool was used to examine concurrent and longitudinal outcomes of the measured behaviours. Only one other study has used the Middle Childhood Emotion Regulation System (MCERS; August & Stack, 2013, and with the exception of a few more recent works (e.g., Lougheed, Hollenstein, Lichtwarck-Aschoff, & Granic, 2015; Penela

Walker, Degnan, Fox, & Henderson, 2015), emotion regulation in the majority of studies in childhood and adolescence has been measured solely by responses to questionnaires (e.g., Compas et al., 2014; Eisenberg, Fabes, Guthrie, & Reiser, 2000; Fox, Henderson, Rubin, Calkins, & Schmidt, 2001; Rothbart, 1989; Rydell, Berlin, & Bohlin, 2003; Thompson, 1994). The limitations of methodology that relies predominantly on young people's self-report information are generally linked to the finding that young children have considerable difficulties reporting their emotional states (Cole et al., 2004). Thus, the accuracy and utility of self-report measures in this domain can be called into question. Longitudinally, the observational measure allowed us to consider questions related to developmental psychopathology at a broader level, examining risk factors that may contribute to the development of maladaptive outcomes over time (Cicchetti, 2016). Early difficulties with the adaptive regulation of emotion may lead to maladaptive behaviour patterns in later years. Behavioural challenges, combined with social and environmental factors may contribute to adolescent health risk behaviours such as alcohol and tobacco use (DiClemente, Hansen, & Ponton, 2013).

In examining these early emotion regulation behaviours, it was hypothesized that maternal childhood histories of aggression would be predictive of children's negative coping strategies (specifically approach negative behaviours). Although maternal childhood histories of aggression are associated with some middle childhood emotion regulation behaviours, such as self-comfort and approach verbal behaviours (August, Stack, Serbin, Ledingham, & Schwartzman, 2017), the present study yielded significantly fewer findings linking maternal childhood histories of risk to present-day mother or child emotion regulation behaviours. In fact, maternal childhood histories of aggression were

not significantly associated with any of the child emotion regulation categories observed in the conflict task. However, a trend was found for higher levels of maternal childhood aggression predicting mothers spending more time using approach negative behaviours in interactions with their school-aged children during the conflict task. Approach negative behaviours, such as yelling, voice raising, mimicking and sarcasm were used more by mothers with histories of aggression than by those without this childhood disposition. Notably, this trend is consistent with evidence that aggressive response styles remain fairly stable over time (Elder et al., 1986), suggesting that when aggressive girls become mothers, they may be more likely to be aggressive in the home; or in this case they may demonstrate higher incidences of maladaptive emotion regulation strategies. Although only emerging as a trend in this study, it is essential to investigate and highlight potential cycles of aggression over time, given that mothers' childhood histories of aggression increase the probability for negative outcomes in their children (Serbin & Karp, 2003).

Observational data were used to examine the link between both mothers' and children's emotion regulation behaviours during middle childhood, and concurrent levels of maternal parenting stress. Overall, maternal education was significantly related to total maternal stress, in that lower levels of maternal education predicted higher levels of stress for all models run. This finding can be understood within the context of Family Stress Theory (Conger, Conger, & Martin, 2010), which posits that cumulative contextual risk factors (e.g., histories of aggression, low SES, lower levels of education) are associated with less effective coping skills. Therefore, since mothers from disadvantaged backgrounds are more likely to have higher levels of cumulative stress, they may be more likely to perceive conflict situations with their children (even those that are proposed

within the context of a study) to be inconvenient and bothersome. Experiencing these situations as additional sources of stress, rather than opportunities to use and model more positive or prosocial emotion regulation behaviours with their children, likely impacts socialization potential and socio-emotional lessons that their children draw from such interactions (Martin, 2016).

With regards to specific emotion regulation behaviours and their link to maternal stress, significant findings were in relation to the approach positive coding category. Approach positive behaviours included affectionate touch, leaning forward towards partner, and positive emotional expression. In the case of both mothers and children, less time spent using approach positive behaviours predicted significantly higher parental stress. Again, less time spent using approach positive behaviours may be linked to approaching the discussions in the conflict task with a sense of obligation or inconvenience rather than eagerness. In addition, the approach positive behaviours examined reflect elements of positive affect, which contributes significantly to overall well-being (Gentzler, Ramsey, & Black, 2015). More time spent using approach positive behaviours may contribute to experiencing more harmonious interactions, thus reducing stress and improving overall well-being. The presence of less of this type of interaction may be linked to higher stress levels because there is less of a prosocial buffer against stress and/or because this leaves more time for more negative types of interactions.

While these findings do highlight an important association between an observed behaviour and maternal stress levels, one must recall that the absence of positive behaviour is not equivalent to the presence of negative behaviour (Landry, Smith, & Swank, 2006). For example, the use of more approach negative behaviours by children

and mothers was not significantly related to maternal stress levels (as it was to maternal childhood histories of aggression). Linking stress levels to reduced adaptive, rather than increased maladaptive emotion regulation behaviours may nevertheless be consequential, as lower levels of positive affect may be a precursor of clinical depression (Durbin, Klein, Hayden, Buckley, & Moerk, 2005; Olino et al., 2011). Studies have found that children of depressed mothers report lower levels of positive affect, but similar levels of negative affect compared to their peers without this parental history of risk (Dietz et al., 2008; Shaw et al., 2006).

In addition to exploring the link between maternal childhood histories and middle childhood emotion regulation behaviours, the third objective examined how middle childhood emotion regulation behaviours were linked to children's concurrent problem behaviour. Across all analyses, lower levels of maternal education were predictive of higher incidences of reported child behaviour problems, regardless of observed emotion regulation behaviours. These results highlight lower levels of maternal education as a risk factor for their offspring. Low levels of parental education, a primary marker of socio-economic status (SES), are associated with less maternal responsiveness (Bornstein & Bradley, 2014), as well as lower educational achievement in their offspring (Fall et al., 2015). Mothers with higher levels of education provide better physical environments for their children, as well as being more emotionally invested in their children (Carneiro, Meghir, & Parey, 2013).

With regards to linking problem behaviours to observed behaviours in our coding system, children who spent less time using approach positive behaviours were rated by their mothers as having significantly more internalizing, externalizing, and total problems.

There is some extant evidence to suggest that emotion dysregulation plays a greater role in child and adolescent internalizing than externalizing problems (Garnefski, Kraaij, & van Etten, 2005; McLaughlin, Hatzenbuehler, Mennin, Nolen-Hoeksema, 2011). The present findings serve to provide further support of this relationship, and also to highlight the less commonly discussed association with externalizing (and total) problem behaviours. This was done in a meaningful way by including observational data.

The final objective of this study sought to examine the longitudinal association between middle childhood emotion regulation behaviours and adolescent health risk behaviours. Young people who use adaptive emotion regulation strategies are rated as being more socially competent by their teachers and are better liked by their peers (e.g., Fabes, Martin, Hanish, Anders, & Madden-Derdich, 2003; Raver, Blackburn, Bancroft, & Torp, 1999). Conversely, children who use maladaptive emotion regulation strategies have poorer social competence in adolescence (Caspi, 2000). Difficulties in early socio-emotional competence may negatively impact adolescents' responsse to stressful situations and their management of relationship problems (Luecken, Roubinov, & Tanaka, 2013). Results from several longitudinal studies report that early socio-emotional deficits predict problem behaviours such as aggression, delinquency, and substance use (e.g., Moffitt et al., 2011; Trentacosta & Fine, 2010).

Given these associations, we sought to uncover a link between emotion regulation in middle childhood behaviours and several substance use behaviours in these same individuals as adolescents. The first substances examined were alcohol and/or cigarettes. No middle childhood behaviours measured significantly predicted drinking or tobacco use. A lack of variability was observed in the data for alcohol and tobacco use, possibly

because drinking and smoking are becoming more normative behaviours to some extent during adolescence. Despite these null findings, the onset of tobacco use has been previously linked not only to externalizing or antisocial behaviours, but also to low SES (Dishion, Capaldi, & Yoerger, 1999; Hiscock, Bauld, Amos, Fidler, & Munafò, 2012). As such, we chose to explore potential associations between child emotion regulation behaviours and the riskier adolescent health-risk behaviour of drug use, keeping in mind that early substance use is associated with a higher risk of adult dependence (Brook, Balka, Ning, & Brook, 2007; Winters & Lee, 2008).

We found that children who spent more time using avoidance verbal behaviours (e.g., minimal elaborations, uninformative responses, changing topic) during middle childhood were significantly more likely to have used more marijuana in the past month than those who spent less time displaying these behaviours. In general, Canadian adolescents' reports are amongst the highest rates of cannabis use in the world. In 2010, 33% of Canadian 15-year-olds reported having ever used cannabis, as compared to an international (Western) average of 17% (Currie et al., 2009). Although cannabis use is the most commonly used illicit drug by adolescents (Degenhardt et al., 2012), it is critical to note that not all adolescents in our study reported using cannabis, but that those who spent more time using avoidance verbal behaviours did so at significantly higher rates. Cannabis use in adolescence is associated with an increased risk of developing a psychotic illness later in life (Moore et al., 2007). There is also an ongoing debate as to the strength and direction of the association between cannabis use in adolescence and depressive symptoms or episodes, such that some research suggests that depressive episodes precede cannabis use, while others infer the opposite directionality of the

association (De Graaf et al., 2010). In addition, psychiatric problems associated with externalizing problems such as attention-deficit hyperactivity disorder (ADHD) and conduct disorder (CD) are common among adolescent cannabis users (Diamond et al., 2006).

In addition, adolescents who spent more time using avoidance verbal behaviours during middle childhood were significantly more likely to have reported using more methamphetamine in the past month than those who displayed fewer of these behaviours. Methamphetamine use, like the use of other psychostimulant drugs (e.g., cocaine), may lead to chronic dependence or involve binging with brief drug-free periods (McKetin, Kelly, & McLaren, 2006). Of note, heavy cannabis use and other drug and alcohol use are commonly concomitant in methamphetamine users (McKetin, McLaren, & Kelly, 2005). In our observations, the use of this addiction-forming psychostimulant was associated with verbal avoidance during a task in which mother and child were instructed to work toward a solution to their problem. Over time, this may suggest that an avoidant coping style may develop from these early emotion regulatory difficulties, in which youth regulate via drug-use rather than engaging in problem-solving strategies such as elaborating and collaborating with their interaction partners.

Thus, observation of this type of avoidance verbal behaviours at an early age was effective at predicting some drug use in adolescence. The avoidance verbal behaviours that were observed are ones that related to children keeping their thoughts and feelings to themselves (e.g., internalizing them). Drug use in adolescence is frequently linked to internalizing problems, specifically depression, in both boys and girls (Rasic, Weerasinghe, Asbridge, & Langille, 2013). This may suggest stability in emotion

regulation behaviours from childhood to adolescence, such that children who spend more time using avoidance verbal behaviours become adolescents who do the same, and are thus more likely to use certain drugs. These youths' verbal avoidance may also be related to difficulties within the parent-child relationship, as it may impact the quantity, quality, and effectiveness of their communication with their parents.

Limitations and Future Directions

Despite some limitations, the present study was one of the first to use observational methods to assess multiple aspects of emotion regulation behaviours in mother-child interactions in middle-childhood.

Although this study included an important observational component at its middle childhood time point, observational measures were not used to evaluate adolescent outcomes. In childhood, emotion regulation behaviours are still developing and patterns of behaviours and responses to emotional stimuli are emerging; therefore examining emotion regulation behaviours later in development (e.g., during adolescence) may represent a more stable and engrained style, and may have yielded more associations with adolescent risky behaviour outcomes. This argument is consistent with a basic tenet of developmental research; in order to maximize results, similar behaviours and similar experimental tasks are required across multiple time points (Conger, Neppl, Kim, & Scaramella, 2003).

Future research should continue to investigate the evolution of observed child emotion regulation behaviours both over time and across normative and at- and high-risk samples. In addition, future research using this observational measure to examine emotion-regulation behaviour should include positive-emotion eliciting tasks (e.g.,

surprise task) and different relationships (e.g., siblings, peers, father-child) to help further understand the range of emotion regulation behaviours and their role in social interactions. In addition, this study used only one observational task (conflict task), rather than multiple tasks. Additional tasks may have provided richer or more variable data. Nevertheless, important findings were still uncovered using the conflict task for the present study.

It has been hypothesized that difficulties with emotion and emotion regulation may be more prevalent than suggested by formal Diagnostic and Statistical Manual (DSM) criteria (Gross & Jazaieri, 2014). This study was integral in examining early emotion regulation behaviours and their association with concurrent problem behaviours and later risk behaviours that may be precursors or correlates of mental health problems (DiClemente, Hansen, & Ponton, 2013). Our study represents one of few investigations of emotion regulation to use observational data within an at-risk sample and include efforts to tie it to specific correlates in both children and their mothers.

Our results, especially those suggesting that childhood emotion regulation behaviours may be predictive of drug use in adolescence, speak to the importance of helping children develop adaptive regulatory skills from a young age. There is considerable evidence that socio-emotional competencies, such as the adaptive regulation of emotion early on, buffer against risk behaviours and mental health problems (e.g., Moffitt et al., 2011; Trentacosta & Fine, 2010). This study allows us to begin to think about deconstructing the types of childhood behaviours that may be able to be flagged as important precursors to later difficulties. Findings related to maternal childhood histories of aggression and parental stress also have implications for the design of preventive

intervention programs to foster children's socio-emotional competence, particularly in the context of at-risk and vulnerable families. By understanding the importance of these early socio-emotional stepping-stones, intervention and prevention strategies to promote wellness for at-risk youth can be tailored more effectively, yielding more efficient prevention programs. By associating the specific emotion regulation behaviours observed in this study with behavioural outcomes, we have gathered important information about some of the types of skills that should be prioritized in these programs.

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Table 1

Brief Operational Definitions and Reliability Coefficients for the Middle Childhood Emotion Regulation System (MCERS; August & Stack, 2015)

Emotion Regulation Behaviour Category	**Behaviours Included**	**Cohen's Kappa (r_k)**	**Percent Agreement (%)**
Self-Comfort	Self-soothe (e.g., repeated ear rubbing) Self-talk (e.g., reassuring self)	0.96	97.6
Approach Non-Verbal		0.94	95.3
Positive	Affectionate touch (e.g., rubbing mother's hand for comfort) Leaning toward (e.g., physically getting closer to partner)		
Negative	Non-affectionate Touch (e.g., grabbing partner) Deep sigh Sharp/pointed gesture (e.g., fingers or hands are rigid) Rolling eyes Distorting face (e.g., frowning, scrunching nose)		
Approach Verbal		0.88	90.1
Positive	Positive emotional expression (e.g., laughing, smiling)		
Negative	Exaggerated vocalizations (e.g., raising voice, yelling) Mimicking/sarcasm/obnoxious (e.g., speaking in a tone to mock partner)		
Avoidance Non-Verbal	Decreased proximity (e.g., move back chair to decrease space between partners) Slouching (e.g., downward vertical movement toward table) Avoiding eye contact (e.g., changing head position to avert gaze away from partner) Lack of response (e.g., not answering partner's question/statement)	0.94	95.5
Avoidance Verbal	Uninformative response (e.g., short utterance of two words or less) Changing topic (e.g., change conversation topic during emotionally charged moment)	1.0	100

Table 2

Proportionalized Duration of Child Emotion Regulation Variables on the MCERS

	Conflict Task (n = 60)	
	M	*SD*
Self-Comfort	20%	.08
Avoidance Verbal	3%	.01
Avoidance Non-Verbal	11%	.06
Approach Negative	18%	.07
Approach Positive	22%	.14

Note. To obtain the percent duration for each emotion regulation behaviour, raw duration scores were divided by the exact time (in milliseconds) of the duration of the tasks and multiplied by 100.

Table 3

Proportionalized Duration of Mother Emotion Regulation Variables on the MCERS

	Conflict Task (n = 60)	
	M	*SD*
Self-Comfort	11%	.09
Avoidance Verbal	0%	.00
Avoidance Non-Verbal	1%	.01
Approach Negative	14%	.06
Approach Positive	19%	.17

Note. To obtain the percent duration for each emotion regulation behaviour, raw duration scores were divided by the exact time (in milliseconds) of the duration of the tasks and multiplied by 100.

Table 4

Mother's Approach Positive Behaviours and their Association with Parenting Stress (N=59)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.03	1.82
Childhood Aggression	-0.18*	0.03	-1.35		
Step 2				0.12	7.63**
Childhood Aggression	-0.28*	0.08	-2.17		
Maternal Education	-0.36**	0.12	-2.76		
Step 3				0.02	0.11*
Childhood Aggression	-0.28*	0.07	-2.08		
Maternal Education	-0.35**	0.12	-2.68		
Sex of Child	-0.04	0.00	0.33		
Step 4				0.00	0.20*
Childhood Aggression	-0.27*	0.07	-2.03		
Maternal Education	-0.37**	0.12	-2.69		
Sex of Child	-0.04	0.00	0.30		
Age of Child	-0.06	0.00	-0.45		
Step 5				0.08	5.42**
Childhood Aggression	-0.25*	0.07	-1.97		
Maternal Education	-0.31**	0.09	-2.30		
Sex of Child	0.06	0.00	0.46		
Age of Child	-0.06	0.00	0.46		
Mother's Approach Positive	-0.29*	0.09	-2.33		
		R = .48	R^2_{Adj} = 0.16	F = 3.18**	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 5

Children's Approach Positive Behaviours and their Association with Parenting Stress (N=59)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.03	1.82
Childhood Aggression	-0.18*	0.03	-1.35		
Step 2				0.12	7.62*
Childhood Aggression	-0.28*	0.08	-2.17		
Maternal Education	-0.36**	0.12	-2.76		
Step 3				0.00	0.11*
Childhood Aggression	-0.28*	0.07	-2.08		
Maternal Education	-0.35**	0.12	-2.68		
Sex of Child	0.04	0.00	0.33		
Step 4				0.00	0.20
Childhood Aggression	-0.27*	0.07	-2.03		
Maternal Education	-0.37**	0.12	-2.69		
Sex of Child	0.04	0.00	0.30		
Age of Child	-0.06	0.00	-0.45		
Step 5				0.08	5.05**
Childhood Aggression	-0.28*	0.10	-1.74		
Maternal Education	-0.36**	0.13	-2.74		
Sex of Child	0.07	0.01	0.59		
Age of Child	-0.00	0.00	-0.03		
Child Approach Positive	-0.28**	0.09	-2.25		
		R = .48	R^2_{Adj} = 0.16	F = 3.09**	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 6

Children's Approach Positive Behaviours and their Association with Internalizing Problems (N=59)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.00	0.13
Childhood Aggression	-0.47	0.00	-0.36		
Step 2				0.10	6.05*
Childhood Aggression	-0.13	0.02	-1.03		
Maternal Education	-0.32*	0.05	2.46		
Step 3				0.02	1.10^t
Childhood Aggression	-0.16	0.02	-1.20		
Maternal Education	-0.34*	0.11	-2.58		
Sex of Child	-0.13	0.02	-1.05		
Step 4				0.01	0.35
Childhood Aggression	-0.16	0.02	-1.16		
Maternal Education	-0.36*	0.11	-2.63		
Sex of Child	-0.14	0.02	-1.08		
Age of Child	-0.08	0.00	-0.59		
Step 5				0.06	4.28*
Childhood Aggression	-0.11	0.01	-0.85		
Maternal Education	-0.35*	0.11	-2.62		
Sex of Child	-0.11	0.02	-0.83		
Age of Child	-0.03	0.00	-0.20		
Child Approach Positive	-0.26*	0.07	-2.07		
		R = .43	R^2_{Adj} = 0.11	F = 2.46*	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 7

Children's Approach Positive Behaviours and their Association with Externalizing Problems (N=59)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.06	3.53
Childhood Aggression	2.48	0.06	1.88		
Step 2				0.07	4.48**
Childhood Aggression	1.71[t]	0.02	1.28		
Maternal Education	-1.37*	0.07	-2.12		
Step 3				0.00	0.03*
Childhood Aggression	1.75	0.03	1.28		
Maternal Education	-1.35*	0.07	-2.06		
Sex of Child	0.48	0.00	0.17		
Step 4				0.01	0.43
Childhood Aggression	1.81	0.03	1.31		
Maternal Education	-1.45*	0.07	-2.14		
Sex of Child	0.36	0.00	0.12		
Age of Child	-0.54	0.01	-0.65		
Step 5				0.10	6.93**
Childhood Aggression	2.35	0.06	1.78		
Maternal Education	-1.38*	0.08	-2.14		
Sex of Child	1.34	0.00	0.47		
Age of Child	-0.13	0.00	-0.16		
Child Approach Positive	-3.70*	0.11	-2.63		
		R = .48	R^2_{Adj} = 0.16	F = 3.26**	

[t] $p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < .001$

Table 8

Children's Approach Positive Behaviours and their Association with Total Problems (N=59)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.01	0.39
Childhood Aggression	0.08	0.01	0.63		
Step 2				0.08	5.15
Childhood Aggression	0.00	0.00	0.00		
Maternal Education	-0.30*	0.08	-2.27		
Step 3				0.01	0.38
Childhood Aggression	-0.02	0.00	-0.11		
Maternal Education	-0.31*	0.09	-2.32		
Sex of Child	-0.08	0.01	-0.62		
Step 4				0.01	0.45
Childhood Aggression	-0.01	0.00	-0.07		
Maternal Education	-0.33*	0.09	-2.40		
Sex of Child	-0.09	0.01	-0.66		
Age of Child	-0.09	0.01	-0.67		
Step 5				0.11	7.41*
Childhood Aggression	0.05	0.00	0.36		
Maternal Education	-0.32 *	0.10	-2.42		
Sex of Child	-0.04	0.00	-0.33		
Age of Child	-0.02	0.00	-0.17		
Child Approach Positive	-0.34**	0.12	-2.72		
		R = .46	R^2_{Adj} = 0.14	F = 2.89*	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 9

Children's Avoidance Verbal Behaviours and their Association with Marijuana Use in the Past Month (N=28)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.14	4.22*
Sex of Child	-1.16*	0.14	-2.05		
Step 2				0.01	0.26
Sex of Child	-1.20*	0.14	-2.08		
Age of Child	0.09	0.01	0.51		
Step 3				0.24	9.76***
Sex of Child	-0.60	0.05	-1.11		
Age of Child	-0.14	0.03	-0.87		
Child Avoidance Verbal	340.03***	0.28	3.13		
		R = .62	R^2_{Adj} = 0.31	F = 5.20**	

$^t p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Table 10

Children's Avoidance Verbal Behaviours and their Association with Methamphetamine Use in the Past Month (N=28)

Variables	Beta	Sr^2	T	R^2_{ch}	F_{ch}
Step 1				0.17	4.53
Sex of Child	-0.19	0.02	-0.67		
Step 2				0.06	1.55
Sex of Child	-0.25	0.03	-0.86		
Age of Child	0.11	0.06	1.24		
Step 3				0.49	8.26***
Sex of Child	-0.17	0.02	0.77		
Age of Child	-0.05	0.02	-0.78		
Child Avoidance Verbal	234.24***	0.53	5.32		
		R = .75	R^2_{Adj} = 0.51	F =10.79***	

$^{t}p < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < .001$

Chapter 5: General Discussion

Since the end of the 20th century, the topic of emotion regulation has become increasingly popular in developmental literature (e.g., Cicchetti & Toth, 2009; Cole et al., 2004; Cole, Michel, & Teti, 1994; Deater-Deckard, Li, & Bell, 2016; Eisenberg & Fabes, 1992; Eisenberg & Moore, 1997; Garber & Dodge, 1991; Gross, 2013; Thompson, 2014; Vohs & Baumeister, 2011). The ability to regulate a wide range of emotions is indispensable in everyday life, and developing appropriate coping methods to deal with routine situations constitutes a major developmental task.

The definition of the construct of emotion regulation itself has been long debated in developmental and other literatures (Cole et al., 2004; Thompson, 2014). It is perhaps this characterization of a "theme in search of a definition" (Thompson, 1994) that has contributed to the relative dearth of its observational measurement. Exploring definitional and measurement challenges that are frequently linked to emotion regulation work with children (e.g., Callear et al., 2017; Cole et al., 2004; Criss et al., 2016) constituted a major theme underlying the present dissertation.

The overarching goal of the dissertation was to more deeply understand emotion regulation behaviours in at-risk mother-child dyads via a series of two studies. These studies were conceptualized through the lenses of the transactional model, Ecological Systems Theory, and developmental psychopathology perspective. Study 1 sought to initiate the use of an innovative tool (Middle Childhood Emotion Regulation System; MCERS; August & Stack, 2013) developed to measure emotion regulation behaviours observationally during middle childhood; explore the association between mothers' childhood histories of aggression and children's and mothers' emotion regulation

behaviours; and examine the links between children's emotion regulation behaviours and parental support, child behaviour problems, and child cognitive abilities. Study 2 aimed to replicate some of the findings of Study 1 in a separate sub-sample of the Concordia Project by also observationally examining emotion regulation (using the same tool) and its association with intergenerational and concurrent behaviours (parental stress, child problem behaviours). Study 2 was designed to extend the findings from Study 1 by examining the longitudinal associations of emotion regulation behaviours during middle childhood into adolescence. The primary theoretical frameworks guiding this body of work were the developmental psychopathology, biopsychosocial, and transactional models. The following sections will focus on discussing the patterns of results obtained across the two studies and on drawing implications for development, the applied realm, and intervention.

Emotion Regulation and Maternal Histories of Risk

Both studies aimed to explore the association between mothers' childhood histories of aggression and their children's emotion regulation behaviours (during both game-playing and conflict tasks in Study 1, and a conflict task in Study 2). Children ranged in age from 9-to-13-years-old in Study 1, and from 5-to-12-years-old in Study 2. The studies also explored the link between mothers' childhood histories of aggression and mothers' current emotion regulation behaviours, although those findings were less robust and are addressed in the discussion sections of each study respectively. The common avenue of inquiry with regards to maternal risk predicting child behaviour was essential given that maternal childhood dispositions may contribute to the transfer and to the cumulative risk experienced by their offspring. In general, higher levels of

cumulative risk in early-and middle-childhood are predictive of lower levels of competent emotion regulation (Evans & English, 2002; Lengua, 2002). Aggression is a frequently examined maternal childhood risk behavior that has implications for considering both cumulative risk (e.g., Stack, Serbin, Mantis, & Kingdon, 2015) as well as parenting (e.g., Rubin & Coplan, 2004). Past studies with the Concordia Project demonstrate that aggressive girls are at-risk for increased academic and cognitive difficulties (Schwartzman et al., 1985) as well as more antisocial behaviour (Serbin et al., 1993).

In Study 1, we found that higher levels of maternal childhood aggression predicted children spending more time using self-comfort behaviours in both the conflict and combined tasks. This finding aligns with research suggesting that when aggressive girls become mothers, they may be more likely to employ aggressive styles within their own families (Serbin et al., 1991; Serbin & Karp, 2004). Children needing to use more self-comfort behaviours may have benefited less from the availability of a partner (in this case their mother), with whom to effectively problem solve a situation and co-manage the emotional content (co-regulate). Conversely, children who benefit from more positive parental strategies/expression may have increased ability to self-sooth, cope successfully, and self-regulate (Eisenberg et al., 2001; Kliewer, Fearnow, & Miller, 1996). No significant associations between maternal histories of aggression and children's use of self-comfort behaviours were found in Study 2.

In Study 1, lower levels of maternal childhood aggression predicted more time spent using approach verbal positive behaviours in children. Mothers with higher levels of childhood aggression spent more time using approach verbal negative strategies

themselves in observed interactions. Study 2 yielded fewer findings linking maternal childhood histories of risk to present-day mother or child emotion regulation behaviours. In fact, maternal childhood histories of aggression were not significantly associated with any of the child emotion regulation categories observed in the conflict task. Only a trend was found for higher levels of maternal childhood aggression predicting mothers spending more time using approach negative behaviours in interactions with their school-aged children during the conflict task. However, this trend is consistent with evidence that aggressive response styles remain fairly stable over time (Elder, Caspi, & Downey, 1986), suggesting that when aggressive girls become mothers, they may be more likely to be aggressive in the home, or in this case they may demonstrate higher incidences of maladaptive emotion regulation strategies. This finding also serves to partially replicate the findings from Study 1, suggesting that there may be an observable difference in mother's approach strategies with their children when they have a childhood history of aggression.

In Study 1, maternal childhood histories of aggression were not significantly related to avoidance behaviours in their offspring. Study 2 also did not find an association between maternal childhood histories of risk and children's avoidance behaviours. It is possible that these null findings were somewhat linked to cycles of aggression being more associated with approach- than avoidance-type behaviours. Another possibility is that more avoidance behaviours may have been observed had the tasks lasted for longer periods of time.

Although less present in Study 2, this series of findings demonstrates that it is possible to link maternal childhood histories of risk to observable present-day emotion

regulation behaviours. Being able to investigate observable behaviours linked to maternal histories of aggression, contributes to our understanding of cycles of aggression over time. This is especially true in the context of past findings of the Concordia Project whereby mothers' childhood histories of aggression increase the potential for negative outcomes in children and impact how children and parents interact over time (Serbin & Karp, 2003; Serbin, Kingdon, Ruttle, & Stack, 2015; Stack et al., 2015). The interaction of parental childhood variables and concurrent child and parental variables relates to the transactional and biopsychosocial lens through which we conceptualized these studies. Future studies in this area would benefit from continuing to examine longitudinal outcomes related to mothers' observed emotion regulation strategies. Such a study would allow for an examination of mothers with childhood histories of aggression at several time points across the lifespan.

Parenting Variables

Given parents' role as emotional coaches (Saarni, 1999) as well as the dyadic nature of the development of emotion regulation (Jean, Stack, & Fogel, 2009; Jean & Stack, 2012), parent characteristics were examined in both studies. In Study 1, parental support, a key factor in the development of children's social competence (Davis et al., 2001), predicted children needing to engage in less independent regulation (self-comfort behaviours). Supportive parents may have been more available to their children, requiring children to spend less time self-regulating. In Study 2, both mothers and their children spent less time using approach positive behaviours (e.g., affectionate touch, leaning forward toward partner, and positive emotional expression) predicted significantly higher parental stress. While spending more time using approach positive

behaviours may contribute to experiencing more positive affect and to a reduction in stress, less of this type of interaction may be linked to higher stress levels because there is less of a prosocial buffer against stress and/or because there is more time for more negative types of interactions. Thus, aiming to increase the experience of positive affect in parent-child (for both partners) may yield children who are more self-sufficient regulators and parents who experience lower levels of stress.

However, it is important not to over-interpret these findings given that the absence of positive behaviour is not equivalent to the presence of negative behaviour (Landry, Smith, & Swank, 2006). Overall, the parenting variables that were examined in this dissertation allow us to make the following two statements regarding emotion regulation and parental support and stress: (1) parents with more nurturing, responsive, and non-restrictive attitudes were more available to support their children's emotion regulation (and possibly help more with co-regulation); (2) parents who demonstrated less outwardly nurturing and positive behaviours experienced higher levels of stress. The notion that individual behaviour variables within dyadic interactions over time and in different contexts may contribute to parenting behaviour demonstrates the utility of the transactional framework in placing the individual in evolving interactional contexts producing developmental outcomes.

Children's Problem Behaviours and Cognitive Functioning

Both the over- and under-regulation of emotion are maladaptive (see review by Gross, 2014). Emotion dysregulation is associated with both internalizing and externalizing symptoms and clinical disorders during development (Aldao et al., 2016; Sheppes et al., 2015; Schäfer et al., 2017; Steinberg & Avenevoli, 2000). Both studies in

this dissertation examined how observed emotion regulation behaviours were associated with concurrent child problems behaviours (e.g., internalizing, externalizing, and total problems), as rated by mothers on the Child Behaviour Checklist (CBCL). Findings from Study 1 generally suggested links between observed emotion regulation behaviours and externalizing and total problems, but not with internalizing problems. Children who spent less time using approach verbal positive behaviours were rated by their mothers as having more externalizing problems. These findings were partially replicated in Study 2, where children who spent less time using approach positive behaviours were rated as having significantly more externalizing, as well as internalizing and total problems. Results from a number of studies report that adolescents with externalizing problems are more likely to have later academic difficulties (Masten et al., 2005; Risi, Gerhardstein, & Kistner, 2003). Although the absence of positive behaviour is not equivalent to the presence of negative behaviour (Landry et al., 2006), our results appear to highlight that using fewer of what we traditionally perceive to be happy behaviours, (e.g., laughing, grinning, smiling, affectionate touching, increasing proximity to a partner) appears to be associated with more problem behaviours. These findings may point to the adaptive or up-regulation of positive emotion as a protective factor.

Given that emotion regulation facilitates performance on cognitive tasks (Phillips, Bull, Adams, & Fraser, 2002) concurrent cognitive functioning was examined in Study 1. Somewhat surprisingly, more frequent use of self-comfort behaviours predicted lower overall cognitive functioning (Full Scale IQ), while more sarcasm/eye rolling/non-affectionate touch/and yelling were found to predict higher overall cognitive functioning on a standardized assessment instrument (WISC-III). A finding more in line with our

expectations was that children who used more avoidant strategies had lower overall cognitive abilities. This is in line with Glutting, Oakland and Konold's (1994) study in which higher levels of avoidance were related to lower cognitive abilities in at-risk children. We hypothesize that children who have poorer cognitive abilities may engage in patterns of avoidance with regards to schoolwork and educational opportunities that may perpetuate academic delays or failure. Clearly, this speculation must be tested empirically. In more severe cases, this can be seen from a developmental psychopathology point of view, whereby cycles of schoolwork avoidance in children with cognitive deficits are linked to academic difficulties in children with ADHD and learning disorders (e.g., Cuffe et al., 2015; Loe & Feldman, 2007; Swanson, Harris, & Graham, 2014).

Emotion Regulation Behaviours: Approach, Avoidance, and Self-Comfort

Broadly speaking, the three primary dimensions of emotion regulation measured in the present set of studies were approach, avoidance, and self-comfort behaviours. Self-comfort behaviours were examined in the same manner in both studies. Mothers who were more supportive had children who spent less time using self-comfort behaviours, while mothers with childhood histories of aggression had children who spent more time using self-comfort behaviours. Interestingly, across both studies, we did not observe an association between maternal childhood histories of aggression and mothers' own self-comfort behaviours. It is possible that self-comfort behaviours as they were measured, are used more in children than adults.

Depending on the study, approach and avoidance behaviours were examined either separately by verbal and non-verbal behaviours (Study 1), or as a single construct

(Study 2). In both studies, maternal childhood histories of aggression were related to mothers spending more time using approach negative behaviours. Study 2 also found that lower levels of aggression in childhood predicted mothers spending more time using approach positive behaviours. This pattern of findings points to the possibility that socio-emotional difficulties (in this case aggression) early on, are related to less adaptive emotion regulation strategies in adulthood.

With regard to offspring findings, in general, maternal childhood histories of aggression and concurrent child behaviours were associated more with children's use of approach-based strategies. Conversely, the longitudinal findings with regards to drug use revealed associations between children's avoidance-based emotion regulation strategies and marijuana and methamphetamine use.

Considering the mother and child findings together, one begins to see patterns emerging, particularly with regards to the longitudinal and intergenerational prediction of less adaptive emotion regulation behaviours in mothers with histories of aggression and their offspring. In addition, avoidance-based strategies in children appear to be an indicator of future high-risk behaviours. An important aspect of analyzing these findings is to begin to better understand these patterns and derive ways to apply them to intervention and prevention plans for children and youth.

Longitudinal Findings and Psychopathology

The longitudinal component of the work sought to examine how the development of emotion regulation skills in middle childhood is predictive of later health-risk behaviours. In addition to early socio-emotional deficits being linked to problem behaviours, results from several longitudinal studies report that poor socio-emotional

skills are linked to substance use (e.g., Moffitt et al., 2011; Trentacosta & Fine, 2010). Study 2 yielded results linking avoidance verbal behaviours (e.g., minimal elaborations, uninformative responses, changing topic) during middle childhood to the use of greater marijuana and methamphetamine use in adolescence. Early avoidant behaviours may be maintained and generalized from childhood to adolescence, leading to a type of avoidant coping style that may develop from these early emotion regulatory difficulties. This potential pattern of avoidance may be linked to drug-use as a regulatory strategy over collaborative or problem-solving approaches. These types of avoidance behaviours are those that would typically be linked to internalizing problems. Internalizing problems (e.g., depression) during adolescence are linked to increased drug use in both boys and girls (Danzo, Connell, & Stormshak, 2017). In these cases, drug use is often perceived as a coping strategy that reflects a lower level of emotional competence. Adaptive emotion regulation may be a protective factor in the face of rising rates of psychopathology during adolescence (Yap et al., 2011).

Difficulty regulating emotions is a transdiagnostic feature in high prevalence mental health problems such as anxiety, depression, and borderline personality disorder (Leahy, Tirch, & Napolitano, 2011). The therapeutic process has increasingly evolved to focus more on the enhancement of positive emotion, rather than only the reduction of negative emotion, in the goal of achieving overall changes for the client (Wood & Tarrier, 2010). Studies indicate that positive up-regulation strategies, such as humour (Larsen & Prizmic, 2004) can be used to mitigate negative emotions by increasing positive ones. To our knowledge, much of the literature on the enhancement of positive emotion in the therapeutic process ("Positive Clinical Psychology") has focused on therapy for adults

(e.g., Sin & Lyubomirsky, 2009). The longitudinal findings from our work point to the importance of incorporating the acquisition of adaptive emotion regulation skills in therapeutic intervention work with children and adolescents. The potential focus of a future intervention program could be to observationally examine emotion regulation behaviours in mother-child dyads that have been identified as at-risk (e.g., based on SES, neighbourhood, level of education, or past histories and experiences). Following careful observational coding and analyses of dyadic patterns of behaviour, a parent-training-type group could focus on promoting strategies that are more likely to elicit positive emotion regulation behaviours in children (e.g., approach verbal positive behaviours). This type of intervention could also emphasize teaching parents to help scaffold their children's emotional reactions when overwhelmed and/or distressed.

Applied Implications based on Emotion Regulation Findings in the Present Studies

Improved understanding of emotion regulation in children and adolescents is particularly important for the treatment of psychopathology (e.g., Aldao et al., 2016). A recent trend in clinical psychology has seen the rise of transdiagnostic treatment efforts. The transdiagnostic approach is based on a unifying theoretical model that explains mental health problems through common mechanisms (Chu, Temkin, & Toffey, 2016). Once common mechanisms are identified, multiple problems can be treated within a single protocol (Barlow, Allen, & Choate, 2004). While transdiagnostic treatments have predominantly been proposed for work with adult populations, recent work has attempted to adapt transdiagnostic treatments to youth (Chu et al., 2016). Therefore, adapting treatment protocols for depression and anxiety in adolescents to include a focus on the regulation of emotion is considered necessary. Both the use of less adaptive emotion

regulation strategies, and of more maladaptive emotion regulation strategies, are significantly related to depression and anxiety in adolescents (Schäfer et al. 2017). In this context, adaptations to current models are essential, since emerging psychopathology during adolescence may be more difficult to fit into a single diagnostic category, and differential diagnoses may be more common.

Leahy and colleagues (2011) developed a practitioner's guide to helping clients with problematic emotion regulation strategies suffering from various mental health diagnoses. The common feature of dyregulated emotions has been linked to depression and anxiety (e.g., D'avanzato, Joormann, Siemer, & Gotlib, 2013), eating disorders (e.g., Brockmeyer et al., 2014; Marta-Simões, Ferreira, & Mendes, 2017), and borderline personality disorder (e.g., Gratz, Moore, & Tull, 2016). In the practitioner's guide, they discuss a variety of emotion regulation strategies such as rumination, avoidance, problem solving, and suppression and examine how and when these strategies are maladaptive and how they can be altered in a positive manner. More recently, Barlow, Allen, and Choate (2016) proposed that working from three basic therapeutic principles (antecedent cognitive reappraisals, emotional avoidance, modifying emotional action tendencies) could effectively treat a range of emotional disorders (e.g., Generalized Anxiety Disorder, Major Depressive Disorder, and Panic Disorder with Agoraphobia). Given the rise in popularity of emotion regulation, the empirical evidence to date, and the general consensus that it is implicated in multiple forms of psychopathology, it is anticipated that emotion regulation will become an increasingly common element in transdiagnostic treatment plans, especially in work with children and adolescents.

Findings regarding emotion regulation behaviours in both mothers and their children also provide us with valuable information to apply to parent-training intervention protocols (e.g., Sanders, 2012; 'Triple P-Positive Parenting Program') and parenting more generally. Better understanding how mother and child emotion regulation behaviours are associated with stress and support may serve as a springboard to targeting specific types of behaviours (e.g., support in the regulation of emotions) or responses in in-vivo parent-training sessions.

Limitations and future directions

While its strengths are many, this series of studies is not without limitations. First, the age-range examined, particularly in Study 2, was wider than ideal. However, given that this sample was part of a much larger study with several time points and sub-samples, this inconvenience was perceived to be relatively minor, and consistent with the types of limitations experienced by others using data points within large studies. In addition, although two tasks were available for observation in this dissertation, one limitation was that none of these tasks were designed to yield high intensity valences of positive emotions. Future studies of children's emotion regulation in very positive contexts would complement these findings. In fact, expanding the contexts more widely in general would be of interest, especially to observe dyadic interactions with peers or siblings. Examining approach, avoidance, and self-comfort emotion regulation behaviours addressed in the current work in a typically-developing population (no risk status) or other high-risk groups or vulnerable populations would also represent a potentially interesting and informative avenue of inquiry.

In addition, the sample size, especially in Study 2, was small, thus limiting the extent and interpretation of the statistical analyses. In particular, the sample size limited the

exploration of the mediating or moderating roles of emotion regulation (Baron & Kenny, 1998; Fritz & MacKinnon, 2007). In addition, the sample sizes played a role in our choice of hierarchical multiple regressions being the primary analytic approach used in our studies. It should be noted that the number of regression analyses conducted in our studies may have limited the power.

Finally, a pertinent future direction would be to combine the measures used in this dissertation with physiological measures of emotion regulation. Observational measures of emotion regulation allow for an understanding of how a child appears to be emotionally regulating in a given context and in the moment. Given the involvement of the brain in responding to environmental cues, conveying emotional arousal and priming action patterns, studying hormonal levels and somatic activity would be helpful in understanding emotional development (Hastings, Kahle, & Han, 2014). This line of inquiry would also provide additional support for the biological component of the biopsychosocial model, and help more fully understand the impact of emotion regulation on development.

Conclusions

The present series of two studies employed two different at-risk sub-samples from the Concordia Project to observationally examine emotion regulation during middle-childhood. A number of foci were examined: intergenerational factors linking emotion regulation behaviours to maternal histories of aggression; concurrent associations of emotion regulation behaviours in terms of parenting factors, children's behaviour problems, and cognitive abilities; and longitudinal associations between early emotion regulation behaviours and adolescent substance use. Findings from this body of work offer a unique contribution to the literature through the design of an observational

measurement tool used in two separate samples to examine school-aged children's emotion regulation behaviours. Links evident between maternal histories of aggression and their children's emotion regulation behaviours may point to a mechanism partially explaining the intergenerational transfer of problem behaviours. Teaching parents more adaptive emotion regulation strategies may impact younger children and adolescents alike. In addition, using information derived from observed maternal emotion regulation behaviours may serve as a useful starting point to identifying target areas for teaching parents these skills.

Furthermore, these studies succeeded in linking specific emotion regulation behaviours to children's internalizing and externalizing problem behaviours, providing valuable information on what some precursors to behaviour problems may be. For example, the ability to recognize the use of certain emotion regulation strategies as being linked to behaviour problems may allow for earlier detection and work toward modification of these responses at home, school, and in the children's other primary environments. In addition, the relationship between middle-childhood avoidance-type behaviours to adolescent marijuana and methamphetamine use is relevant in the early detection and prevention of potentially harmful trajectories of risk. Longitudinal findings suggesting a link between early emotion regulation behaviours and drug use in adolescence also bolster the argument for early socio-emotional prevention and intervention programs to promote wellness for at-risk youth. Treatments for adolescent psychopathology that incorporate a strong (potentially transdiagnostic) focus on emotion regulation skills is a promising future avenue for practitioners. A recent review of the literature (Domitrovich, Durlak, Staley, & Weissberg, 2017) suggests that the socio-

emotional interventions for young children (including emotion regulation skill development) should include an explicit and active approach. These programs should be delivered as early as in the preschool years and continue throughout elementary school.

Taken together, results from the present studies underscore the importance of considering emotional development in the parent-child context as a dynamic and far-reaching course that impacts parents' as well as children's lives in the present and in the future. Findings from the present body of work have the potential to inform the development and application of preventative intervention programs that may foster early emotion regulation abilities and contribute to a healthier developmental trajectory for young people.

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Appendix A

Informed Consent Form (Study 1)

***L'INDIVIDU DANS SON MILIEU: Les parents et leurs enfants+**

Directeurs du projet: -Lisa A. Serbin, Ph.D.
-Dale M. Stack, Ph.D.

Numéro d'identification:

Formulaire de consentement

Je, soussigné(e), autorise les chercheurs du projet **L'individu dans son milieu+* de l'université Concordia à rencontrer mon enfant _____ à l'école, en deux sessions, durant la période de classe. Je comprends que mon enfant remplira des tests de fonctionnement intellectuel et académique ainsi que des questionnaires sur son comportement et son tempérament. J'autorise également les chercheurs à recueillir des informations sur la vie scolaire de mon enfant de la part de son professeur et à avoir une copie du dernier bulletin de l'année en cours. Finalement, lors d'une troisième visite, je consens à rencontrer les chercheurs de l'université Concordia à la maison avec mon enfant afin de remplir des questionnaires additionnels portant sur notre vie familiale et de recueillir des échantillons de salive sur moi-même, lors de la rencontre, et sur mon enfant, lors de la rencontre et pendant deux jours de la semaine. J'accepte aussi d'être filmé(e) avec mon enfant lors d'une session incluant un jeu et des discussions portant sur des résolutions de problèmes.

Je comprends que toute l'information recueillie demeurera confidentielle et qu'elle ne servira qu'à des fins de recherche. Cependant, si après évaluation des examens votre enfant raquerait une attention spéciale, les chercheurs de l'université Concordia s'engagent à faire le suivi de la rencontre afin de référer les services nécessaires.

Dans l'éventualité où j'aurais des questions concernant cette recherche, je pourrai m'adresser soit à Mina Popliger ou bien à Jean-François Rhéaume au (514) 848-2253.

Nom: _____ Date_____
EN LETTRES MOULÉES

Signature:_____

****

Nom de l'enseignant/e:

Année: _____

Nom du directeur/de la directrice: _____

Nom de l'école: _____

Numéro de téléphone: (_____) _____
Code régional

Adresse: _____
rue

_____
ville code postal

Appendix B

Conflict Questionnaire (Parent)

Numéro D'identification: _____

Questionnaire sur les conflits

(parent)

Voici une liste d'éléments à propos desquels les enfants et les parents sont souvent en désaccord. Nous voulons savoir jusqu' à quel point votre enfant et vous êtes en désaccord sur ces sujets à la maison. Veuillez évaluer chaque item sur une échelle de 0 à 5 où 0 = "Je ne suis pas en désaccord" et 5 = "Je suis très en désaccord".

1. Tâches ménagères / aide à la maison.	1	2	3	4	5
2. Travail à l'école / devoirs, notes ou mauvaise conduite à l'école.	1	2	3	4	5
3. Inimité / être capable de garder certaines choses pour lui/elle-même.	1	2	3	4	5
4. Écouter / respecter les demandes et les conseils de ses parents.	1	2	3	4	5
5. L'heure à laquelle l'enfant doit être à la maison le soir.	1	2	3	4	5
6. Apparence physique / façon dont il/elle s'habille.	1	2	3	4	5
7. L'heure du coucher.	1	2	3	4	5
8. Passer du temps ensemble en temps que famille.	1	2	3	4	5
9. Les ami(e)s de mon enfant / les gens avec qui il/elle se tient.	1	2	3	4	5
10. S'entendre avec son/ses frère(s) et sa/ses soeur(s).	1	2	3	4	5
11. L'argent.	1	2	3	4	5
12. Parler au téléphone / regarder la télévision.	1	2	3	4	5
13. Garder sa chambre en ordre.	1	2	3	4	5
14. Prendre un bain / une douche.	1	2	3	4	5
15. _____	1	2	3	4	5
16. _____	1	2	3	4	5
17. _____	1	2	3	4	5
18. _____	1	2	3	4	5

Appendix C

Conflict Questionnaire (Child)

Numéro D'identification: _____

Questionnaire sur les conflits

(Enfant)

Voici une liste d'éléments à propos desquels les enfants et les parents sont souvent en désaccord. Nous voulons savoir jusqu' à quel point ta mère et toi êtes en désaccord sur ces sujets à la maison. Évalue chaque item sur une échelle de 0 à 5 où 0 = "Je ne suis pas en désaccord" et 5 = "Je suis très en désaccord".

1. Mes tâches ménagères / aide à la maison.	1	2	3	4	5
2. Mon travail à l'école / devoirs, notes ou mauvaise conduite à l'école.	1	2	3	4	5
3. Mon inimité / être capable de garder certaines choses pour moi.	1	2	3	4	5
4. Écouter / respecter les demandes et les conseils de mes parents.	1	2	3	4	5
5. L'heure à laquelle je dois être à la maison le soir.	1	2	3	4	5
6. Mon apparence physique / la façon dont je m'habille.	1	2	3	4	5
7. L'heure à laquelle je dois me coucher.	1	2	3	4	5
8. Passer du temps ensemble en temps que famille.	1	2	3	4	5
9. Mes ami(e)s / les gens avec qui je me tiens	1	2	3	4	5
10. M'entendre avec mon/mes frère(s) et ma/mes soeur(s).	1	2	3	4	5
11. L'argent.	1	2	3	4	5
12. Parler au téléphone / regarder la télévision.	1	2	3	4	5
13. Garder ma chambre en ordre.	1	2	3	4	5
14. Prendre un bain / une douche.	1	2	3	4	5
15. _____	1	2	3	4	5
16. _____	1	2	3	4	5
17. _____	1	2	3	4	5
18. _____	1	2	3	4	5

Appendix D

Informed Consent Form (Study 2)

L'INDIVIDU DANS SON MILIEU: Les parents et leurs enfants
Directeur du projet : Lisa A. Serbin, Ph.D.

Numéro d'identification: _____

Formulaire de consentement

Je _____ accepte de participer avec mon enfant _____ à l'étude «mère et enfant» du projet «L'individu dans son milieu» de l'université Concordia. Je comprends que nous serons testés(es) au laboratoire en une session pour une période d'environ deux heures. Nous remplirons des questionnaires et nous donnerons des échantillions de salive. Ces échantillons seront prélevés à l'aide de cotons dentaires que nous garderons à l'intéreiur de notre bouche pendant 2-3 minutes.

Cette procédure ne provoque aucune douleur et ne comporte aucun risque pour notre santé. Je comprends que nos réponses et notre dossier resteront confidentiels et que tous les renseignments et les prélèvements ne seront identifiés que par un numéro. Je recevrai la somme de 40$ pour ma participation et mon enfant recevra 5$. Je comprends que notre participation à cette étude est entièrement volontaire et que nous pouvons cesser de participer à n'importe quel moment au cours de l'étude.

Nom : _____

Signature : _____

Date : _____

Expérimentateur(trice) _____