Early Childhood Characteristics, Parenting, and Contextual Influences on Preschoolers' Behaviour and Developing Competencies: An Examination of Behavioural, Academic, and Social Adjustment

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ABSTRACT

Early Childhood Characteristics, Parenting, and Contextual Influences on Preschoolers' Behaviour and Developing Competencies: An Examination of Behavioural, Academic, and Social Adjustment

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The present studies were designed to examine early emerging behaviour problems, temperament, parenting, maternal characteristics, and contextual influences on children's developing competencies in a pooled sample of mother-child dyads, as well as links to academic and social adjustment following preschoolers' transition to elementary school. Mothers from three independent Canadian samples participated with their preschool-aged offspring in data collection; questionnaire measures were employed in order to investigate temperament, behaviour problems, parenting, and maternal emotionality in early childhood (children aged 2-6), and classroom behaviour, interpersonal skills, social and attention problems in middle childhood (children aged 6-11). In addition to maternal and teacher-report questionnaires, report-card marks were collected at the conclusion of the academic year, and children completed standardized measures of verbal ability to assess school achievement and vocabulary, respectively.

Results reflected the significance of child, parental, and familial influences on children's early behaviour and subsequent adjustment following the school transition. In addition to direct effects, findings demonstrated indirect and interactive relationships between temperament, parenting, maternal emotionality, and familial socioeconomic stress in contributing to the early emergence of externalizing problems, and to academic and social adjustment outcomes in middle childhood. Further evidence of bidirectional associations between temperament and parenting was also indicated in the context of children's externalizing behaviour at preschool age.

The results highlight the complexity of relationships across a range of multi-level factors,

and their direct, indirect, and interactive contributions to children's early behaviour and subsequent adjustment at school age. Findings underscore the significance of early childhood in shaping social, behavioural, and academic outcomes, and have important implications for policies and programs that promote positive developmental outcomes. By pooling participants from three independent Canadian samples, results contribute valuable information to the field of early childhood development, and underscore the concurrent and longitudinal influences on preschoolers' behaviour and school age adjustment.

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Chapter 1: General Introduction

The emergence of problem behaviour during the early childhood period has been shown to place children at-risk for a range of problems across the life course (Elder, 1998; Moffitt & Caspi, 2001; McLeod & Kaiser, 2004; Mesman, Bongers, & Koot, 2001; Crosnoe & Elder, 2004; Entwisle et al., 2005; Leve, Kim, & Pears; 2005; Duncan et al., 2007; McLeod & Fettes, 2007; Burt & Roisman, 2010; Bierman et al., 2013). Not only do early emerging behaviour problems convey increased risk for persistent patterns of problem behaviour, but they have also been shown to impede normative development, and the acquisition of fundamental skills required for important childhood tasks, such as going to school and making new friends (Johnson & Foster, 2005; Duncan et al., 2007; Ostrov, 2008; Bierman et al., 2013; Kawabata & Crick, 2013; Gower, Lingras, Mathieson, Kawabata, & Crick, 2014). Underscoring the significance of early behaviour is evidence from longitudinal studies demonstrating that behavioural competence, or developmentally appropriate regulation of behaviour, at preschool age represents a primary predictor of kindergarten adjustment and longer-term school and social success (Entwisle & Alexander, 1999; DiLalla et al., 2004; Duncan et al., 2007; Waller et al., 2015).

Developmental research has predominantly focused on two distinct classes of broadband behaviour problems in child populations: Internalizing Problems (IP) are characterized by over-control and self-focused or internal experiences and expressions of distress, and manifest in the form of anxious, avoidant, inhibited, or fearful, reticent behaviour (Bub, McCartney, & Willett, 2007). Externalizing Problems (EP), in contrast, are characterized by under-control and are overtly expressed in the form of aggressive, overactive, impulsive, inattentive, and/or oppositional behaviour (Achenbach & Edelbrock, 1978, Campbell, 2002; Bub, McCartney, & Willett, 2007; Lorber, Del Vecchio, & Slep, 2014). Despite variation in definition and expression, evidence has indicated that IP and EP become increasingly differentiated with age and often co-occur between the ages of 2 and 5 years in clinical and nonclinical samples (Gjone & Stevenson, 1997; Shaw, Gilliom, Ingoldsby, & Nagin, 2003; Campbell, Gilliom, & Shaw, 2004; Oland & Shaw, 2005; Mäntymaa, Puura, Luoma, Latva, Salmelin, & Tamminen, 2012).

The early onset of problem behaviour is concerning given the potential to interfere with children's concurrent functioning and to constrain future development of socio-emotional, self-regulatory, cognitive, and academic competencies (Calkins & Fox, 2002; Nigg & Huang-Pollock, 2003; Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Gower et al., 2014). While normative declines in problem behaviour are evidenced as a function of maturation and age, studies have shown that approximately 10% of preschoolers exhibit enduring behaviour problems that interfere with development, and that 4-6% of these children go on to experience severe impairments in later childhood and adolescence (Mathiesen & Sanson, 2000; Campbell, 2002; Shaw et al., 2003; Duncan et al., 2007; Waller et al., 2015). Such findings underscore the need for early remediation and systematic differentiation between patterns of normative, transient problem behaviour and patterns of maladaptive, impairing behaviour that negatively impacts children's adjustment (Campbell, Shaw, & Gilliom, 2000; Rapport, Denney, Chung, & Hustace, 2001; Bub et al., 2007; Gower et al., 2014).

Research on broadband behaviour problems has consistently associated EP in middle childhood with underachievement, school failure, and social deficits even after accounting for such factors as intellectual ability and family socioeconomic status (Vitaro, Larocque, Janosz, & Tremblay, 2001; Vitaro, Tremblay, Brendgen, & Larose, 2005; Beyer, Postert; Müller, & Furniss; 2012). More recent evidence has demonstrated that upon elementary school entry, EP is predictive of subsequent grade retention, low marks, high school non-completion, and behaviour disorder classification/diagnosis (Bierman et al., 2013). Results from additional studies reflect significant relationships between IP at school age and grade retention, underachievement, and peer exclusion/victimization (Newcomb et al., 1993; Kovacs & Devlin, 1998; Rapport et al., 2001; Henricsson & Rydell, 2006; Burt & Roisman, 2010; Choe, Olson, & Sameroff, 2013). Based on findings from a large-scale study by McLeod and Kaiser (2004), elevated levels of IP in middle childhood significantly decreased the probability of obtaining a high school diploma above and beyond the effects of family socioeconomic status and parental education.

Early Emerging Internalizing Problems

Even earlier than middle childhood, early emerging IP during the preschool period has also been shown to have adverse effects on developmental outcomes (Pulkkinen, 1995; Newman, Caspi, Moffit, & Silva, 1997; Hirshfeld-Becker & Biederman, 2002; Gilliom & Shaw, 2004; Beyer et al., 2012). Young children with heightened IP often display anxious, reticent, and avoidant behaviours, and tend to withdraw from novel experiences and interpersonal interactions; such behaviour not only impedes their opportunities to learn and develop new skills, but also contributes to relational difficulties, peer rejection/victimization, and social isolation (Grover, Ginsburg, & Ialongo, 2007; Wood, 2007). It is suggested that early emerging IP may interfere with the acquisition of cognitive and pre-academic skills by limiting children's participation in early learning activities and social interactions, and thereby compromising their capacity to engage with peers and daycare/preschool teachers, and to practice emergent skills (Farmer & Bierman, 2002; Rapport et al., 2001; Aronen et al., 2004). Increased demands for interpersonal interaction in unfamiliar group contexts may be especially challenging for children with IP (Evans, 2001; Rimm-Kaufman & Kagan, 2005; Coplan et al., 2008), and elicit heightened levels of anxious arousal, negative emotionality, and socially-withdrawn behaviour.

Early Emerging Externalizing Problems

Aggressive, defiant, and over-active behaviour appears to be particularly deleterious during the early childhood period and is among the most common correlates of academic failure and underachievement in later childhood and adolescence (McLeod & Kaiser, 2004; Bierman et al., 2013; Yin & Dix, 2014). Studies have shown that such behaviours typically arise before the age of seven and may persist throughout development (Barkley, 2003; Furman, 2005; Bierman et al., 2013; Lorber et al., 2014). In addition to problems with impulse control and modulation of activity, children with heightened EP often experience marked difficulty initiating and sustaining attention, concentrating effectively, and resisting distractions (Pelham, Fabiano, & Massetti, 2005), and also struggle with self-regulation of behaviour, affect, and motivation (Eisenberg et al., 2001; Calkins & Keane, 2009). Preschool children with heightened EP tend to display deficits in pre-literacy and numeracy skills, and often go on to experience a range of academic and interpersonal struggles (Chen, Rubin, & Li, 1997; Hawkins et al., 2003; Masten et al., 2005; Sonuga-Barke, Auerbach, Campbell, Daley, & Thompson, 2005; Vitaro et al., 2005; Waller et al., 2015).

While such factors as child temperament, parenting, socio-demographic variables, and familial risk have been implicated in the early emergence (Smith, Calkins, Keane, Anastopoulos, & Shelton, 2004; Burt & Roisman, 2010; Lorber et al., 2014) and persistence of EP (Ackerman, Brown, & Izard, 2003; Evans, Li, & Whipple, 2013; Waller et al., 2015), less is known about the interplay between these factors or their associated pathways of influence (Campbell et al., 2010). The importance of acquiring a better understanding of the developmental origins of externalizing behaviour is underscored by evidence demonstrating significant associations between EP and increased rates of juvenile delinquency, violence, and earlier onset substance abuse (King, Lacono, & McGue, 2004; Lui, 2004). Given the need for further research to offset the costs associated with EP, the emergence of EP during the preschool period was a primary focus of the present dissertation.

While prior research on early-onset problem behaviour and child adjustment has played a fundamental role in identifying salient factors that are implicated in trajectories of adaptation and maladjustment, additional studies are required to elucidate the ways in which multi-level factors may indirectly, interactively, and reciprocally contribute to developmental outcomes at preschool age and over time. Guided by a bioecological systems framework (Bronfenbrenner & Morris, 1998; 2006) and the transactional model of development (Sameroff, 2009; 2010), the two studies that comprise this dissertation were designed to investigate complex relationships across a range of child and environment factors. The contributions of multi-level factors were explored first in the context of early emerging EP at preschool age in Study 1 and to subsequent academic and social adjustment outcomes at school age in Study 2.

Theoretical Framework

Bioecological systems theory (Bronfenbrenner & Morris, 1998; 2006) postulates that proximal processes (i.e., interactions between the child and the environment) operate over time to influence development, and vary as a function of the individual, the environmental context, and the specific outcome(s) of interest (Bronfenbrenner & Morris, 1998; Engle & McElwain, 2010). Also relevant are the range of influences on child development at multiple levels, and in multiple social subsystems, including but not limited to the family, peers, daycare/school, and the neighborhood or community at-large.

Complementary to this framework is the transactional model of development (Sameroff, 2009; 2010), which emphasizes the continuous, dynamic interplay between the child and his/her environments over time. This model acknowledges the plasticity of the caregiving environment(s) and the child, both of which play an active role in shaping socialization and development. Such an approach recognizes that adjustment outcomes are a function of dynamic interchanges between the individual and his/her environments, whereby each is changed through experience with the other (Cicchetti & Toth, 1997; Sameroff & Mackenzie, 2003; Sameroff, 2009; 2010).

Implicit in this model is consideration of internal (child-level; e.g., genetic, biological, neurological traits) and environmental (e.g., caregiver characteristics, parenting practices, family economic resources) factors that may contribute to developing competencies or problems.

Specifically, risk factors refer to empirical markers or stressors, which predispose, precipitate, and/or intensify maladaptive outcomes, while protective factors buffer against negative outcomes within the context of adversity (Cicchetti & Cohen, 1995; Masten, 2001; Cicchetti & Dawson, 2002; Sameroff, 2009). Because such factors rarely operate in isolation, the transactional nature of risk and protective factors is considered within the context of the individual and across multiple social subsystems, which reflect the dynamic interplay between the child and his/her environments over time. In this way, developmental outcomes are considered to be the product of complex and intricate processes that encompass ongoing and reciprocal interactions between multiple influences and pathways (e.g., biological, behavioural, cognitive; Cicchetti & Toth, 1997; Vasey & Ollendick, 2000; Burgess, Rubin, Cheah, & Nelson, 2001; Sameroff & Mackenzie, 2003; Weems & Stickle, 2005; Muris, 2006; Sameroff, 2009; 2010; Kuczynski & de Mol, 2015).

Framed by a bioecological systems perspective (Bronfenbrenner & Morris, 1998; 2006), and transactional model of development (Sameroff, 2009; 2010; Kuczynski & de Mol, 2015), specific foci of the two studies comprising this dissertation included bidirectional, interactive, and indirect relationships between child and environment variables with respect to the emergence of EP at preschool age, and to adjustment outcomes in middle childhood. More specifically, the contributions of child temperament and behaviour, positive, critical, and punitive parenting, maternal emotionality, and family socioeconomic stress (SES) were investigated in the context of early-onset EP and subsequent academic and social adjustment following the early school transition.

Temperament

The importance of children's early behavioural and emotional styles has been consistently underscored by studies documenting the effects of temperament on concurrent and long-term developmental outcomes, including behavioural competence and problems, school achievement, and social adjustment (e.g., McCoy & Raver, 2011; Gower, Lingras, Mathieson, Kawabata, & Crick, 2014). As defined by Rothbart and Bates (1998, pp. 109), temperament refers to "constitutionally based individual differences in self-regulation and emotional, motor, and attentional reactivity, which are shaped over time by heredity, maturation, and experience". In this way, temperament represents individual variation in normative behaviours pertaining to sensory sensitivity, affect, activity, and attention that are modified over time via development and interactions with the environment.

Despite variability in the number, definition, and measurement of temperament dimensions, the constructs of emotion reactivity and activity-level are widely recognized as important constituents of children's early behaviour and interactional patterns that have profound implications for concurrent and longer-term functioning (Sanson, Hemphill, & Smart, 2004; Rothbart & Bates, 2006; Lorber et al., 2014; McCormick, O'Connor, Capella, & McClowry, 2015). Between the ages of 2 and 5 years, children demonstrate considerable improvements in their ability to regulate and adapt their behaviours and emotions to different contexts and situations (Miller, Gouley, Seifer, Dickstein, & Shields, 2004; McCormick et al., 2015). Displays of intense negative emotion, motor activity, and physical aggression tend to dissipate across early childhood as preschoolers learn how to modulate their affective expression, and to follow conventions regarding highly active motor behaviour (Kiff, Lengua, & Zalewski, 2011; Denham, Bassett, Zinsser, & Wyatt, 2014).

In general, difficulties regulating activity (motor behaviour) and emotion in early childhood have been associated with EP, including aggression, over-activity, and defiance (Miller et al., 2004; Choe et al., 2013; Lorber et al., 2014), deficits in social competence (Denham et al., 2001), and anxiousness, peer conflict, social isolation, and poor overall adjustment (Miller & Olson, 2000; Shields et al., 2001; Denham et al., 2001; Fabes et al., 2002; Rubin, Burgess, & Hastings, 2002; McCoy & Raver, 2011). Consequently, young children with temperamental profiles characterized by high levels of both emotion reactivity and activity-level have been shown to be at-risk for a constellation of social, behavioural, and academic problems across childhood and beyond (Sanson, Hemphill, & Smart, 2004; O'Connor, Rodriguez, Capella, Morris, & McClowry, 2012; McCormick et al., 2015). In contrast, adaptive regulation of behaviour and emotion during the preschool period has been associated with greater academic achievement and social competence throughout middle childhood (Miller et al., 2006; Teglasi et al., 2009; Chen, Deater-Deckard, & Bell, 2014; Denham et al., 2014). In light of the important implications for concurrent functioning and subsequent adjustment, emotion reactivity and activity-level comprised specific foci of interest in both studies of the present dissertation.

Activity-Level. As a component of the reactivity temperament system, activity-level refers to a child's tendency to exert gross motor movement in response to stimuli within the environment (Rothbart & Bates, 2006; Rudasill, Gallagher, & White, 2010). Evidence from a number of studies has associated high activity-level with the early emergence and persistence of behaviour problems, and with such maladaptive outcomes as grade retention, underachievement, and peer exclusion (Caspi, 2000; Goldsmith, Aksan, Smider, & Vandell, 2001; Sanson et al., 2004; Leve et al., 2005; Rudasill et al., 2010; O'Connor et al., 2012; Denham et al., 2014). Young children are frequently on the move and are easily distracted; these two characteristics become increasingly evident upon preschool-entry when sedentary, focused behaviour is required in a number of daily situations. Parents and daycare/preschool teachers often view high levels of physical activity as particularly problematic and as an impediment to early learning, interpersonal interaction, and behavioural competence (Campbell, Eaton, & McKeen, 2002; Dix & Branca, 2003; Choe et al., 2013; McCormick et al., 2015). Deviations in activity-level have also been found to predict a number of maladaptive outcomes across childhood (Windle, 1992; Hagekull, 1994; Chen et al., 2014; Lorber et al., 2014), and are considered an important component of developmental psychopathology (Gandour, 1989; Schaugency & Fagot, 1993; Fantuzzo, Bulotsky-Shearer, Fusco, & McWayne, 2005; Bierman et al., 2013). More specifically, during the preschool period and prior to kindergarten entry, failure to modulate gross motor activity has been associated with externalizing behaviour, deficits in social competence, fine motor ability, and emergent cognitive skills, as well as with heightened risk for global maladjustment in later childhood and adolescence (Lonigan, Bloomfield, Anthony, Bacon, Phillips, & Samwel, 1999; DuPaul McGoey, Eckert, & VanBrakle, 2001; Rabiner & Malone, 2004; Miller, Goulet, Seifer, Dickstein, & Shields, 2004; O'Conner et al., 2012; Chen et al., 2014).

The integrity of these results however, has been called into question given methodological disparities in the assessment and measurement of activity-level, which has varied across studies from such dimensions as tempo control (Maccoby et al., 1965), delay of gratification (Toner et al., 1977), and impulsivity or behavioural control (Martin, 1989; Victor et al., 1985; Weithorn et al., 1984; Dix et al., 2004), to rates of injury and hospital visits (Deater-Deckard et al., 2001; Dix & Branca, 2003), vigor of gross motor movement (Kiff et al., 2011) and squirming, fidgeting, and/or off-task behaviour (Lorber et al., 2014; O'Connor et al., 2012; McCormick et al., 2015).

Despite such negative implications, activity-level is a basic and important tenant of young children's play, and is therefore socially salient (Pellegrini & Smith, 1998; Campbell et al., 2002; McCormick et al., 2015). Typical levels of activity change with age, most likely in an inverted U-shaped pattern with a peak sometime between 2 and 5 years of age (Eaton, 1994). While there is evidence of a normal distribution (across the population), it is unclear how individual variations in activity-level affect children's behaviour and interpersonal interactions (Martin 1988a; 1989). As aforementioned, past findings suggesting that lower activity may be advantageous, have documented significant inverse associations between activity-level and behavioural competence and self-regulatory abilities (Victor, Halverson, & Montague, 1985; Martin, 1989; Weithorn, Kagan, & Marcus, 1984; Dix, Gershoff, Meunier, & Miller, 2004; Teglasi et al., 2009; Lorber et al., 2014). However, a conflicting line of research suggests that high activity-level is adaptive in early childhood, not only for its more obvious links with physical and motor skills development (Von Hofsten, 1993), but also for the maturation of emergent cognitive abilities (Choe, Olson, & Sameroff, 2013; Chen et al., 2014). Such studies have demonstrated significant positive relationships between motor activity and cognitive functioning at preschool-age, as well as observed exploratory behaviour (Goldsmith, 1996; Chen et al., 2014; Lorber et al., 2014). These findings suggest that greater motor activity may facilitate children's inhibitory control and contribute to enhanced regulation over behaviour in general. A more detailed discussion of motor activity and the methods by which it is assessed is presented in the introduction to Study 1.

Despite considerable inconsistencies, the current literature does reflect a fundamental relationship between activity-level at preschool-age and developmental outcomes in later childhood. Moreover, evidence linking activity-level and cognitive skills may be particularly important in providing a more integrative view of the development of behavioural competence and in identifying the factors that contribute to behaviour problems, including over-activity, impulsivity and/or deficits in self-regulation (Eaton et al., 2001; Fantuzzo et al., 2005; Teglasi et al., 2009). Given the need for further research on discrete dimensions of temperament, activity-level was examined in the present dissertation in the context of both early emerging EP, as well as subsequent adjustment outcomes at school age.

Emotion Reactivity. In addition to regulation of motor activity and behaviour, the current literature underscores the significance of effective regulation of emotions in early childhood with regard to concurrent and longer-term adjustment outcomes. Deficits in effective regulation of emotion have been associated with increased risk for the emergence of problem behaviour, and both school and social adjustment difficulties (O'Connor et al., 2012; Denham et al., 2014; McCormick et al., 2015). Children who display heightened levels of emotion reactivity have been found to exhibit greater difficulty monitoring, evaluating, and modifying their affective reactions, and regulating their emotions adaptively (Campos et al., 1983, Zahn-Waxler, Klimes-Dougan, & Slattery, 2000; Mills et al., 2012; Choe, Sameroff, & McDonough, 2013).

Evidence suggests that a biological propensity towards heightened physiological reactivity may result from a reduced capacity to regulate arousal and the associated experiences of negative affect, including anger, frustration, irritability, distress, and fearfulness; as a result, situations that are mildly stressful for most children, may elicit elevated levels of intense negative affect in children who are highly emotionally reactive (Goldsmith, 1996; McCoy & Raver, 2011; Choe et al., 2013; Chen et al., 2014). In this way, it appears that greater emotion reactivity confers increased risk for the experience and expression of prolonged and dysregulated negative affect, anger proneness, and anxious arousal, and for the emergence of socio-emotional, behavioural, and adjustment problems (Kagan, Reznick, & Snidman, 1988a; Kagan et al., 1988b; Rothbart, Ahadi, & Hershey, 1994; Kagan, Snidman, Zetner, & Peterson, 1999; Eisenberg et al., 2001; Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Hirshfeld-Becker, Micco, Henin, Bloomfield, Biederman, & Rosenbaum, 2008; McCoy & Raver, 2011).

As a sub-component of negative emotionality, heightened emotion reactivity has been linked to impaired self-regulatory skills (Kagan et al., 1999; Fox et al., 2005), as well as with behavioural problems, and social reticence during the early childhood period (Denham et al., 2002; Eisenberg et al., 2005; Hirshfeld-Becker et al., 2007). Underscoring the significance of emotion reactivity to the acquisition of developing competencies, additional studies with preschooler samples have associated emotion reactivity with peer rejection and poor pre-academic skills, as well as with longer-term deficits in behavioural, social, and cognitive competencies (Eisenberg et al., 2005; Batum, & Yagmurlu, 2007; Trentacosta & Izard, 2007; O'Connor et al., 2012). Children who are less emotionally reactive and better able to self-regulate have been found to display increased attentional and inhibitory abilities, and to cope more constructively with teacher directives to adapt their behaviour accordingly (Bronson, 2000;

Opper, 2003). Less well-regulated children, however, appear to exhibit greater difficulties attending to teacher instruction, persisting at assigned classroom tasks, and maintaining focus during group activities, thereby interfering with engagement in processes required for learning (Calkins & Howse, 2004; Fantuzzo, Perry, & McDermott, 2004; O'Connor et al., 2021; McCormick et al., 2015). Consequently, the concurrent and predictive role of emotion reactivity was investigated in the present dissertation in the context of early emerging EP, as well as adjustment outcomes at school age.

Given that young children are reliant on and interact primarily with parents or caregivers, parent-child interactions and parenting behaviours have been shown to play a pivotal role in the expression of temperament and in the nature of adjustment outcomes across childhood (Choe et al., 2013; Chen et al., 2014; Blair & Raver, 2015). Consequently, the ways in which parenting behaviour and temperament dimensions contribute to concurrent competencies and developmental outcomes has been of increasing interest to researchers in the area of child adjustment (e.g., Lehman, Steifer, Guidash, & Wanna, 2002; van Bakel & Riksen-Walraven, 2002; Bryan & Dix, 2009; Choe et al., 2013). Objectives of the studies comprising this dissertation included elucidating the nature of concurrent and predictive relationships between temperamental activity-level and emotion reactivity, and both positive and negative parenting to early-onset behavioural problems, and to subsequent adjustment outcomes at school age.

Parenting

As demonstrated by findings from a substantial body of literature, transactions between children and influences within their immediate social environments have profound implications for shaping the expression of early temperament characteristics as well as the nature of associated developmental outcomes. Research has suggested that parental figures within children's immediate and ongoing social environments may moderate the nature and expression of temperament characteristics, and thereby contribute to numerous facets of development (Baumrind, 1967; Gallagher, 2002; Choe et al, 2013). Parents or caregivers play a critical role in managing children's early emotions and behaviours, and in contributing to their acquisition of developing competencies and self-regulatory abilities. The parent-child relationship represents the primary relational context in which fundamental learning takes place and early competencies are acquired (Greenberg, Speltz, & DeKlyen, 1993; Bates & Pettit, 2015). Throughout early childhood, the family represents a major arena for socialization in which parents are arguably the most influential (Maccoby, 1992; Laible, Thompson, & Froimson, 2015).

Socialization involves a constellation of bidirectional and transactional processes by which children are taught the skills, values, and behaviours necessary for developing competencies (Maccoby, 2007; Hastings et al., 2006; Kuczynski & de Mol, 2015; Kuczynski, Parkin, & Pitman, 2015). Socialization has been conceptualized around parenting strategies involving discipline, control, and warmth and their influence on children's behaviours and adjustment (Grusec & Davidov, 2007; Ciciolla, Gerstein, & Crnic, 2014; Bates & Pettit, 2015; Laible et al., 2015). According to such research, parental socialization practices constitute proximal processes through which children acquire the means to manage their emotions and behaviour independently (e.g., Belsky, Hsieh, & Crnic, 1998; Morris, Silk, Steinberg, Sessa, Avenevoli, & Essex, 2002; Blair & Raver, 2015), and are conceptualized as specific kinds of parental interactions in specific situations, which directly affect children's emotional and behavioural self-regulation (Darling & Steinberg, 1993; Wood, McLeod, Sigman, Hwang, & Chu, 2003; Grusec & Hastings, 2014). As such, a growing body of evidence has demonstrated the critical role of parenting and dyadic parent-child interactions in the development of self-regulatory abilities and in the expression of temperament (e.g., Rubin, Burgess, & Hastings, 2004).

To date, the literature reflects the significance of parenting behaviours related to the general dimensions of warmth and rejection. Parental warmth incorporates behaviours that convey acceptance, sensitivity, support, and responsiveness toward the child, and is indicative of the parents' propensity to express positive affect, affection, and autonomy-support. Such behaviours are thought to promote emotional security and independence, as well as adaptive self-regulation and behavioural competence (Berk & Spuhl, 1995; Pianta, 1997; Neitzel, 2001; Laible et al., 2015), and have been associated with children's social competence, prosocial behaviour, and academic achievement (Pettit, Bates, & Dodge, 1997; Domitrovich & Bierman, 2001; Joussemet, Koestner, Lekes, & Landry 2005; Stack, Serbin, Enns, Ruttle, & Barrieau, 2010; Chen et al., 2014).

Conversely, parental rejection refers to behaviours characterized by low levels of warmth and responsiveness, which may be expressed in the form of criticism, derision, hostility, harsh discipline, or punitive actions (Bayer, Sanson, & Hemphill, 2006; Laible et al., 2015). Such behaviours convey a lack of acceptance of the child's feelings and a general absence of emotional involvement, and thereby serve to reinforce the child's overall distress. It is suggested that critical-punitive or rejecting parenting may undermine autonomy and effective self-regulation of emotions and behaviour (Wood, McLeod, Sigman, Hwang, & Chu, 2003; McLeod, Wood, & Weisz, 2007; Choe et al., 2013). Accordingly, parenting characterized by harsh punishment, or hostile, coercive behaviour has been associated with negative developmental outcomes, including aggression and reduced prosocial behaviour in children (Domitrovich & Bierman, 2001; Stack, Serbin, Enns, Ruttle, & Barrieau, 2010; Chen et al., 2014). These broad categories of parenting behaviour have substantial implications for children's development; it is posited that through socialization experiences with parents, children come to establish patterns of experiencing, expressing, and regulating their emotions and behaviours that shape subsequent interactions in a range of social environments (Hastings & De, 2008; Ciciolla et al., 2014).

Moderation via Parenting. While both parenting and temperament have been shown to affect children's development directly (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; NICHD Early Child Care Research Network, 2004; McCoy & Raver, 2011), additional research has examined moderated, bidirectional, and indirect effects of these variables with respect to their contribution to adjustment outcomes across childhood (Chen et al., 2014; Ciciolla et al., 2014). As the parent-child relationship is dyadic in nature, research has supported the notion that parental socialization practices influence children's development/adjustment, and that children's early characteristics also shape parental socialization practices, and may serve to moderate the effects of parenting behaviour on individual adjustment outcomes (Choe, Olson, & Sameroff, 2013; Chen, Deater-Deckard, & Bell, 2014; Ciciolla, Gerstein, & Crnic, 2014; Kuczynski & de Mol, 2015). Such evidence suggests that developmental outcomes may be better accounted for by considering the transactional and bidirectional nature of temperament and parenting (Gallagher, 2002; Lengua & Kovacs, 2005; Bryan & Dix, 2009; Combs-Ronto et al., 2009, Campbell et al., 2010; Wang et al., 2013; Kuczynski & de Mol, 2015).

One of the gaps in this literature is that most studies have focused on broad measures of difficult temperament composites without attending to distinct aspects of behavioural/emotional approach, avoidance, and regulation (Lengua, 2006; Laukkanen, Ojansuu, Tolvanen, Alatupa, & Aunola, 2014). While "difficult temperament" is often comprised of such characteristics as negative emotion reactivity, high activity-level, low adaptability, and low regulation (Chess & Thomas, 1989), definitions tend to vary across studies as different combinations and measures are used to represent this construct (Chen et al., 2014; Laukkanen et al., 2014; McCormick et al., 2015). Similar differences exist in the conceptualization and measurement of parenting constructs across studies, which are further limited by a largely unidimensional focus on negative parenting in the absence of positive parenting practices (e.g., Choe, Olson, & Sameroff, 2013).

Certain studies, however, have demonstrated significant interactions between parenting and child temperament (or behavioural styles) in the context of adjustment outcomes (e.g., Morris, Silk, Steinberg, Sessa, Avenevoli, & Essex, 2002; Lengua, 2006; Chen et al., 2014; Baer, Schreck, Althoff, Rettew, Harder, Ayer et al., 2015). One such study by van Aken and colleagues explored the interactive contribution of temperament and maternal parenting behaviour in the development of EP with a sample of children and their mothers (Junger, Verhoeven, van Aken, & Dekovic, 2007). Their results indicated that the effects of maternal negative control and lack of maternal sensitivity were related to an increase in EP, but only for temperamentally difficult children. Similar findings have been demonstrated in the context of emotion reactivity, whereby the effects of negative parenting have been shown to be particularly deleterious for highly emotionally reactive children and to predict greater levels of problem behaviour relative to less emotionally reactive children (Calkins, 2002; Campbell et al., 2010; Chen et al., 2014).

Not only has negative parenting been shown to be particularly harmful for emotionally reactive children, but highly emotionally reactive children have also been found to elicit heightened levels of punitive behaviour and lower levels of positive maternal affect during dyadic parent-child interactions (Kochanska, Freisenborg, Lange, & Martel, 2004; Lengua & Kovacs, 2005). Evidence of bidirectional influences between child temperament and both parental behaviour and affective responses support transactional conceptualizations of development (Sameroff, 2009; 2010; Kuczynski & de Mol, 2015), whereby patterns of reciprocal negativity are a function of the complex interplay between characteristics of the child and those in his/her immediate social environments (Lengua & Kovac, 2005; Bryan & Dix, 2009; Combs-Ronto et al., 2009, Wang et al., 2013).

In addition to emotion reactivity, interactions between activity-level and parenting have been demonstrated in the context of adjustment outcomes. Findings by Szabo and colleagues (2008) revealed the interactive contribution of activity-level and maternal intrusiveness to child EP in a community sample of mothers and children. According to their results high activity-level was associated with elevated EP only in the presence of high parental intrusiveness. As such, these findings elucidate the moderating role of negative parenting in exacerbating temperamental activity, and contributing to significantly higher levels of externalizing problem behaviour (Szabo et al., 2008).

As in the case of emotion reactivity, preliminary research has also supported the notion of bidirectional influences between activity-level and parenting whereby children exhibiting high levels of temperamental activity elicit more punitive, critical, and intrusive parenting behaviour and negative affective responses during dyadic parent-child interactions (van Bakel & Riksen-Walraven, 2002; Bryan & Dix, 2009). As previously discussed, evidence of negative reciprocity between temperamental activity and parental behaviour and emotional expression is consistent with bidirectional and transactional models of development, and reflective of the complex interplay between characteristics of the child and influences within his/her environments. In an effort to address inconsistencies and gaps in the literature to date, the studies comprising the present dissertation investigated bidirectional and interactive effects between parenting and child temperament in the context of positive and negative parental practices, as well as activity-level, emotion reactivity, and early emerging problem behaviour with respect to developmental outcomes at preschool age and in middle childhood.

In addition to exploring the moderating effects of parenting on temperament, further research has focused on parenting behaviour as mediating associations between developmental outcomes and related variables of interest. In this regard, indirect effects models have garnered increasing attention and have been implemented to investigate mediating relationships between familial, maternal, or child characteristics and developmental outcomes via parenting behaviour. Based on this line of research, it is contended that parenting behaviours represent proximal processes that may influence offspring indirectly. In support of this contention, studies have shown that psychologically vulnerable or distressed parents are more likely to implement maladaptive parenting practices, particularly during challenging childcare interactions, and to direct negative emotions toward their children (Coplan, Arbeau, & Armer, 2008; Mills et al., 2007; Yan & Dix, 2014).

Research findings have further demonstrated marked associations between maternal depressive symptoms and parenting deficits, including heightened levels of critical, rejecting, and punitive parenting, and lower levels of warmth, support, and nurturance (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Johnson, Cohen, Kasen, Smailes, & Brook, 2001; Kane & Garber, 2004; Choe et al., 2013; Laukkanen et al., 2014); these relationships pertained not only to parents diagnosed with major depressive disorder but further extended to those exhibiting subclinical levels of distress (Lovejoy et al., 2000; Kane & Garber, 2004; Ciciolla, Gerstein, & Crnic, 2014; Yan & Dix, 2014).

Maternal Negative Emotionality

Large-scale studies with school age children and adolescents have linked maternal depressive symptoms to school/social adjustment problems indirectly via maladaptive parental behaviour, and thereby reflect the mediating role of parenting in associations between maternal expression of negative emotionality and maladjustment in older child populations (Johnson et al., 2001; Elgar, Mills, McGrath, Waschbusch & Brownridge, 2007). Although the generalizability of these findings to preschool populations requires further research, preliminary evidence corroborates analogous relationships between maternal depressive symptoms, parenting deficits, and self-regulatory and behavioural problems in preschool samples (Wright, George, Burke, Gelfand, & Teti, 2000; Sohr-Preston & Scaramella 2006; Trapolini, McMahon, & Ungerer, 2007; McCoy & Raver, 2011; Laukkanen et al., 2014).

It is suggested that maternal distress and/or depressive symptoms may compromise the quality of parent-child interactions and positive parenting practices, which during early childhood are considered pivotal to the development of emotional and behavioural self-regulation. Consequently, offspring of depressed mothers may be at-risk for the early emergence of socio-emotional and/or behavioural problems given their relative dependence on caregivers and increased likelihood of experiencing compromised parenting (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Berg-Nielsen, Vikan, & Dahl, 2002; Connell & Goodman, 2002; Gagne, Spann, & Prater, 2013; Laukkanen et al., 2014).

During the early years, children begin to understand emotional processes largely through referencing, observing, and modeling the emotional behaviours or expressiveness of their parents/caregivers (Eisenberg, Cumberland, & Spinrad, 1998; Gagne et al., 2013). Whereas positive maternal emotional expressiveness has been linked to greater emotion regulation and fewer behaviour problems in children (Garner, 1995; McCoy & Raver, 2011), negative emotional expressiveness has been associated with early emerging behaviour problems and higher emotion reactivity (Eisenberg et al., 2001; McCoy & Raver, 2011; Choe et al., 2013).

Evidence has demonstrated significant links between maternal negative emotionality and individual differences in positive parenting (Adam et al., 2004; Ginsburg et al., 2006; Feng et al., 2008; Turney, 2012) and in punitive, critical parenting, particularly when offspring display more difficult temperament traits (Ginsburg & Schlossberg, 2002; Letcher et al., 2008; Chen et al., 2014). Consequently, preliminary evidence has supported the mediating role of parenting in associations between maternal negative emotional expression and adjustment outcomes, as well as between child temperament and behaviour problems (Turney, 2012; Choe et al., 2013).

Together with research demonstrating similar indirect relationships between maternal negative affect and child adjustment problems via harsh, punitive parenting (Kiff et al., 2011; Stack et al., 2012; Turney, 2012), maladaptive parenting appears to represent a potential mechanism for the transfer of risk that serves to mediate the relationship between maternal expression of negative emotionality and problematic adjustment in offspring (Turney, 2012; Choe et al., 2013). Given these implications, the directionality and effects of maternal negative emotionality on early emerging EP and subsequent adjustment outcomes were investigated in the present dissertation, both directly, and indirectly via parenting and child temperament.

Contextual Factors Promoting Risk

As previously noted, a child's immediate familial environment is a primary context of early development that plays a pivotal role in shaping his/her adjustment over time (Sameroff, 2009; 2010; Turney, 2012; Kuczynski & de Mol, 2015). Nested within larger ecological contexts, including neighbourhoods and communities at-large, parent-child interactions, parental behaviour, and caregiver emotional expressiveness are subject to influences by macro-level stressors, such as socioeconomic adversity. Family socioeconomic status (SES) is represented by annual income, education, and occupation, each of which have been shown to affect parenting and child development. It has been posited that SES and individual development reciprocally influence one another, as well as the development of the subsequent generation (Conger & Donnellan, 2007). That is, individuals' traits and abilities determine the quality of his/her social and economic circumstances, which also influence individual development and parenting; this in turn, affects the continuity and subsequent intergenerational transfer of risk. Accordingly, for working class parents with limited time and resources, values of conformity and obedience are often espoused in offspring as a result of the financial constraints imposed by their jobs, whereas parents in more prestigious occupations can afford the time and money required to reason with their children, consider their perspectives, and encourage prosocial behaviour, problem solving, and adaptive decision-making (Masten & Coatsworth, 1998; Caspi, 2004; Conger & Dogan, 2007; Conger & Donnellan, 2007; Jackson et al., 2009; Turney, 2012).

In the extant literature, economic hardship has also been linked to greater maternal depressive symptoms and negative emotional expressiveness, less efficacious parenting, and poorer adjustment outcomes in children, particularly for those living in disadvantaged environments persistently throughout their early childhood years (Duncan & Brooks-Gunn, 1997; Bronfenbrenner & Morris, 1998; Aber, Jones, & Cohen, 2000; Ackerman, Brown, & Izard, 2004; Raver, 2004; Jackson et al., 2000; 2009; Serbin et al., 2011). Findings have indicated that children from economically disadvantaged families also experience greater parental inconsistency (routines and parenting), more critical, punitive parenting, higher levels of familial conflict, and less parental support, supervision, and involvement (Brooks-Gunn & Duncan, 1997; Mistry, Vandewater, Huston, & McLoyd, 2002; Elgar, McGrath, Waschbusch, Stewart, & Curtis, 2004; Temcheff, Serbin, Martin-Storey, Stack, Hodgins, Ledingham, & Schwartzman, 2008; Jackson et al., 2009; Stack et al., 2012; Serbin, Stack, & Kingdon, 2013; Stack, Serbin, Matte-Gagné, Kingdon, Doiron, & Schwartzman, accepted). In addition to greater instability in their home environments, children from lower income families may also have less access to basic resources and stimulating learning materials, and may incur actual and/or perceived threats to their safety and general wellbeing that further disrupt their development and acquisition of cognitive, self-regulatory, and behavioural competencies (Bradley & Corwyn, 2002; Mistry, Biesanz, Taylor, Burchinal, & Cox, 2004; Ackerman, Brown, & Kail, 2006; Paterson, Farr, & Hastings, 2015).

Despite evidence linking contextual adversity to suboptimal developmental outcomes (Brooks-Gunn & Duncan, 1997; Mistry et al., 2002; Elgar, et al., 2004; Ackerman et al., 2006; Temcheff, et al., 2008; Jackson et al., 2009; Stack et al., 2012; Serbin et al., 2013; Paterson et al., 2015; Stack et al., accepted), many other studies have focused on samples comprised of non-urban, middle-class families, with substantially less research targeting low-income populations. Consequently, the present dissertation included an at-risk, urban subsample of lower income families and their preschool aged offspring. The inclusion of a low income, urban subsample allowed for exploration of adjustment outcomes in an economically diverse Canadian sample of young children and their mothers, as well as potential interactions between socioeconomic factors, and child characteristics or maternal parenting behaviours. As such, familial socioeconomic factors were of considerable interest in both studies comprising the present dissertation, and included parental education, annual income, employment status, and occupational prestige.

Concordia Longitudinal Risk Project

The *Concordia Longitudinal Risk Project* (henceforth referred to as the *Concordia Project*) is a long-term prospective, intergenerational investigation of families at psychosocial risk. The *Concordia Project* comprises a community-based sample of individuals first recruited in 1976-78 (Ledingham, 1981; Schwartzman, Ledingham, & Serbin, 1985; Serbin, Cooperman, Peters, Lehoux, Stack, & Schwartzman, 1998; Stack et al., accepted). At the project's inception, peer ratings were used to identify 1774 inner-city school-aged children as highly aggressive, socially withdrawn, or high on both dimensions, with approximately equal representation of boys and girls. As original participants have since become parents, it became possible to study the processes and mechanisms for the transfer of risk in offspring. Studies with this sample have revealed that mothers' childhood histories of risk can lead to problematic parenting and subsequent deviant behaviour patterns in offspring (e.g., Saltaris, Serbin, Stack, Karp, Schwartzman, & Ledingham, 2004; Serbin, et al., 2004; De Genna, Stack, Serbin, Ledingham, & Schwartzman, 2006; Grunzeweig, Stack, Serbin, Ledingham, & Schwartzman, 2009; Stack et al., accepted). Specifically, a significant interaction between hostile parenting and maternal childhood histories of aggression and/or withdrawal indicated that mothers who were aggressive in childhood were more likely to demonstrate behaviours indicative of hostility when interacting with their children (Bentley, 2002; Enns et al., 2009; Stack et al., 2012), while mothers who were socially withdrawn in childhood were more likely to demonstrate weaker parenting and poorer interaction skills with offspring (Bentley, 2002; Enns et al., 2009; Grunzeweig et al., 2009). Furthermore, their children were also more likely to exhibit poor social skills in parent-child interactions (Bentley, 2002; Enns et al., 2009; Grunzeweig et al., 2009).

The Present Studies

In accord with a bioecological systems approach and transactional model of development (Bronfenbrenner & Morris, 1998; Sameroff, 2009; 2010; Kuczynski & de Mol, 2015), the current studies investigated complex relationships between a range of factors and their contributions to children's early behaviour and subsequent adjustment following the school transition. The wide-ranging costs of early emerging problem behaviour on school and social adjustment outcomes underscore the need to better understand the mechanisms that perpetuate maladaptive patterns, both within the child and within the social environments in which he/she is embedded.

Among the methodological shortcomings of previous research are variable and inconsistent measures of temperament constructs and parenting behaviour, often represented by aggregate or composite scores on multiple subscales, small sample sizes (e.g., Carmody, Haskett, Loehman, & Rose, 2015) primarily comprised of mid-to-upper SES families (e.g., Choe, Olson, & Sameroff, 2013; Choe, Sameroff, & McDonough, 2013; Gower, Lingras, Mathieson, Kawabata, & Crick, 2015). Furthermore, there has been only a limited focus on either the moderating or mediating role of parenting without consideration of alternative models (e.g., Early et al., 2002; Jackson, Choi, & Bentler, 2009; Turney, 2012), bidirectionality, or the comprehensive contribution of maternal characteristics and differential dimensions of temperament, parenting, and familial environment (Jackson et al., 2009; McCoy & Raver, 2011).

While certain studies have demonstrated significant child by environment interactions in the prediction of adjustment problems (e.g., Morris et al., 2002; van Aken, Junger, Verhoeven, van Aken, & Dekovic, 2007; Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2007; Bradley & Corwyn, 2008; Karreman, Van Tuijl, Van Aken, & Dekovic, 2009; Karreman et al., 2010; Chen, Deater-Deckard, & Bell, 2014), others have failed to provide consistent support for the moderating role of parenting behaviour (Engle & McElwain, 2010; Karreman et al., 2010; Mills et al., 2012). Further ambiguity surrounds the nature of the relationship between maternal depression or the expression of negative emotionality and child adjustment (Choe et al., 2013); whereas certain evidence has indicated that the effects of maternal characteristics on child behaviour are mediated by negative parenting and/or a relative absence of positive parenting, conflicting research suggests that children elicit specific types of parental behaviours regardless of maternal personal characteristics (Choe, Sameroff, & McDonough, 2013; Yan & Dix, 2014). Such studies have provided evidence of child-effects in shaping the nature of parental behaviour and the quality of parent-child interactions, thereby suggesting that temperament characteristics of the child elicit certain parental responses, which in turn contribute to early behavioural patterns irrespective of maternal emotional expression (McCoy & Raver, 2011). A number of discrepancies, however, have been demonstrated across studies with respect to the role of parenting in mediating associations between child temperament and EP. While certain findings have reflected at least partial mediation via parental behaviour (Paulussen-Hoogeboom et al., 2008; Choe et al., 2013), others have failed to provide evidence of significant indirect effects in the relation between dispositional attributes and problem behaviour in childhood (Paulussen-Hoogeboom et al., 2008; Karreman et al., 2010; McCoy & Raver, 2011).

The studies comprising the current dissertation utilized a large, heterogeneous, and diverse sample of preschool children and their mothers to investigate complex relationships across a range of multilevel factors and their additive, interactive, and indirect contributions to child adjustment outcomes in early childhood and at school age. Three independent Canadian samples were pooled to increase the power and generalizability of results, which included the previously mentioned high-risk subsample from the Concordia Project, as well as mothers and offspring from a Montreal-based study on preschoolers' adjustment, and a Winnipeg-based study on shame in early childhood.

Through the use of structural equation modeling (SEM), the first study of the present dissertation explored complex relationships between familial SES, maternal negative emotionality, child temperament, IP, and positive, critical, and punitive parenting in the context of early emerging externalizing problems at preschool age. In addition to investigating direct, indirect, and interactive contributions to the development of EP at preschool age, bidirectional relationships were also examined via SEM in accord with transactional models of development (Sameroff, 2009; 2010; Kuczynski & de Mol, 2015). By pooling three independent samples, this study is among the first to utilize advanced statistical methodology (SEM) to investigate a range of multilevel factors and pathways associated with the early emergence of EP at preschool age.

In the second study of the present dissertation, children were followed longitudinally to assess their transition and adjustment to elementary school. The large-scale pooled sample afforded the opportunity to investigate the predictive capacity of familial SES, maternal negative emotionality, child temperament, early-onset IP/EP, and positive, critical, and punitive parenting to academic achievement, vocabulary ability, problem behaviour, and social skills at school age. In accord with a bioecological systems perspective (Bronfenbrenner & Morris, 1998; 2006) and transactional model of development (Sameroff, 2009; 2010; Kuczynski & de Mol, 2015), direct, indirect, interactive, and bidirectional relationships were similarly examined across predictors in the context of their contributions to adjustment outcomes in middle childhood.

Chapter 2: Dissertation Study 1

Dispositional, Parental, and Familial Contributors to Early Emerging Externalizing Problems: A Bioecological Systems and Integrative Analysis Approach

Manuscript to be submitted

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Note. Author contributions for the dissertation. The first and second authors (Feldstein, Stack) conceptualized research questions and hypotheses for the present study and dissertation; the first author conducted the literature review and statistical analyses, and wrote the manuscripts and dissertation with feedback and revisions by the second author. The first author was not involved in original data collection or in study design as participants comprised a pooled sample from various geographical locations; study design and data collection were conducted by Drs. Mills (sample 3), Hastings (sample 2), Serbin & Stack (sample 1) as part of the larger longitudinal study developed in the original grant.

Abstract

Julia Feldstein, Ph.D.
Concordia University, 2016

While the wide-ranging costs of externalizing problems (EP) have been well-established, discrepant findings and methodological inconsistencies have resulted in ambiguities surrounding the processes and mechanisms that give rise to the early emergence of such behaviour. Underscoring the need to better understand the factors that contribute to EP is research linking preschool EP to problematic adjustment concurrently, in middle childhood, and beyond. The current study investigated the nature of the relationships between child internalizing behaviour, temperament, parenting, maternal emotionality, and family environment to early emerging EP. Through integrative data analysis, three independent Canadian samples were integrated to create a large, heterogeneous sample of preschool children and their mothers.

Results provided evidence of moderation by punitive parenting in the context of emotion reactivity, and suggested that for highly emotionally reactive children, more punitive parenting was particularly harmful in predicting greater EP. Similar patterns were revealed with respect to the moderating effects of family SES on child IP and on emotion reactivity in predicting heightened EP, respectively. Results also demonstrated that punitive and less positive parenting partially mediated associations between EP and maternal negative emotionality, as well as between EP and family SES. Parenting was also found to mediate associations between EP and temperament, such that the relationship between EP and emotion reactivity was partially mediated by more punitive, less positive parenting, whereas the association between EP and activity-level was partially mediated by more punitive, critical parenting.

Mediation and SEM analyses reflected bidirectional relationships between parenting and temperament with respect to their contribution to EP both directly and indirectly, such that significant path coefficients were revealed in models with pathways from punitive and positive parenting to emotion reactivity, and subsequently to EP, as well as with the corresponding inverse pathways from emotion reactivity to punitive and to positive parenting, and subsequently to EP. With the exception of one non-significant path, results were replicated in models with activity-level.

Evidence of direct, indirect, interactive, and bidirectional links reflects the complexity of interrelations between multiple variables at multiple levels, in multiple social subsystems.

Together, the present findings support a bioecological systems perspective and transactional model of development that implicate a chain of reciprocating influences from socioeconomic factors to the psychological resources of parents, parenting quality, and children's dispositional characteristics to developmental outcomes.

Dispositional, Parental, and Familial Contributors to Early Emerging Externalizing Problems: A Bioecological Systems and Integrative Analysis Approach

Typically emerging during the early preschool years, externalizing problems (EP) are among the most detrimental of behavioural symptoms and have been shown to compromise the development of fundamental competencies in multiple domains of functioning (Bierman et al., 2013; Evans, Li, & Whipple, 2013). Despite the emergence of EP in early childhood, research has predominantly targeted older child populations. In addition to a paucity of research, discrepancies in the existing literature and a multitude of methodological constraints have culminated in ambiguities surrounding the nature and contributions of relevant variables and the mechanisms implicated in the early emergence of EP (McIntoh, Rizza, & Bliss, 2000; Vaughan, Wetzel, & Kratochvil, 2008). Despite evidence documenting the relative magnitude of such factors as child temperament, parenting, socio-demographics, and familial risk in the early emergence and persistence of EP (Ackerman, Brown, & Izard, 2003; Smith, Calkins, Keane, Anastopoulos, & Shelton, 2004; Burt & Roisman, 2010; Mäntymaa, Puura, Luoma, Latva, Salmelin, & Tamminen, 2012; Blair & Raver, 2015), fewer studies have considered the interplay between these factors, their associated bidirectional pathways, or mechanisms of influence (Jackson, Choi, & Bentler, 2009; Campbell et al., 2010; Ciciolla, Gerstein, & Crnic, 2014).

To date, the existing literature has demonstrated robust yet modest direct associations between early-onset EP and temperament dimensions (Caspi, Henry, McGee Moffitt, & Silva, 1995; Gjone & Stevenson, 1997; Rothbart & Bates, 1998; Sanson et al., 2004; Blair & Raver, 2015), parenting practices, maternal characteristics, and contextual factors (Morris, Silk, Steinberg, Sessa, Avenevoli, & Essex, 2002; Belsky, 2005; Choe, Olson, & Sameroff, 2013). While this research has played an integral role in identifying important predictors of EP, direct effects models have limited utility in terms of accounting for variability in developmental outcomes, given the complexity of the relationships between individual (child-level) and environmental factors. Extrapolating from these findings, it is likely that a more complete understanding of early emerging EP may be obtained by examining the comprehensive contributions and interplay between child characteristics (e.g., temperament, behaviour) and environmental factors, including parental behaviour and emotional expression, as well as socio-demographic indicators and constituents of familial stress.

Guided by a bioecological systems framework (Bronfenbrenner & Morris, 1998; 2006) and the transactional model of development (Sameroff, 2009; 2010; Kuczynski & de Mol, 2015), the current study not only explored direct or main effects of individual or child-level and environmental factors, but also the ways in which these factors indirectly and interactively contributed to early patterns of externalizing behaviour. Based on preliminary evidence demonstrating moderating and mediating relationships between temperament, child and parenting behaviour, maternal emotional expression, and socio-demographic variables, the current study focused on direct, indirect, and interactive contributions of preschooler children's internalizing behaviour, emotion reactivity, activity-level, punitive, critical, and positive parenting, maternal negative emotionality, and familial socioeconomic stress to the early emergence of EP. Bidirectional relationships between temperament and parental variables were investigated in this regard via the use of structural equation modeling (SEM) techniques.

Associations between EP and Temperament

Difficulties regulating and adapting behaviours and emotions appropriately have been associated with the early emergence of EP (Miller et al., 2004; McCoy & Raver, 2011; Choe, Olson, & Sameroff, 2013) and internalizing problems (IP; Miller & Olson, 2000; Fabes et al., 2002; Rubin, Burgess, & Hastings, 2002; McCoy & Raver, 2011). As such, activity-level and emotion reactivity constitute important temperament dimensions implicated in children's self-regulation of behaviour and emotion.

Activity-Level. Certain studies have associated high activity-level with the early emergence and persistence of EP from preschool to middle childhood (Strelau, 1998; Nelson et al., 1999; Caspi, 2000; DuPaul McGoey, Eckert, VanBrakle, 2001; Goldsmith et al., 2001; Miller, Goulet, Seifer, Dickstein, Shields, 2004; Metcalfe, Harvey, & Laws, 2013). Previous evidence suggesting that lower activity may be advantageous has documented inverse associations between activity-level and behavioural competence and self-regulation in early childhood (Victor, Halverson, & Montague, 1985; Martin, 1989; Weithorn, Kagen, & Marcus, 1984; Dix, Gershoff, Meunier, & Miller, 2004). Conflicting evidence, however, has demonstrated significant positive relationships between activity-level and cognitive functioning at preschool age, as measured by performance-based tasks and observed exploratory behaviour (Goldsmith, 1996; Chen, Deater-Deckard, & Bell, 2014). Such findings suggest that greater motor activity may facilitate children's ability to inhibit response patterns, and thereby contribute to enhanced control over motor behaviour and self-regulatory abilities (Lonigan et al., 1999; DuPaul et al., 2001; Miller et al., 2004). Despite the inconsistencies reflected by the current literature, activity-level does appear to be associated with early behavioural patterns in a fundamental way. Investigating activity-level in the context of environmental factors, such as parenting and familial socioeconomic stress may be particularly important in providing a more integrative view of the early development of EP at preschool age (Eaton et al., 2001; Fantuzzo Bulotsky-Shearer, Fusco, & McWayne, 2005; Choe, Olson, & Sameroff, 2013).

Emotion Reactivity. In addition to modulation of behaviour or motor activity, research suggests that deficits in effective regulation of negative emotions may also contribute to the early emergence of behaviour problems, including EP (Campos et al., 1983, Zahn-Waxler, Klimes-Dougan, & Slattery, 2000; Choe, Sameroff, & McDonough, 2013). Evidence has demonstrated that a biological propensity towards heightened physiological reactivity may result from a reduced capacity to regulate arousal and the associated experiences of anger, frustration, and distress (Goldsmith, 1996; Hastings, Rubin, & Mielcarek, 2004; McCoy & Raver, 2011; Chen et al., 2014). Consequently, the biological underpinnings of such temperament traits as emotion reactivity may render children more vulnerable to heightened physiological arousal, and to the expression of intense/dysregulated negative affect (Neal et al., 2002; Kennedy, Rubin, Hastings, & Maisel, 2004; Fox et al., 2005; Hastings & Dix, 2008; Hirshfeld-Becker et al., 2008), anger proneness, and to the early emergence of EP (Kagan, Reznick, & Snidman, 1988a; Rothbart, Ahadi, Hershey, 1994; Kagan, Snidman, Zetner, & Peterson, 1999; Eisenberg et al., 2001; Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Hirshfeld-Becker, Micco, Henin, Bloomfield, Biederman, & Rosenbaum, 2008; McCoy & Raver, 2011).

Associations between EP and Parenting Behaviour

Given the role of parents or caregivers in helping young children to regulate their emotions and behaviour, and in facilitating their acquisition of self-regulatory abilities, associations between temperament (i.e., emotion reactivity, activity-level), and parental behaviour and emotional expression have been supported by research on early childhood adjustment (Eisenberg et al., 2001; Lehman, Steier, Guidash, & Wanna, 2002; van Bakel & Riksen-Walraven, 2002; Bryan & Dix, 2009; Choe, Olson, & Sameroff, 2013; Ciciolla, Gerstein, & Crnic, 2014).

In general, studies have associated parental warmth or positive parenting with heightened behavioural competence and self-regulation (Pettit, Bates, & Dodge, 1997; Joussemet, Koestner, Lekes, & Landry 2005), as well as with lower rates of EP (Calzada et al., 2004; Dennis, 2006; Laible, Thomas, & Froimson, 2015). A considerable body of evidence has also shown that preschoolers are more likely to exhibit overly-active, aggressive, and noncompliant behaviour when parents are highly critical, punitive, and/or derisive (Dumas & LaFreniere, 1993; Calkins et al., 2007; Chen et el., 2014). As such, negative parenting has been consistently associated with higher levels of early emerging EP in offspring (Gershoff, 2002, Patterson, 2002; Kochanska et al., 2003; Laible et al., 2015).

Despite revelation of the impact of parenting, modest effect sizes and inconsistent findings suggest that additional variables, including child temperament, are implicated in the genesis of problem behaviour. While negative parenting and/or an absence of positive parenting may be associated with heightened child EP, the presence of behavioural difficulties in the child may also interfere with a parent's ability to be sensitive and supportive, which in turn, may elicit more problem behaviour (Combs-Ronto, Olson, Lunkenheimer, & Sameroff, 2009; Wang, Christ, Mills-Koonce, Garrett-Peters, & Cox, 2013). Evidence that parenting influences children and that children affect parents, suggests that behavioural outcomes may be better accounted for by considering the transactional and bidirectional nature of temperament and parenting factors (Gallagher, 2002; Lengua & Kovacs, 2005; Bryan & Dix, 2009; Combs-Ronto et al., 2009, Campbell et al., 2010; Wang et al., 2013; Ciciolla et al., 2014).

In accord with this hypothesis and the transactional model of development (Sameroff, 2009; 2010), studies have demonstrated the significant contribution of temperament and parenting to child EP, suggesting that the expression of early dispositional tendencies may be moderated by specific parental behaviours that serve to exacerbate or ameliorate constitutional vulnerabilities (Calkins et al., 2007; Szabo, Dekovic, van Aken, Verhoeven, van Aken, & Junger, 2008; Chen et al., 2014). According to such research, young children with maladaptive temperament traits may be more susceptible to the effects of both positive and negative parenting in comparison to their same-aged peers. For highly emotionally reactive children, the influence of negative parenting has been shown to be particularly deleterious, and to predict heightened levels of EP than would otherwise be expected (Choe et al., 2013). Such evidence demonstrates the moderating role of negative parental behaviour, which appears to exacerbate emotion reactivity and/or impede emotion regulation, and thereby increases the risk for early emerging EP (Calkins, 2002; Campbell et al., 2010; Chen et al., 2014).

In addition to emotion reactivity, interactions between activity-level and parenting have been demonstrated in the context of behavioural outcomes in early childhood. In their investigation of temperament, maternal sensitivity, and maternal intrusiveness, Szabo and colleagues (2008) examined the interactive contribution of activity-level and parenting to observed child EP in a community sample of young boys and their mothers. A significant interaction between maternal intrusiveness and activity-level indicated that children with high activity-levels displayed greater EP when maternal behaviour was characterized by high levels of intrusiveness relative to low levels of intrusiveness; children with low activity-levels, however, showed similar rates of EP regardless of maternal intrusiveness. Interestingly, results failed to reflect a significant main effect of activity-level and instead revealed that high activity-level was associated with elevated EP only in the presence of high parental intrusiveness. These findings not only revealed the importance of accounting for interactions between temperament and parenting, but also the moderating role of negative parenting in exacerbating temperamental activity, and thereby contributing to greater rates of early-onset EP (Szabo et al., 2008).

While negative parenting has been shown to be particularly harmful for temperamentally vulnerable children, highly active and emotionally reactive children have also been found to elicit heightened levels of punitive parenting behaviour and lower levels of positive maternal affect during dyadic parent-child interactions (van Bakel & Riksen-Walraven, 2002; Kochanska, Freisenborg, Lange, & Martel, 2004; Lengua & Kovacs, 2005; Bryan & Dix, 2009). Evidence of bidirectional influences between child temperament and both parental behaviour and affective responses support transactional conceptualizations of early emerging EP (Sameroff, 2009; 2010), whereby patterns of reciprocal negativity are a function of the complex interplay between characteristics of the child and those in his/her immediate social environments (Lengua & Kovac, 2005; Bryan & Dix, 2009; Combs-Ronto et al., 2009, Stack et al., 2012; Wang et al., 2013; Stack et al., accepted).

While the aforementioned studies focused primarily on dimensions of negative parenting, further research has examined the protective effects of positive parenting and maternal warmth for temperamentally vulnerable children. Karreman and colleagues (2010) demonstrated the moderating role of positive parenting in buffering against the early emergence of EP in children with tendencies toward over-activity and impulsivity. According to results, the strength of the relationship between temperamental over-activity/impulsivity and EP was markedly reduced when parents displayed heightened levels of positive involvement, sensitivity, and structure relative to lower levels (Karreman et al., 2010). The implications of these findings add to an existing body of evidence underscoring the benefits of positive parenting in effecting change in maladaptive emotional/behavioural styles, and in protecting against the early onset and/or persistence of EP (Huang, Teti, Caughy, Feldstein, & Genevro, 2007; Karreman et al., 2010; Choe et al., 2013). Collectively, studies have demonstrated that parenting accounts for considerably more variance in behavioural outcomes when simultaneously considering the temperamental characteristics of the child (Morris et al., 2002; Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2007; van Aken, Junger, Verhoeven, van Aker, & Dekovic, 2007; Choe et al., 2013). Despite promising results, however, a number of studies have failed to replicate analogous interactions between temperament and parenting in the context of early-onset EP (Karreman et a., 2010; Waller et al., 2015).

In addition to their aforementioned findings, Karreman and colleagues (2010) also investigated the interactive contribution of negative parental control and child negative emotionality to early-onset EP in a community sample of preschoolers and their parents. Their results indicated that parental negative control, as assessed for both mothers and fathers, failed to moderate the expression of child negative emotionality, as neither interaction reached significance. Similar findings were demonstrated by Engle and McElwain (2010) in a short-term longitudinal study investigating interactions between punitive parenting and child negative emotionality with respect to EP at preschool age. Despite a significant main effect of child negative emotionality in predicting heightened EP, results failed to reflect a significant interaction between child negative emotionality and punitive parenting for either mothers or fathers. Given such inconsistencies, the present study investigated interactions between both positive and negative parenting (e.g., punitive, critical) and children's temperament characteristics (e.g., emotion reactivity, activity-level) in the context of early emerging EP to determine potential moderating effects of parenting on temperament.

In addition to moderating relationships, further research has focused on parenting behaviour as mediating associations between child EP and related variables of interest. Preliminary evidence has supported the mediating role of parenting in associations between maternal negative emotional expression and child EP, as well as between child temperament and EP. Such findings suggest that parenting behaviour may serve as a pathway through which parents' personal characteristics contribute to the emergence of EP in young children. Accordingly, Choe and colleagues provided longitudinal evidence demonstrating the mediating role of suboptimal parenting in relations between maternal distress in early childhood and elevated levels of subsequent EP at six years of age (Choe, Olson, & Sameroff, 2013). Based on their results, maternal depressive symptoms predicted heightened EP indirectly through associations with parenting that was lower in warmth (support, responsiveness) and positive control (Choe et al., 2013). Moreover, through the analysis of data from two large-scale studies of preschool adjustment in at-risk families, Turney (2012) provided evidence of mediation by parenting in the link between maternal depressive symptoms and early-onset EP. Consistent with findings by Choe and colleagues, results indicated that punitive parenting and harsh discipline mediated the association between maternal depression and heightened EP at preschool age (Turney, 2012; Choe et al., 2013). Together, the presence of aversive parenting as well as the relative absence of positive parenting appears to represent potential mechanisms that serve to mediate the relationship between maternal expression of negative emotion and the early emergence of EP (Turney, 2012; Choe et al., 2013).

Associations between EP and Maternal Negative Emotionality

While the aforementioned studies implicate maternal characteristics in shaping parental behaviour, additional evidence suggests instead that characteristics of the child elicit certain parenting behaviours regardless of maternal personality, depressive symptomology, or diagnostic status (Woodruff-Borden et al., 2002; Turner et al., 2003; Ginsburg, Grover, & Ialongo, 2004; Moore, Whaley, & Sigman, 2004; Verhoeven, Junger, van Aken, Dekovic, & van Aken, 2010; Wang et al., 2013). According to this line of research, parenting behaviour is driven by characteristics of the child; however, further studies with preschool children are required to determine the nature and directionality of these relationships (Gar & Hudson, 2008).

Based on evidence that parenting is driven by child-effects on mothers, certain studies have focused on the ways in which temperament shapes parental behaviours, and in turn, contributes to the expression of early-onset EP. Paululssen-Hoogeboom and colleagues investigated indirect associations between temperament and EP via parental behaviour in a community sample of preschool children and their mothers (Stams, Hermanns, Peetsma, &

Wittenboer, 2008). Multiple indices of parenting behaviour were combined to derive composite measures of parenting style; authoritarian parenting was defined via behaviours reflective of love withdrawal and power assertion, while authoritative parenting consisted of behaviours reflective of responsiveness, consistency, acceptance, and induction. In addition to a significant association between temperamental negative emotionality and heightened child EP, results demonstrated that the link between temperament and behaviour problems was partially mediated by authoritative parenting. Counter to hypotheses, however, authoritarian parenting was not related to temperament nor to EP, and tests of mediation failed to reach significance. These findings lend partial support to the notion that certain types of parenting may serve as a mechanism by which child temperament and EP are linked.

According to researchers, failure to demonstrate mediation effects by authoritarian parenting may have been attributable to sample demographics and/or methodological limitations; however, analogous discrepancies have been corroborated by additional studies examining similar mediating relationships (Paululssen-Hoogeboom et al., 2008). In a more recent investigation, Karreman and colleagues explored potential mediation by parenting behaviour in relations between child temperament and EP at preschool age (de Haas, van Tuijl, van Aken, & Dekovic, 2010). Despite inclusion of maternal and paternal ratings of temperament, as well as multiple dimensions of positive and negative parenting by mothers and fathers, parenting behaviour failed to emerge as a significant mediator in the link between child negative emotionality and early-onset EP, and in the link between temperamental impulsivity and EP (Karreman et al., 2010).

Additional evidence has reflected the mediating role of children's dispositional attributes in linking parenting behaviour to EP (e.g., Yates, Obradovic, & Egeland, 2010; Kiff et al., 2011; Halligan et al., 2013). In a recent longitudinal investigation, Halligan and colleagues (2013) examined indirect associations between maternal sensitivity and child EP via emotion reactivity (regulation) from 12 months to five years of age. Results revealed that emotion regulation served to mediate the relationship between maternal sensitivity and child EP. Lower levels of sensitive parenting contributed to EP indirectly via emotion dysregulation or heightened emotion reactivity (Halligan et al., 2013). While certain evidence has supported the mediating role of related temperament constructs (Yates et al., 2010; Hardawat, Wilson, Shaw, & Dishion, 2012), the state of the existing literature, rife with inconsistencies and discrepant results, underscores the need to elucidate the nature, interplay, and contribution of dispositional, parental, and environmental factors to the early emergence of child EP.

The Current Study

The wide-ranging costs of early-onset problem behaviour underscores the need to better understand the related and predictive factors of EP, both within the child and within the environment. Elucidating the complex interplay and relationships between these multi-level factors is paramount from a preventative standpoint and holds substantive clinical utility. Despite empirical evidence implicating child temperament, parenting, maternal negative emotionality, and family SES in the development of early behaviour problems, discrepant findings and methodological inconsistencies have resulted in ambiguities surrounding the processes and mechanisms through which these factors are linked. Consequently, the ways in which these factors collaboratively contribute to the emergence of EP remains largely unclear. Among the methodological shortcomings of past research are variable and inconsistent measures of temperament constructs and parental behaviour, often represented by aggregate or composite scores on multiple subscales, small sample sizes primarily comprised of mid-to-upper SES families, as well as a limited focus on either the moderating or mediating role of parenting without consideration of alternative models, bidirectionality, or the comprehensive contribution of maternal characteristics and differential dimensions of temperament, parenting, familial environment.

In light of these limitations, the current study sought to investigate the nature of the relationships between child internalizing behaviour and temperament characteristics (emotion reactivity, activity-level), positive and negative parenting (punitive, critical), maternal negative emotionality, and family socioeconomic stress in predicting early onset EP in a large, representative, heterogeneous Canadian sample of preschool children and their mothers.

The specific research questions addressed by the present study and associated hypotheses were embedded in four objectives. The first objective was to determine the relative contributions of family SES, maternal negative emotionality, parenting, child IP, and temperamental activity-level and emotion reactivity to the early emergence of EP during the preschool period. It was hypothesized that in conjunction with temperamental over-activity, heightened emotion reactivity and IP, as well as greater familial socioeconomic stress, maternal negative emotionality, and more punitive, critical, and less positive parenting would predict higher maternal ratings of early-onset EP. The second objective was to determine the interactive contribution of children's early characteristics (temperament, internalizing behaviour) and environmental factors to concurrent levels of EP at preschool age. It was hypothesized that the links between parental behaviour and preschool EP would be stronger among overly active and/or emotionally reactive children, or among children with high levels of co-occurring IP. Similar relationships were expected in contexts of greater familial socioeconomic stress whereby links between family SES and preschool EP would be stronger among overly active and/or emotionally reactive children, or among those with heightened ratings of co-morbid IP.

The third objective was to determine whether environments of greater familial socioeconomic stress and/or maternal expression of negative emotionality contributed to child EP via their impact on parental behaviour. It was hypothesized that the relationship between familial socioeconomic stress and early-onset EP would be mediated via parenting that was less positive, more critical, and/or more punitive in quality. This was also expected for maternal expression of negative emotionality such that the relationship between child EP and maternal negative emotionality would be mediated via less positive, more critical, and/or more punitive parenting. In addition to the role of parenting in mediating links between child EP and both maternal negative emotionality and family SES, a corollary to the third objective addressed the nature of indirect relationships between child temperament and EP via parenting, and more specifically, whether parental behaviour served to mediate relations between EP and temperamental activity-level and/or emotion reactivity. Alternatively, the role of temperament was also examined as mediating links between EP and parenting given empirical support for both (types/variants of) indirect effects models. It was hypothesized that parenting would contribute to EP both directly and indirectly through an impact on activity-level and emotion reactivity, and would thereby serve to mediate, at least partially, relations between child temperament and EP. Similar direct and indirect effects were expected in the context of child temperament, such that activity-level and emotion reactivity would serve to mediate, at least in part, relations between parental behaviour and early-onset EP. The final question addressed in objective 3 concerned the role of temperament in mediating the relationship between co-occurring IP and EP; it was hypothesized that IP would contribute to EP both directly and indirectly, such that activity-level and emotion reactivity would serve to partially mediate this relationship.

As suggested by the evidence to date, more complex models testing bidirectional relations between multiple independent variables may be required to elucidate the manner in which these factors contribute to early emerging EP. Therefore the fourth objective of the present study was to delineate the comprehensive contribution of the aforementioned multilevel factors to early-onset EP, as well as the nature and directionality of their relationships to each other. It was hypothesized that contextual variables (i.e., family SES) would affect parental behaviour, which in turn, would contribute to child EP by way of emotion reactivity and/or activity-level. Based on preliminary empirical support, it was expected that pathways linking temperament dimensions and parenting would be bidirectional in nature, and thereby contribute both directly and indirectly to child EP through their reciprocal influence on each other. While bidirectional relationships were expected between emotion reactivity and both punitive and positive parenting, lack of empirical evidence linking activity-level to positive parenting suggested that pathways between these two variables may not be significant in predicting concurrent levels of early-onset EP.

Method

Participants

The integrated sample comprised 523 preschoolers ranging in age from 2.1 to 6.1 years (M = 3.95 years, SD = .80) and their mothers, derived from three individual samples (details below). As there is no evidence for age differences in risk factors associated with IP/EP in early childhood, the sample consisted of children up to kindergarten age, including seven kindergarten children in sample 1 who turned six before being assessed late in the school year. Twenty-three children with missing values on most of the key variables were excluded (7 in sample 1 and 16 in sample 3), leaving a final integrated sample of 500. Demographic characteristics are shown in Table 1. On average, children in samples 1 and 3 were approximately 7 months older than those in sample 2, $t(257) = 4.82$, $p < .001$, and $t(372) = 11.23$, $p < .001$, respectively; children in samples 1 and 3 did not differ significantly in age, $t(365) = 0.09$ NS. Mothers in sample 1 were also significantly younger than those in sample 2, $t(255) = 8.59$, $p < .001$, and in sample 3, $t(364) = 8.39$, $p < .001$, while mothers in samples 2 and 3 did not differ in age, $t(369) = 0.03$. Proportionately more mothers had a low level of education (high school or less) in sample 1 (67 percent) than in samples 2 (12 percent) or 3 (16 percent), χ^2 (8, N = 500) = 213.87, $p < .001$, and proportionately more mothers were in a low income family (below $30,000/year) in sample 1 (40 percent), than in samples 2 (11 percent) or 3 (16 percent), χ^2 (12, N = 487) = 73.01, $p < .001$. Individual sample details are described below and are illustrated in Table 1.

Sample 1 (n = 126). The Concordia Longitudinal Risk Project (Concordia Project; e.g., Ledingham, 1981; Schwartzman, Ledingham, & Serbin, 1985; Saltaris, Serbin, Stack, Karp, Schwartzman, & Ledingham, 2004; Serbin, et al., 2004; De Genna, Stack, Serbin, Ledingham, & Schwartzman, 2006; Grunzeweig, Stack, Serbin, Ledingham, & Schwartzman, 2009; Stack et al, accepted) is an intergenerational study of long-term trajectories of childhood social withdrawal and aggression. The original sample included over 1770 Francophone (French-speaking) children predominantly from lower income Montreal neighbourhoods in 1976-78. As the original participants (now in their thirties and forties) became parents, assessments of their offspring were conducted at multiple points from toddlerhood through adolescence. Of over 469 representative participants in the ongoing Concordia project at that time, 126 had children of an appropriate age for the current study and agreed to participate with their child (acceptance rate was approximately 78 percent of eligible families). Within-sample mean comparisons demonstrated that these parents did not differ significantly from either the ongoing longitudinal sample or the original Concordia sample of 1770 with regard to socio-demographic and behavioural characteristics, including maternal education, annual family income, occupational prestige, and parental childhood histories of aggression and social withdrawal (see Appendix A). The 126 participants involved in the present study (61 boys) were second-generation children for whom target variables were assessed in early childhood, as well as their mothers. Assessments were done in the families' home when children were between 2.15– 6.12 years of age (M = 4.18, SD = 1.24), at which time mothers completed questionnaire instruments. Families were 95 percent Caucasian and 5 percent other ethnicities (Hispanic and African).

Sample 2 (n = 133). The Daycare and Preschool Adjustment Study (e.g., Hastings, Sullivan, McShane, Coplan, Utendale, & Vyncke, 2008) comprised 133 families in the greater metropolitan Montreal area. Targeted ads were used to recruit children between 2.0 – 4.92 years of age (M = 3.50, SD = 0.76) with varying levels of behaviour problems ranging from average (at or below the norm) to clinically significant (Achenbach & Rescorla, 2001). Prior to the onset of this study, standardized screening measures completed by mothers identified 69 children (32 boys) as "at-risk" for adjustment problems on the basis of elevated IP and/or inhibited temperament scores; 64 children (30 boys), identified as "low risk" for adjustment problems had both IP and inhibited temperament scores less than ½ standard deviation above age-norms. Mothers completed parental-report instruments used in the present study during four assessment periods over approximately 7 months; this included a telephone interview, home visit, laboratory visit, and mailed questionnaires. The sample was 70 percent Caucasian and 30 percent other ethnicities (Asian, Caribbean, African, Indian, Hispanic, and North African), with approximately half representing Anglophone families (first language was English); in 37 families, one or both parents were Francophone (first language was French), and in 33 families, one or both parents were Allophone (first language was neither English nor French).

Sample 3 (n = 241). The Shame in Childhood Study (e.g., Mills, Imm, Walling, & Weiler, 2008) is a community sample of 241 English-speaking families with children (131 boys) between 3.58 and 4.50 years of age (M = 4.10, SD = 0.26). Children born between June 1, 1999 and May 31, 2000 were recruited by Manitoba Health via a letter of invitation sent to 3,500 families drawn at random from 6,358 families residing in Winnipeg; a mid-size city (population 600,000) in the geographic center of Canada. Details about the study were provided and if parents had a healthy child and wished to participate, they were invited to return the enclosed return-stamped postcard. The final sample included parents predominantly of Caucasian ethnicity, (94 percent), of European ancestry (74 percent), and at least second-generation Canadian (78 percent). Instruments in the current study comprised mailed questionnaires that were completed by mothers, followed by a laboratory visit shortly thereafter.

Between-sample heterogeneity. As methods of recruitment varied considerably across samples, so too did children's risk for behaviour problems. Given that parents in sample 1 comprised a high-risk population, their offspring were at greater risk for IP and EP. Children in sample 2 ranged from low to high risk for anxiety problems based on screening scores, and children in sample 3 were recruited from the community and at low-risk for behaviour problems. Although increasing the heterogeneity of the pooled sample may in turn increase the generalizability of results, it is also possible that the higher risk for behaviour problems in samples 1 and 2 may contribute disproportionately to the findings. Consequently, individual sample differences were examined separately in the analyses below before pooling participants across samples (Mills, Hastings, Serbin, Etezadi, Stack, et al., 2012).

Measures

Given that three independent samples were used in this study, assessment measures varied widely across individual samples; in all protocols, however, the same instrument was used to assess internalizing and externalizing problems, and identical information was gathered about family demographic and socioeconomic characteristics (see Table 2 for assessment instruments in each sample). In two of the three samples, the same instruments were used to assess child temperament and maternal emotionality. While the three samples differed with respect to the assessment of parenting, all instruments had been widely implemented and validated in previous research. In these cases where instruments differed, parallel factors were created by selecting items with the same meaning across samples that measured the same construct of interest, and if necessary, standardizing scale values. When items were on different scales (4- or 5-point scale vs. 7-point scale), values of the smaller scale were converted to those of the larger scale using graduated constants to preserve distributional properties and to allow for greater variability in measurement (1 = 1, 2 = 2.5, 3 = 4, 4 = 5.5, 5 = 7; 0 = 1, 1 = 3, 2 = 5, 3 = 7). The use of rescaled original units was preferable to a transformation (e.g., z-transformation) because the latter can change distributions of data, and thus, relations among variables may be altered (Cudeck, 1989; Mills et al., 2012).

For measures of temperament, parenting, and maternal emotionality, candidate items with similar content were identified across instruments that reflected the same overall construct; item and scale statistics were examined in iterative processes to identify sets of items with the highest internal consistency and indices of reliability (Mills et al., 2012). Analyses for the integrated sample were conducted using data centered within each constituent sample; mean centers were thus computed for each sample separately by subtracting individual scores from the sample mean. Centering served to control for between-group variance by ensuring that all variances would range around zero (Mills et al., 2012). This method of item selection produced subsets of items with the highest reliability across samples while accounting for between-sample differences. Selected items were then rigorously tested with their original sample means included to ensure unidimensionality across the samples. Accordingly, parallel factors represent sets of items that measure the same construct as indicated by acceptable reliability in the integrated sample. The instruments and procedures used to create parallel factors across samples are described in detail below. The items selected for each measure are shown in Table 3. Table

4 provides descriptive statistics and the alpha coefficients in the three samples and in the integrated sample.

Child Temperament. To assess child temperament, mothers completed the *Children's Behavior Questionnaire* (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001), in samples 2 and 3, and the *Emotionality, Activity, and Sociability* (EAS) *Temperament Survey* for children (Buss & Plomin, 1984) in sample 1. On the CBQ, parents rate children's reactions to specified situations on a 7-point scale ranging from 1 (*extremely untrue*) to 7 (*extremely true*). Parental ratings on the EAS are on a 5-point scale ranging from 1 (*not characteristic or typical*) to 5 (*very characteristic or typical*). Three items equivalent in meaning across instruments were used to create a parallel measure of *emotion reactivity* (e.g., reacts intensely when upset, is very difficult to soothe when upset), and similarly, five items were used to create a parallel measure of *activity-level* [e.g., prefers quiet activities to active games (reversed), is full of energy even in the evening]. All EAS items were rescaled converting 5-point to 7-point scales.

Parenting. Mothers' parenting styles and practices were assessed using instruments and items shown in Table 3; including the *Parenting Scale* (Arnold, O'Leary, Wolff, & Acker, 1993), the *Parenting Dimensions Inventory* (PDI; Slater & Power, 1987), and the *Parenting Stress Index* (PSI; Abidin, 1995) in sample 1; the *Child Rearing Practices Report* (CRPR; Block, 1981) and *Responses to Children's Emotions* (RCE; Hastings & De, 2008) in sample 2; and the *Parenting Styles and Dimensions Questionnaire* (PSDQ; Robinson, Mandleco, Olsen, & Hart, 2001) in sample 3. These questionnaires asked mothers to rate the frequency or likelihood of using a specific parenting strategy, or to indicate how descriptive an item was of their own parenting. To increase similarity, certain items within an instrument for one sample were averaged to form a composite item that cohered better than any of its constituent items with the items on the instruments for the other samples. Individual and composite items were used to create three-item parallel measures of *critical, punitive*, and *positive* parenting, each of which comprised sets of items that cohered more within than across measures (see Mills et al., 2012). Items originally scored on 3- or 5-point scales were rescaled to 7-point scales and parenting scores were computed as the mean of item ratings (Mills et al., 2012). The relatively low alphas for some variables (see Table 4) are likely due to the small number of items in each measure necessitated by rigorous item selection. The composites reflect parcels that are beneficial empirically as their use allows for the inclusion of multiple items, a greater common-to-unique variance (Little, Cunningham, Shahar, & Widaman, 2002; Little, Rhemtulla, Gibson, & Schoemann, 2013), and are most likely to capture the true relations among constructs of interest (Rushton, Brainerd, & Pressley, 1983; Mills et al., 2012).

Maternal Negative Emotionality. Two self-report measures were used to assess maternal expression of negative emotionality: the *Emotionality, Activity, and Sociability* (EAS) *Temperament Survey* for adults (Buss & Plomin, 1984) in samples 1 and 3, and the *Positive and Negative Affect Scales* (PANAS; Watson, Clark, & Tellegen, 1988) in sample 2. The EAS asked mothers to rate items describing emotions and behaviours on a scale ranging from 1 (*not characteristic or typical of you*) to 5 (*very characteristic or typical of you*). For the PANAS, mothers rated affect terms (e.g., bashful, nervous, happy) on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*) as non-descriptive to highly descriptive of their emotions in recent weeks. Eight items with similar content across the two instruments were used to create the parallel construct of *maternal negative emotionality,* with individual scores computed as the mean of constituent item ratings (Mills et al., 2011).

Family Socioeconomic Stress. Four components were used to assess familial stress associated with socioeconomic status: mothers' education, fathers' education, family income, and highest occupational prestige within the family (Mills et al., 2012). Occupational prestige was scored using an updated version of the *Standard International Occupational Prestige Scale* (SIOPS; Treiman, 1977; Ganzeboom & Treiman, 1996). Originally constructed with reference to the International Standard Classification of Occupation (ISCO68), the SIOPS includes measures of occupational codes and prestige criteria in order to obtain a cross-national comparative assessment of occupational status. Now referencing the ISCO88 (Hakim, 1998), the updated SIOPS includes occupations ranging from professional (e.g. lawyers, physicians, chief executive officers) allotted the highest scores, to domestic labourers, manufacturers, and farmhands allotted the lowest scores.

In all samples, mothers reported the highest levels of education completed by herself and her children's father (in two-parent households), as well as total annual family income before taxes. Education was converted into a 5-point scale ranging from 1 (*did not complete high school*) to 5 (*attained graduate or professional degree,* e.g., MD, PhD), and family income was converted into a 7-point scale from 1 (*$0 - $10,000*) to 7 (*$75,000 or more).* As demonstrated by a principal components analysis, a single-factor solution was appropriate for the four component measures (mothers' education, fathers' education, highest SIOPS score in the family, and family income), eigenvalue = 2.23, variance accounted for = 56%. An overall measure of *family socioeconomic stress* was created for each sample by averaging the 4 components after transforming each of them into a standard score (z) and reversing each scale so that higher values reflected greater levels of family socioeconomic stress.

Child Behaviour Problems. Internalizing and Externalizing problems (IP/EP) were assessed via the *Child Behavior Checklist*, using the age 2-3 and 4-18 versions in sample 1 (CBCL; Achenbach, 1991; 1992) and the age 1.5-5 version in samples 2 and 3 (ASEBA CBCL; Achenbach & Rescorla, 2001). The CBCL is among the most widely used tools for assessing behaviour problems in children, and has been established as a reliable instrument with high content, construct, and criterion-related validity (Achenbach, 1991a; 1991b). Across questionnaire versions, the Internalizing and Externalizing problems scales each comprises over 30 items that are rated by the parent from 0 (*not true as far as you know*) to 2 (*very true or often true*). Total scores for each scale were obtained by summing maternal ratings of respective items, and converting them to T-scores based on population (age and gender) norms (see Mills et al., 2012).

Measure Development

In this study, structural equation modeling (SEM) was used to examine multivariate associations among latent temperament constructs (emotion reactivity and activity-level), specified by multiple, conceptually related, measured indicators (Gall, Gall, & Borg, 2003; Little et al., 2013). Accordingly, confirmatory factor analysis (CFA) was conducted to specify these temperament constructs before examining current research questions and structural equation models. As previously mentioned, 3 indicators of emotion reactivity and 5 indicators of activity-level comprised individual items from either the EAS (Buss & Plomin, 1984) or the CBQ (Rothbart et al., 2001) that were equivalent in meaning across samples. Given scale differences, EAS items were converted from a 5-point to a 7-point scale and relevant items from both questionnaires were reverse scored when necessary. Internal consistency and construct validity were assessed using data centered within each constituent sample and computed first within individual samples and subsequently within the pooled sample; Cronbach's alpha reliabilities preceded exploratory factor analyses (EFA), following which CFA was computed within the integrated sample.

Internal Consistency. Cronbach's alpha reliabilities were computed for each temperament factor in each of the three samples, and subsequently in the integrated sample (Table 4). By convention, a minimum scale coefficient alpha of 0.5 represents acceptable internal consistency and was established as the criterion in the present study (Tabachnick & Fidell, 2012). Analysis of the three indicators comprising emotion reactivity demonstrated acceptable internal consistency across samples yielding values above the referenced criterion (Cronbach's α = .509, .724, and .627 for samples 1, 2, and 3, respectively). Similarly, analysis of the five indicators comprising the activity-level factor yielded values above the criterion alpha in each sample (Cronbach's α = .627, .590, .676 for samples 1, 2, and 3 respectively). Given acceptable reliability within individual samples, Cronbach's alpha was computed in the integrated sample yielding values of .614 and .629 for emotion reactivity and activity-level, respectively.

Exploratory Factor Analysis. After establishing acceptable internal consistency, the intercorrelations among indicators of each construct were examined within the individual and integrated samples. Results revealed a number of sizable correlations (> .30) indicating that exploratory factor analysis was an appropriate next step (Tabachnick & Fidell, 2007). Principal components analyses (PCA) with varimax rotation were performed with the 8 temperament indicators separately by sample, and subsequently with the integrated sample. Tests of sampling adequacy (i.e., Kaiser-Meyer-Olkin; KMO, Bartlett's test of Sphericity) met conventional criteria suggesting that analyses reflected distinct, reliable factors; KMO values fell between 0.6 - 0.7 and Bartlett's test of Sphericity yielded significant Chi-squared values, $p < .001$, across individual samples and within the integrated sample; sample 1 KMO = .599, χ^2 (28) = 163.411; sample 2 KMO = .678, χ^2 (28) =163.689; sample 3 KMO = .690, χ^2 (28) = 267.240; integrated sample KMO = .702, χ^2 (28) = 419.336.

In all samples, two factors with eigenvalues greater than one were retained, and with the exception of one in sample 1 and two in sample 2, communalities for individual items were all > 0.5 following rotation. Eigenvalues for emotion reactivity ranged from 2.24 to 2.47 accounting for 28.04 to 30.89% of the variance in samples 1 and 2 respectively (sample 3: eigenvalue = 2.25, % variance = 28.07), while eigenvalues for activity-level ranged from 1.69 (sample 3) to 1.73 (sample 2) and explained 21.24 to 21.63% of the variance in samples 3 and 2 respectively (sample 1: eigenvalue = 1.702, % variance = 21.28). In the integrated sample, communalities for all individual items were > 0.5 and eigenvalues for emotion reactivity and activity-level were 2.167 and 1.602, accounting for 27.091% and 20.029% of the variance respectively.

Taken together, results from EFA suggest that emotion reactivity and activity-level represent reliable temperament factors that demonstrate strong internal consistency and criterion-referenced validity. This pattern of findings reflects minimal variation in item loadings and percentage of explained variance, both within factors and across samples. Consequently, further investigation, in the form of CFA, was deemed an appropriate next step.

Measurement Model. Prior to structural equation modeling, a CFA model was fitted to the integrated sample in order to confirm the presence of temperament factors, and to delineate how measured variables (i.e., individual indicators) reflect the latent constructs of interest (Anderson & Gerbing, 1988). Guided by findings from the EFA, a two-factor model was constructed in Stata 12 depicting emotion reactivity and activity-level with their respective indicators. This measurement model constructs the latent variables from their corresponding manifest variable indicators and then correlates all latent variables (Anderson & Gerbing, 1988; Byrne, 2006; Kline, 2011). Good fit of the measurement model within the integrated sample represents a good construction of latent variables. An area of current debate, however, surrounds the use of the Chi-squared statistic as an overall indicator of model fit given its inherent sensitivity to individual sample characteristics, and in particular, to large sample sizes; as in the present study, when the number of participants exceeds 400, Chi-squared values are almost always significant (Tanaka, 1987; MacCallum, Browne, & Sugawara, 1996; Kenny & McCoach, 2003; Sharma, Mukheriee, Kumar, & Dillon, 2005). For this reason, model fit was assessed on the basis of individual item loadings or path coefficients, as well as four alternative indices of fit; including the Bentler Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Square Root Mean Squared Residuals (SRMR), and the Root Mean Square Error of Approximation (RMSEA). By convention, CFI and TLI values of .90 or above, SRMR values below .08, and RMSEA values below .06 are indicative of good empirical fit (Tabachnick & Fidell, 2013; Sivo, Fan, Witta, & Willse, 2006; Bentler, 2004; O'Boyle & Williams, 2011).

Test of the Measurement Model. Tests of the measurement model revealed reasonably good fit as indicated by the following indices, all of which met the aforementioned criteria, with the exception of the significant Chi-squared value; χ^2 (19) = 34.76, p < .05, CFI = .960, TLI = .941, SRMR = .039, RMSEA = .042. As shown in Figure 1, standardized factor loadings, or path coefficients, for all of the eight indicators were significant, as was the covariance between the latent temperament constructs. Results provided evidence of factorial validity of these temperament variables and for their usage in full structural models. Given that each set of manifest variables loaded onto one latent factor, and that latent factors had a similar correlation pattern across samples, a composite score for each set of variables was computed by simple averaging of constituent items; this was preferable to using weighted scores which would be sample-dependent (Wainer, 1976; Cohen, 1999; Rodebaugh, Holaway, & Heimberg, 2008). In sum, two temperament factors, emotion reactivity and activity-level, were created from composite scores in the pooled sample, and further explored in subsequent multivariate analyses (Figure 1).

Results

Preliminary Analyses. An examination of missing values revealed that for the integrated sample, about 2 percent of data had missing values with the exception of one variable, maternal negative emotionality, which had 9 percent missing values due to a delay in adding it to the sample 3 protocol in the original data collection. Consequently, data for this variable could not be assumed to be missing at random, and thus systematic differences in missing data prevented any form of imputation (Little & Rubin, 2002; Blozis et al., 2013). Participants with missing data on this variable were not included in the analyses that followed. Primarily, variables were normally distributed and although some showed skewness or kurtosis, multivariate normality was not substantially violated.

Sample Differences. Descriptive statistics and coefficient alpha reliabilities for the measured variables are shown in Table 4. A series of one-way analyses of variance was performed to examine mean differences among the three samples with Bonferroni's correction applied to follow-up comparisons; only sample differences at $p < .001$ are reported. Mothers in sample 3 rated themselves as less *punitive* than those in samples 1 and 2, $t(365) = -8.27$, $t(372) = -9.06$, respectively; the latter two samples did not differ significantly on *punitive* parenting. Mothers in sample 3 rated themselves as more *critical* than those in sample 1, $t(365) = 4.37$, who in turn, rated themselves as more *critical* than those in sample 2, $t(257) = 6.19$. Mothers in sample 2 rated themselves as more *positive* than those in sample 3, $t(372) = 4.90$, and slightly more *positive* than mothers in sample 1, $t(365) = 2.46$, $p < .01$ (below the Bonferroni criterion); mothers in samples 1 and 2 did not differ significantly on ratings of *positive* parenting. *Family* *socioeconomic stress* was higher in sample 1 than in sample 3, as indicated by lower scores on all four components, smallest $t(356) = 6.19$; differences between samples 2 and 3 were evident in parental education levels with lower scores in sample 3 relative to sample 2 on maternal and paternal education levels, smaller $t(344) = 4.60$. *Family structural stress* did not differ across samples, with the exception of number of children under age 7, which was higher in sample 3 than in samples 1 and 2, $t(365) = 4.13$, $t(372) = 4.85$, respectively. Furthermore, children in sample 2 evidenced higher levels of *IP* than did children in sample 3, $t(361) = 3.95$; children in sample 1 did not differ significantly from those in samples 2 or 3. In contrast, children in sample 1 evidenced higher levels of *EP* than did children in sample 2, $t(255) = 4.05$, whereas children in sample 3 did not differ significantly from those in samples 1 or 2. Finally, children in sample 2 evidenced significantly lower *activity-levels* than did children in samples 1 and 3, t(236) = -13.95 and t(354) = -14.09, respectively; children in samples 1 and 3 did not differ significantly. In summary, sample heterogeneity, which was evidenced via differences on several measured variables, provided support for use of an integrative approach to obtain a more heterogeneous sample (Curran & Hussong, 2009; Mills et al., 2012).

Correlations among Variables. Zero-order correlations among variables were computed and are summarized in Table 5 for the integrated sample. As shown in Table 5, children with elevated EP were significantly more active and emotionally reactive ($r = .34$, $p < .01$), and had mothers who reported higher levels of negative emotionality ($r = .23$, $p < .01$), and whose parenting was less positive ($r = -.16$, $p < .01$), more critical ($r = .23$, $p < .01$), and more punitive ($r = .34$, $p < .01$). These children also tended to live in families with higher levels of socioeconomic stress ($r = -.21$, $p < .01$). Interestingly, elevated EP was associated with higher levels of IP ($r = .53$, $p < .01$), which in turn, was correlated with increased emotion reactivity ($r = .29$, $p < .01$) and activity-level ($r = .12$, $p < .01$), greater maternal negative emotionality ($r = .24$, $p < .01$), as well as more punitive ($r = .12$, $p < .01$), critical ($r = .16$, $p < .01$), and less positive parenting ($r = -.16$, $p < .01$). IP was further correlated with greater familial socioeconomic and structural stress ($r = -.12$, $p < .01$; $r = -.35$, $p < .01$). Mothers reporting more negative emotionality or greater socioeconomic stress used parenting practices that were significantly less positive ($r = -.18$, $p < .01$; $r = .10$, $p < .05$) and more punitive, respectively ($r = .30$, $p < .01$; $r = -.10$, $p < .05$); maternal negative emotionality was also significantly associated with more critical parenting practices ($r = .22$, $p < .01$). Finally, positive parenting was negatively related to both critical ($r = -.13$, $p < .01$) and punitive parenting ($r = -.28$, $p < .01$), which were positively related to each other ($r = .37$, $p < .01$).

Objective 1: Predicting Early-Onset Externalizing Problems

The first objective was to determine the extent to which the following theoretically-linked, multilevel factors were concurrently predictive of EP at preschool age; factors included family SES, maternal negative emotionality, parenting (punitive, critical, positive), child IP, and temperament (emotion reactivity, activity-level). To investigate the multi-level predictors of early-onset EP, a series of hierarchical regressions was computed controlling for family SES, child sex, and child age. Order of entry was as follows: Step 1: Family SES, Step 2: Child sex and child age, Step 3: Temperament/IP and/or parental predictors.

When both temperament variables were entered simultaneously with punitive, critical, and positive parenting, results demonstrated that in addition to activity-level and emotion reactivity, family SES and all three parenting variables were significant predictors of preschool EP (Table 6). More specifically, heightened EP was predicted by elevations in both activity-level and emotion reactivity, as well as by lower family SES, less positive parenting, and more punitive, critical parenting.

Temperament factors were subsequently entered in separate regression analyses in order to explore the relative differences in the significance of parenting variables. Analogous results for both emotion reactivity and activity-level indicated that each was a significant predictor of heightened EP, in conjunction with lower family SES, and more punitive, critical, less positive parenting. In analyses with emotion reactivity, younger age further accompanied the aforementioned variables as a significant predictor of heightened EP (Table 7).

Similar to emotion reactivity in children, findings demonstrated that higher levels of negative emotionality in mothers predicted heightened EP when entered with punitive, critical, and positive parenting; specifically, greater maternal negative emotionality, in conjunction with less positive, more punitive, critical parenting, as well as lower family SES, and child female sex simultaneously predicted higher levels of child EP (Table 8). When entered with one or both temperament factors and the three parenting variables, however, maternal negative emotionality failed to reach significance as a predictor of child EP.

Hierarchical regressions with IP were also computed to investigate the predictive capacity of internalizing behaviour and thus the potential for comorbid behaviour problems.

Given the theoretical overlap between IP and emotionality, emotion reactivity was also included in these analyses to determine the unique contribution of each variable to early emerging EP. When tested simultaneously with parenting variables, results revealed that both IP and emotion reactivity were significant predictors of heightened EP in conjunction with lower SES, younger child age, and either more critical, less positive parenting or more punitive parenting (Table 9).

Objective 2: Interactive Effects Predicting Early-Onset Externalizing Problems

The second objective was to elucidate the interactive contribution of children's early characteristics and environmental influences to concurrent levels of EP, or the ways in which family SES and/or parental behaviours moderated the expression of IP, emotion reactivity, and/or activity-level to contribute to early emerging EP at preschool age. The hypothesis that parenting would moderate the effects of temperament on EP was investigated via a series of regression analyses in which entry of individual parent/child predictors preceded the entry of their corresponding interaction term. More specifically, hierarchical regressions controlling for child age and sex were completed in a four-step manner, with parent and temperament/behavioural predictors entered in step three, followed by their interaction term in step four. Order of entry was as follows; Step 1: Family socioeconomic stress, Step 2: Child sex and child age, Step 3: Temperament/IP and/or parenting predictors, Step 4: Interaction term.

With the exception of one, all analyses were non-significant indicating no moderating effects by activity-level for the interaction with positive, critical, and punitive parenting, or by emotion reactivity for interactions with positive and critical parenting. Moderating effects were evident, however, for the interaction between emotion reactivity and punitive parenting (Figure 2); in addition to a significant interaction effect, lower socioeconomic stress, and younger child age were significant individual predictors of heightened EP (Table 10). To interpret the interaction effect, the slope of emotion reactivity was computed at high and low values of punitive parenting (Jaccard, Turrisi, & Wan, 1990; Karreman et al., 2010), and simple slope analyses were conducted using the Johnson-Neyman (J-N) technique; this technique identifies regions in the range of the moderator (i.e., punitive parenting) where the effect of the focal predictor (i.e., emotion reactivity) on the outcome (i.e., child EP) is significant and the critical value above which it becomes non-significant (Hayes & Matthes, 2009). Simple slope analyses indicated that for highly emotionally reactive children, more punitive parenting was particularly harmful and predicted significantly greater levels of EP relative to highly emotionally reactive children who experienced less punitive parenting (Figure 2; J-N significance region = 1.79, gradient of simple slope = 1.36, $t(463) = 1.97$, $p < .05$).

Additional analyses revealed a similar pattern with respect to the effect of family socioeconomic stress on children with heightened IP or emotion reactivity. Upon further investigation of child by environment interactions, family socioeconomic stress emerged as a significant moderator of both emotion reactivity and maternal ratings of child IP (Tables 11, 12). Analyses indicated that that family socioeconomic stress was particularly deleterious for children with elevations in IP or emotion reactivity, such that in conditions of greater familial socioeconomic stress, these children experienced significantly higher levels of EP relative to those in environments with less socioeconomic stress (Figures 3, 4; J-N significance region = 1.88, gradient of simple slope ≤ .26, $t(491) = 2.59$, $p < .01$; J-N significance region = 1.45, gradient of simple slope = 1.51, $t(465) = 1.97$, $p < .05$).

Given similarities between emotion reactivity and the expression of IP, a final regression was conducted in which both were entered in step 3, followed by their interaction term in step 4 (i.e., IP x emotion reactivity). In addition to family socioeconomic stress, analyses revealed that the interaction between IP and emotion reactivity was significant over and above that of their individual contributions (Table 13). While emotion reactivity had minimal effects at high levels of IP, for children with low IP, heightened emotion reactivity predicted significantly greater levels of EP than for less emotionally reactive children (Figure 5; J-N significance region = 3.28, gradient of simple slope = .24, $t(464) = 1.97$, $p < .05$).

Objective 3: Mediation Effects on Early-Onset Externalizing Problems

Objective 3 was to explore direct and indirect effects of child and environment variables on the early emergence of EP at preschool age.

3a. Indirect Effects of Maternal Negative Emotionality and Family SES via Parenting. The first part of the third objective entailed elucidating the role of parenting behaviour (punitive, critical, positive) in mediating associations between child EP and both maternal negative emotionality and family socioeconomic stress.

The hypotheses that maternal negative emotionality and family socioeconomic stress would be associated with EP through their impact on parenting were tested by examining indirect effects, estimated as the product of path coefficients linking the independent variable to the mediator(s) and linking the mediator(s) to the dependent variable (Preacher & Hayes, 2008).

Estimates of all paths in both simple and multiple mediation models were investigated in SPSS 20.0 using OLS regression methods to produce Sobel tests (or normal theory tests; Sobel, 1982; 1986; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) of total and specific indirect effects, as well as bootstrap confidence intervals (CI) for the indirect effects. Bootstrapping, a nonparametric resampling procedure, involves taking multiple random samples of observations from the original sample via replacement, and analyzing them to provide a distribution of parameter estimates. As bootstrapping does not impose the assumption of normality on the sampling distribution, distributions of parameter estimates tend to be skewed (Bollen & Stine, 1990; Lockwood & MacKinnon, 1998; MacKinnon et al., 2002); bias-corrected and accelerated confidence intervals were thus computed and reported for the present study (Efron & Tibshirani, 1993, MacKinnon, Lockwood, & Williams, 2004; Williams & MacKinnon, 2008; Hayes & Scharkow, 2013). Significant multiple mediation analyses with latent temperament constructs were also modeled in Stata 12 to provide a graphical depiction of the variables and to obtain supplementary information about the strength of model fit.

Indirect effects are shown in Figure 6 by the paths to child EP from maternal negative emotionality through less positive parenting and through highly punitive parenting. To test the significance of these results, the bootstrapping method was used to estimate the effects of the indirect pathways from maternal negative emotionality to positive parenting and to punitive parenting, and finally from positive and punitive parenting to child EP (Preacher & Hayes, 2008). As shown in Table 14, the 95% bias-corrected and accelerated confidence intervals for the indirect pathways did not contain zero, and were thereby indicative of significant mediation effects (Hayes, 2009). The bootstrapping method was also implemented to estimate the effects of the indirect pathways from family socioeconomic stress to positive parenting and to punitive parenting, and finally from positive and punitive parenting to child EP (Figure 7; Preacher & Hayes, 2008). Similar to the aforementioned findings and as shown in Table 15, the 95% bias-corrected and accelerated confidence intervals for the indirect pathways did not contain zero, and were thereby indicative of significant mediation effects by both less positive and more punitive parenting (Hayes, 2009). Because in both analyses, maternal negative emotionality and family socioeconomic stress also impacted child EP directly, results reflected partially mediated relationships, as evidenced by the significant direct effects values for each of the independent variables, respectively, on child EP (Table 15).

3b. **Indirect Effects of Temperament via Parenting.** The second part of objective 3 was to elucidate the role of parental behaviour in mediating associations between EP and child temperament. In addition to examining parenting as a mediator in links between child EP and both maternal negative emotionality and family SES, the mediating role of parental behaviour was also investigated in the context of temperament. These analyses served to elucidate the direct and indirect effects of parental behaviour to relations between child EP and both emotion reactivity and activity-level. Implementation of the bootstrapping method allowed for estimation of the effects of indirect pathways from emotion reactivity to punitive parenting and from emotion reactivity to positive parenting, and finally from punitive and positive parenting to child EP. As the 95% biased corrected confidence intervals generated for the respective indirect pathways did not contain zero, results were indicative of significant mediation; that is, the relationship between EP and emotion reactivity was partially mediated by both punitive parenting and positive parenting (Table 16). This is represented in Figure 8 by paths to EP from emotion reactivity via punitive parenting and from emotion reactivity via positive parenting. As the direct pathway from emotion reactivity to child EP was also significant, results were suggestive of partial mediation via punitive and positive parenting.

Mediation was similarly assessed for activity-level, however, given the absence of a significant association between positive parenting and activity-level, critical parenting was used in its place. The bootstrapping method was used to estimate the effects of the indirect pathways from activity-level to punitive parenting and from activity-level to critical parenting, and finally from punitive and critical parenting to child EP. As with emotion reactivity, the 95% biased corrected confidence intervals generated for the respective indirect pathways did not contain zero and were therefore indicative of significant mediation; that is, the relationship between EP and activity-level was partially mediated by both punitive and critical parenting (Table 17). This is represented in Figure 9 by paths to EP from activity-level via punitive parenting and from activity-level via critical parenting. As the direct pathway from activity-level to child EP was also significant, results were suggestive of partial mediation via punitive and critical parenting.

3c. **Indirect Effects of Parenting via Temperament.** The third component of objective 3 was to elucidate the role of temperament (emotion reactivity, activity-level) in mediating associations between child EP and parenting.

The bootstrapping method was also used to estimate the effect of the indirect pathway from each parenting variable to emotion reactivity, and finally to child EP. In analyses with punitive parenting and with positive parenting, the 95% biased corrected confidence intervals generated for the respective indirect pathways did not contain zero, and were therefore indicative of a significant mediation effect; that is, the relationship between EP and punitive parenting was partially mediated by emotion reactivity, as was the relationship between EP and positive parenting (Table 18). Analyses were replicated with activity-level in place of emotion reactivity, and a similar pattern emerged whereby significant mediation effects were found with two of the three parenting variables, namely punitive parenting and critical parenting. For each respective variable, the bootstrapping method yielded 95% biased corrected confidence intervals estimating the effect of the indirect pathway from either punitive parenting or critical parenting to activity-level, and subsequently to child EP. As neither confidence interval contained zero, results indicated that the relationship between critical parenting and child EP was partially mediated by activity-level, as was the relationship between punitive parenting and child EP (Table 18).

Interestingly, multiple mediation analyses demonstrated that the relationship between punitive parenting and child EP was (partially) mediated not only by emotion reactivity and activity-level separately, but also by both temperament factors simultaneously. The bootstrapping method was used to estimate the effects of the indirect pathways from punitive parenting to emotion reactivity and from punitive parenting to activity-level, and subsequently, from emotion reactivity and activity-level to child EP (Preacher & Hayes, 2008). The 95% bias corrected confidence intervals for the indirect pathways were indicative of significant mediation effects as neither interval contained zero (Table 19; Hayes, 2009). This is represented in Figure 10 by paths to EP from punitive parenting via emotion reactivity and from punitive parenting via activity-level. Because the direct pathway from punitive parenting to child EP was also significant, results were suggestive of partial mediation by temperament constructs emotion reactivity and activity-level.

3d. **Indirect Effects of Internalizing Problems via Temperament.** The fourth and final component of objective 3 was to determine the role of temperament (emotion reactivity and activity-level) in mediating the association between co-occurring IP and EP. Multiple mediation analysis was conducted to investigate the direct and indirect effects of emergent IP (CBCL) on EP through emotion reactivity and activity-level. The bootstrapping method was implemented to estimate the effects of the indirect pathways from IP to emotion reactivity and from IP to activity-level, and subsequently, from emotion reactivity and activity-level to child EP (Preacher & Hayes, 2008). Similar to previous findings, the 95% bias corrected confidence intervals for the indirect pathways did not contain zero, and results were thereby indicative of significant mediation effects (Table 20; Hayes, 2009). This is represented in Figure 11 by paths to child EP from IP via emotion reactivity and from IP via activity-level; as the direct pathway from IP to child EP was also significant, results were reflective of partial mediation by temperament constructs.

Objective 4: Testing Complex and Bidirectional Relationships

Evidence of bidirectional relationships (between parenting and child temperament), as well as the contribution of contextual, parental, and child-level factors suggests that more complex models testing bidirectional relations between multiple independent variables may be important in elucidating the manner in which these factors collaboratively contribute to the early emergence of EP. Objective 4 was thus to delineate the comprehensive contribution of the aforementioned variables to early-onset EP, as well as the nature of their relationships to each other (i.e., directionality).

More complex pathways to EP from the aforementioned multilevel factors were tested in Stata 12 via SEM analyses, in which model fit was evaluated on the basis of standardized path coefficients and the following indices; model Chi-squared, comparative fit index, (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). For robust SEM analyses, sample size is recommended to be greater than 100, with at least 10 observations for each parameter being estimated. Thus, the integrated sample of 462 would support 45 to 55 parameters and is more than sufficient for robust analyses. While traditional power analyses do not apply to SEM, power estimates can be computed based on regression techniques (Biostat, Inc; Kline, 2011; Acock, 2013). With alpha = .05, sample size ranging from 380 to 500 (allowing for missing data), and 10 to 30 predictors in a model, power = 1.00 to detect even small to moderate effect sizes (R^2 = .07 to .14). Accordingly, multiple models were created to investigate paths to EP from family SES, parenting, and temperament, as well as their relationships with each other.

The results presented below describe models in which emotion reactivity and activity-level were first examined separately, and subsequently together in the final two integrative models. To examine reciprocal relations between temperament and parenting in the prediction of EP, SEM was used to test two corresponding models with each temperament construct independently; the first with the hypothesized path from parenting to either emotion reactivity (4a) or activity-level (4b), and the second with the inverse of the hypothesized path from emotion reactivity or activity-level to parenting. Consequently, the final two integrative SEM models (4c) included both emotion reactivity as well as activity-level, the first of which had pathways from parenting to each temperament construct, while the second included pathways from temperament constructs to parenting variables.

4a. Models with Emotion Reactivity. To explore the relationship between emotion reactivity and parenting, an initial model was constructed with paths to EP from family socioeconomic stress, punitive parenting, positive parenting, and emotion reactivity, as well as paths to emotion reactivity from both punitive and positive parenting. Given the relationship between punitive and positive parenting both theoretically and statistically, a curved path (or covariance) is depicted in the model connecting the two variables (Figure 12). Results demonstrated that this model fit the data well, as indicated by the non-significant model Chi-squared value, χ^2 (9) = 11.23, p = 0.26, as well as the goodness-of-fit-indices, CFI = .993, TLI = .984, RMSEA = .023, SRMR = .019, and significant standardized path coefficients. Although maternal negative emotionality was initially included in tests of this model, as well as in all subsequent SEM models, the corresponding path coefficients from maternal negative emotionality to punitive parenting and to positive parenting failed to reach significance, likely due to the presence of family SES with analogous pathways to parenting. For this reason, maternal negative emotionality was excluded from all models depicted below (See Appendices B–H for corresponding SEM models with maternal negative emotionality). It is interesting to note, however, that the presence of maternal negative emotionality did not appear to affect goodness-of-fit, as all models tested fit the data reasonably well as indicated by the aforementioned fit indices (See Appendices B–H).

Based on evidence reflecting bidirectional relationships between temperament and parenting factors, a second SEM model with inverse paths from emotion reactivity to punitive parenting, and from emotion reactivity to positive parenting was tested in which all other paths were held constant (Figure 13). Findings supported a similar pattern whereby the model Chi-squared statistic was non-significant, χ^2 (9) = 10.99, p = .28, goodness-of-fit indices met conventional criteria for "good model fit", CFI = .994, TLI = .986, RMSEA = .022, SRMR = .018, and all standardized path coefficients were significant (see Table 21).

In addition to reciprocal relationships, these models provided further evidence of partial mediation as described in the above mediation analyses. In the above two SEM models, family socioeconomic stress was linked to EP both directly, and indirectly through either punitive parenting or less positive parenting. Consistent with multiple mediation analyses, when the direct pathway to EP from family socioeconomic stress was removed, model fit was markedly poorer and thereby reflective of partially mediating relationships between EP and family socioeconomic stress by way of punitive parenting or by way of less positive parenting. Upon removal of this path, poor model fit was evidenced in each of the two models (i.e., Emotion Reactivity Model and Inverse Emotion Reactivity Model), respectively, via significant model Chi-squared values, χ^2 (10) = 32.87 and 33.36, $p < .001$, as well as higher RMSEA values (.070 both models), and lower TLI values (.855 and .852 respectively). In addition to family socioeconomic stress, punitive parenting also appeared to affect EP both directly and indirectly through emotion reactivity. Similarly, removal of the direct path to EP from punitive parenting resulted in poorer model fit, as indicated by significant model Chi-squared values, χ^2 (10) = 38.50 and 38.15, $p < .001$, higher RMSEA values (.078, .077), and lower TLI values (.820, .822) respectively (Table 21).

4b. Models with Activity-Level. Analogous SEM models were created to explore relationships between family socioeconomic stress, parenting, and activity-level in the context of child EP. In these models, activity-level replaced emotion reactivity as a latent temperament factor and all remaining paths, including the covariance between punitive parenting and positive parenting, were identical to those described above. The first model tested included paths to EP from family socioeconomic stress, punitive parenting, positive parenting, and activity-level, as well as paths to activity-level from punitive parenting and from positive parenting (Figure 14). Tests of this model reflected a strong fit with the data, as indicated by a non-significant model Chi-squared statistic, χ^2 (22) = 28.83**,** $p = .15$, the aforementioned goodness-of-fit indices, CFI = .985, TLI = .975, RMSEA = .026, SRMR = .030, and significant standardized path coefficients for all but the path linking positive parenting to activity-level (Table 21).

A second SEM model, with the inverse path from activity-level to punitive parenting, as well as with paths to EP from family socioeconomic stress, punitive parenting, and activity-level yielded a similar pattern of results (Figure 15). As in the previous model, this model also met criteria for "good fit" as indicated by the non-significant model Chi-squared statistic, χ^2 (22) = 29.50, p = .13, fit indices, CFI = .983, TLI = .973, RMSEA = .027, SRMR = .031, and significant standardized path coefficients, with the exception of one path, from activity-level to positive parenting (Table 21).

4c. Integrative Models. Given their statistical interrelationship in the current study, as well as empirical evidence of a consistent link between emotion reactivity and activity-level, a final pair of SEM models was tested that included both of these biologically-based dimensions of temperament (Figure 16). Depicted in the first model are the hypothesized paths linking EP to emotion reactivity and activity-level directly, and linking EP to punitive parenting and positive parenting both directly and indirectly via temperament. As each of the two temperament dimensions and parenting variables are theoretically and statistically correlated with each other, covariances are shown connecting emotion reactivity to activity-level, and connecting punitive parenting to positive parenting. Further hypothesized paths included those from family socioeconomic stress to punitive parenting and to positive parenting, as well as from family socioeconomic stress to EP directly.

In summary, this model included direct paths to child EP from family socioeconomic stress, punitive and positive parenting, and emotion reactivity and activity-level, paths to emotion reactivity from punitive and positive parenting, paths to activity-level from punitive and positive parenting, as well as paths from family socioeconomic stress to punitive and positive parenting.

Results demonstrated that this model fit the data reasonably well as indicated by the following fit-indices, all of which met conventional criteria for "good" model fit, χ^2 (45) = 62.90, $p < .05$, CFI = .973, TLI = .960, RMSEA = .029, SRMR = .037, and significant standardized coefficients for all hypothesized paths (Table 21). As indicated by the non-significant path between positive parenting and activity-level, these dimensions did not appear to be related, while in contrast, punitive parenting and activity-level were strongly associated, as were punitive parenting and emotion reactivity, and to a lesser degree, low positive parenting and emotion reactivity. In accordance with hypotheses, the addition of paths from family socioeconomic stress to emotion reactivity and/or to activity-level resulted in non-significant path coefficients and poorer model fit for both temperament constructs alike.

Based on evidence from the prior SEM models supporting bidirectional relationships between temperament and parenting variables, a final model was tested with inverse paths from emotion reactivity to punitive and positive parenting, and from activity-level to punitive and positive parenting (Figure 17). Depicted in this model are paths to EP from emotion reactivity and activity-level, paths to EP from punitive parenting and from positive parenting, as well as paths from emotion reactivity to punitive and positive parenting, and paths from activity-level to punitive and positive parenting. As previously discussed, covariances between each of the two temperament and parenting variables are also depicted, in addition to paths from family socioeconomic stress to punitive and positive parenting, as well as from family socioeconomic stress to EP directly. In summary, this model included direct paths to child EP from family socioeconomic stress, punitive and positive parenting, and emotion reactivity and activity-level, paths to punitive parenting from emotion reactivity and activity-level, paths to positive parenting from emotion reactivity and activity-level, as well as paths from family socioeconomic stress to punitive and positive parenting.

Similar to the previous findings, results demonstrated that this model also fit the data reasonably well as indicated by the following fit-indices, all of which met conventional criteria for "good" model fit, χ^2 (45) = 63.45, $p < .05$, CFI = .972, TLI = .959, RMSEA = .030, SRMR = .038, and significant standardized coefficients for all hypothesized paths (Table 21). As in the models above, the pathway from activity-level to positive parenting was non-significant while in contrast, pathways from emotion reactivity to positive parenting, and pathways to punitive parenting from both activity-level and emotion reactivity were highly significant.

Discussion

The goal of the present study was to delineate concurrent developmental pathways to early-onset EP, and ultimately, to test a bioecological model of the emergence of EP from familial, parental, and child-level factors. Through the use of integrative data analysis (e.g., Curran & Hussong, 2009), three independent Canadian samples were integrated to create a large, heterogeneous, diverse sample of preschool children and their mothers. In order to determine the nature of the relationships among relevant multilevel factors, analyses were conducted that included moderation, mediation, and structural equation modeling with tests of reciprocal relations. Counter to hypotheses that child by environment interactions (e.g., parenting x temperament) would contribute significantly to the early emergence of EP, all such analyses with the exception of one were non-significant. However, results did reflect evidence of moderation by punitive parenting in the context of emotion reactivity, and further suggested that for highly emotionally reactive children, more punitive parenting was particularly harmful and predicted significantly greater levels of EP relative to highly emotionally reactive children who experienced less punitive parenting. A similar pattern was revealed with respect to the moderating effects of family socioeconomic stress on children with heightened emotion reactivity or IP. As with punitive parenting, results suggested that family socioeconomic stress was particularly deleterious for children with elevated emotion reactivity or IP, such that in conditions of greater familial socioeconomic stress, these children experienced significantly higher levels of EP relative to those in environments of lower socioeconomic stress.

That is, it appears that environmental stress exacerbated child IP and emotion reactivity, resulting in higher levels of EP than would be experienced by those children in environments of lower family socioeconomic stress. Such findings add to a growing body of literature documenting the significant contribution of child by environment interactions to adjustment problems throughout childhood (e.g., Rubin, Cheah, & Fox, 2001; Rubin, Burgess, & Hastings, 2002; Degnan, Henderson, Fox, & Rubin, 2007; Hane, Cheah, Rubin, & Fox, 2008; Engle & McElwain, 2010). In addition to punitive parenting, results suggest that children with tendencies toward IP and emotion reactivity may also be particularly sensitive to environments characterized by high levels of familial stress.

Evidence of a significant interaction between IP and emotion reactivity not only served to differentiate these conceptually related constructs, but also provided support for differential susceptibility theories of temperament (e.g., Rothbart, Ahadi, Hershey, 1994; Kagan, Snidman, Zetner, & Peterson, 1999; Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Hirshfeld-Becker et al., 2008). Accordingly, while emotion reactivity exerted minimal effects at high levels of IP, for children with low IP, heightened emotion reactivity predicted significantly greater levels of EP than for less emotionally reactive children. Consequently, it appears that the effect of certain temperament traits on early behaviour may be more pronounced and/or more apparent for children with lower levels of IP than for those with higher IP who seem to experience increased EP regardless of differences in emotion reactivity. In this way, the current findings also support previous research documenting the co-development of internalizing and externalizing problems during early childhood (Gjone & Stevenson, 1997; Campbell, Gilliom, & Shaw, 2004; Oland &

Shaw, 2005; Bub et al., 2007). However, longitudinal evidence is required to address potential divergence in symptom trajectories across later childhood and adolescence.

In addition to moderation, further results targeted potential indirect relationships between EP and both maternal negative emotionality and family socioeconomic stress via parenting behaviour. Consistent with hypotheses, results revealed that punitive parenting and less positive parenting served to partially mediate associations between EP and maternal negative emotionality as well as between EP and family SES. These findings add to a growing body of literature documenting the mediating role of parenting in linking familial and/or maternal characteristics to child EP. Consistent with previous studies (e.g., Jackson, Choi, & Bentler, 2009; Choe, Sameroff, & McDonough, 2013; Yan & Dix, 2014), results suggest that psychologically vulnerable parents, or those displaying greater levels of stress and/or negative emotionality, may be more inclined to use maladaptive parenting strategies that are more punitive in quality and lower in warmth. Such parental behaviour, in turn, appears to contribute directly to the early emergence of EP in preschool children.

While parental behaviour served to mediate associations between child EP and both maternal negative emotionality and family SES, parenting also mediated associations between EP and child temperament characteristics. More specifically, results demonstrated that the relationship between child EP and emotion reactivity was partially mediated by more punitive and less positive parenting, whereas the association between child EP and activity-level was partially mediated by more punitive and critical parenting. These results were consistent with hypotheses and with research suggesting that parenting behaviours represent proximal processes that exert direct effects upon children's development, particularly during the early childhood period when parents serve as primary agents of socialization (e.g., Wood et al., 2003; Rubin, Burgess, Hastings, 2004; Hastings & De, 2008; Mills et al., 2012). Results from our study not only provide evidence of the maladaptive effects of punitive, critical parenting on children's behaviour, but also the salience of positive parenting. Results further suggest that the relative absence of warm parenting exerts an equally detrimental effect that is distinguishable from the presence of highly negative parenting. Differentiation of these parenting constructs extends the current literature by delineating the independent contributions of negative (punitive, critical) parenting, as well as the absence of positive parenting to children's behavioural outcomes.

Of further importance and consistent with hypotheses was evidence of bidirectional relationships between parenting and temperament with respect to their significant contribution to child EP both directly and indirectly. Whereas relationships between child EP and emotion reactivity or activity-level were partially mediated by punitive parenting, the relationship between child EP and punitive parenting was also partially mediated by emotion reactivity and activity-level. Convergent findings were revealed via SEM analyses in which models with pathways from parenting to temperament were tested, as well as models with inverse pathways from temperament to parenting. More specifically, significant path coefficients were evidenced in SEM models with pathways from punitive parenting and positive parenting to emotion reactivity, and subsequently to child EP, as well as with the corresponding inverse pathways from emotion reactivity to punitive parenting and to positive parenting, and subsequently to child EP. With the exception of one non-significant path, results were replicated in SEM models with activity-level in place of emotion reactivity. While path coefficients linking positive parenting and activity-level failed to reach significance in both models, significant pathways were evidenced from punitive parenting to activity-level, and then to child EP, as well as the corresponding inverse pathway from activity-level to punitive parenting, and subsequently to child EP. Moreover, results demonstrated that all of the four aforementioned models fit the data well.

Together, these findings add to a body of evidence that is consistent with bioecological systems and transactional models in which developmental outcomes are conceptualized as ongoing transactions between the child and proximal influences within his/her immediate social environments (Bronfenbrenner & Morris, 1998; 2006; Sameroff, 2009; 2010). While maladaptive parenting appears to play a pivotal role in shaping children's early emotional and behavioural styles, children with tendencies toward over-activity or emotion reactivity may pose unique challenges to caregivers and thereby elicit more negative reactions from parents in the form of punitive, critical, and/or less positive parental behaviour. In this way, dispositional characteristics of the child shape the nature and quality of parental behaviour, while parental behaviour, in turn, shapes the nature and expression of child temperament and associated behavioural patterns.

In addition to bidirectional relations between temperament and parental behaviour, results revealed that parenting was influenced directly by family SES, such that socioeconomic disadvantage contributed to more punitive, less positive parenting, which in turn, predicted child EP both directly and indirectly via activity-level and emotion reactivity. The finding that family SES did not influence temperament directly, but did so indirectly via parenting is consistent with the current literature (Jackson et al., 2009; Kingston et al., 2013, Paterson et al., 2015) and further delineates the significance of punitive parenting, as well as the absence (or low levels) of positive parenting particularly for highly emotionally reactive children. As previously discussed, such findings suggest that punitive parenting and the absence of positive parenting represent two distinct dimensions rather than opposite ends of a single continuum, each of which directly affects the expression of certain temperament characteristics, and in turn, contributes to early emerging externalizing behaviour. The non-significant path from positive parenting to activity-level, however, may reflect differential effects of parental behaviour as a function of specific dispositional attributes in children. Although further investigation is required, differences in the relative magnitude of parental behaviour suggest that the absence of positive parenting may be particularly deleterious for highly emotionally reactive children with tendencies toward dysregulated negative affectivity. Relative to their same-aged peers, these children may be more reliant on parents or caregivers to help regulate negative emotions given a constitutional vulnerability toward heightened physiological reactivity, and thus, the experience and expression of intense negative affect. The absence of warm, supportive parenting may impede children's acquisition of self-regulatory skills, which in turn, may manifest in the form of externalizing behaviour, particularly during early childhood when verbal expression may be compromised by immature speech and language abilities (Choe et al., 2013; Denham et al., 2014; Chen et al., 2014).

It is also interesting to note that while family SES was linked to temperament only indirectly via parenting, its impact on child externalizing behaviour was direct and robust. Such findings not only provide empirical support differentiating temperament and problem behaviour as separable dimensions, but also reflect the magnitude of the effects of family socioeconomic factors on children's behaviour as early as the preschool years. The impact of socioeconomic disadvantage on child development and behavioural outcomes is well established (Entwisle et al., 2005; Gershoff et al., 2007; Jackson et al., 2009; Paterson et al., 2015), however, our results shed light on potential mechanisms by which contextual factors may influence young children indirectly. Despite initial evidence linking maternal negative emotionality to child EP via parental behaviour, the effects of maternal negative emotionality on parenting were rendered non-significant when tested simultaneously in SEM models with family socioeconomic stress; consequently, results suggested that parenting quality was more strongly influenced by socioeconomic disadvantage, which exerted consistent and robust effects on the provision of highly punitive and less positive parental behaviour. Accordingly, in families with elevated levels of socioeconomic stress, mothers may be more likely to implement ineffective parenting practices characterized by harsh discipline and low warmth or sensitivity (Choi & Bentler, 2009; Kiff et al., 2011; Kingston et al., 2013). Maladaptive parental interactions with offspring may be further exacerbated by temperament characteristics of the child that likely become more ingrained in the absence of warm, responsive parenting and/or the presence of punitive parenting, the combination of which appears to be particularly deleterious for highly emotionally reactive children.

In summary, the findings from the present study add to a growing body of literature that reflects the complex interplay between multilevel factors in contributing to the early emergence of problem behaviour during the preschool period. Evidence of child by environment interactions is consistent with current theory and research, and suggests that the expression of certain temperament characteristics and behaviour patterns may be moderated by such external factors as family socioeconomic stress and punitive parenting. It appears that children with tendencies toward high emotion reactivity and/or internalizing behaviour problems may be particularly vulnerable to such environmental factors and increasingly likely to exhibit heightened levels of EP in the presence of punitive parenting and/or familial stress. Unlike emotion reactivity, results failed to provide evidence of significant interactions between activity-level and environmental factors (e.g., parenting, family SES); while this is consistent with other studies failing to document significant interactions (Bates & Petit, 2007) between parenting and related temperament constructs, this may also be reflective the strength of the direct relationship between activity-level and early-onset EP. While the absence of such moderating effects cannot be attributed to a lack of power given the large sample size, results suggest that in early childhood, separate, individual factors, such as activity-level, may be sufficient by themselves to increase or decrease the risk of EP (Mills et al., 2012).

In conjunction with the aforementioned interactive effects, evidence of bidirectional relationships between parenting and temperament, as well as direct and indirect links between family SES and child EP via more punitive, less positive parenting further reflects the complexity of interrelations between multiple variables at multiple levels, and in multiple social subsystems. Together, such findings provide further support for a bioecological systems perspective and transactional model of development (Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 1998; Sameroff, 2009; 2010; Kuczynski & De Mol, 2015) that implicate a chain of reciprocating influences leading from socioeconomic factors at the family level to the psychological resources of parents, the quality of parenting, and children's dispositional characteristics to such developmental outcomes as early-onset EP (Conger & Dogan, 2007; Mills et al., 2011). In this way, familial and parental factors may contribute to the emergence of EP via multiple pathways, and ongoing bidirectional and transactional processes.

Despite the contributions of these findings, some limitations must also be considered. Given differences in assessment instruments administered to participants in each of the three independent samples, the measures in the current study were primarily constructed by selecting individual items that were parallel in content across questionnaires. In this way, measurement error was likely inflated and findings may thus represent an underestimate of the relations that exist. In addition to inflated measurement error, it is also likely that restricted variance associated with parenting variables, and particularly with negative parenting constructs, undermined the strength of the relationships between family socioeconomic stress and punitive, critical parenting. Further limitations stem from the cross-sectional nature of the study's design and reliance on data based solely on maternal report. Consequently, causal directions of the present results must be interpreted cautiously and without inferences as to their generalizability to fathers. While the use of a single source of information may not account entirely for the pattern of relations found, findings should be replicated in future longitudinal studies beginning in early childhood, with multiple informants, and different methods of measurement. This may result in a more comprehensive understanding of the relevant pathways and mechanisms implicated in trajectories of early emerging EP over time, as well as the ways in which these factors may serve to exacerbate and/or ameliorate problem behaviour across the preschool and school age periods. Extending this research to clinical and community-based samples across a range of neighbourhood (e.g., urban, rural), and familial environments (low-to-high SES, single parent, two-parent homes) may also provide important information delineating pathways of risk.

Despite these limitations, results from the present study have important implications. In addition to further demonstrating the power and efficacy of integrative data analysis, findings reflect the advantages conferred by combining complementary samples to investigate complex developmental questions and models. The consistent and robust effects of family socioeconomic stress on child EP both directly and indirectly via parenting suggest that lower SES families may benefit from preventative interventions designed to enhance the quality of parent-child interactions and the provision of warm, responsive parenting and effective discipline techniques. This may be especially important for families with histories of maternal depression and/or with offspring who display early patterns of over-activity, emotion reactivity, and/or internalizing behaviour given the unique challenges posed by these children. While further longitudinal studies are clearly warranted, the current findings point to the clinical utility of targeting parental behaviour in at-risk families in order to reduce the emergence of early-onset EP in preschool children and to help support vulnerable families.

Table 1. Demographic Characteristics of the Individual and Integrated Samples

Characteristics	Sample 1 (N = 126) % or *M*	Sample 1 (N = 126) N or *SD*	Sample 2 (N = 133) % or *M*	Sample 2 (N = 133) N or *SD*	Sample 3 (N = 241) % or *M*	Sample 3 (N = 241) N or *SD*	Integrated (N = 500) % or *M*	Integrated (N = 500) N or *SD*
Child age (years)	4.11	1.23	3.50	.76	4.10	.26	3.95	.80
Child gender								
Boys	48.4%	61	45.9%	61	54.4%	131	50.6%	253
Girls	51.6%	65	54.1%	72	45.6%	110	49.4%	247
Maternal age	30.69	3.31	35.32	5.11	34.98	5.62	34.14	5.40
Maternal Education								
Below high school	27.0%	34	.0%	0	.4%	1	7.0%	35
Completed high school	39.7%	50	12.0%	16	15.4%	37	20.6%	103
Community college	24.6%	31	26.3%	35	48.1%	116	36.4%	182
Undergraduate degree	7.9%	10	42.1%	56	32.8%	79	29.0%	145
Graduate/Professional	.8%	1	19.5%	26	3.3%	8	7.0%	35
Family Income ($)								
0 – 10 000	7.1%	9	.0%	0	.9%	2	2.3%	11
10 001 – 20 000	16.7%	21	6.2%	8	8.6%	20	10.1%	49
20 001 – 30 000	15.9%	20	4.7%	6	7.3%	17	8.8%	43
30 001 – 40 000	10.3%	13	9.3%	12	10.3%	24	10.1%	49
40 001 – 60 000	28.6%	36	17.8%	23	26.3%	61	24.6%	120
60 001 – 74 999	12.7%	16	14.0%	18	14.2%	33	13.8%	67
75 000 or more	8.7%	11	48.1%	62	32.3%	75	30.4%	148

Notes. Sample 1: Concordia Project; Sample 2: Preschool Adjustment; Sample 3: Shame in Childhood; Integrated: Pooled Sample.

Table 2. Assessment Instruments by Sample

Construct	Measure(s)
Behaviour Problems Internalizing/Externalizing	**All:** Child Behavior Checklist (CBCL)
Temperament Emotion Reactivity, Activity-Level	**S1:** Emotionality Activity, Sociability Temperament Survey (EAS) **S2, S3:** Child Behavior Questionnaire (CBQ)
Parenting Punitive, Critical, Positive	**S1:** Parenting Scale, Parenting Dimensions Inventory, Parenting Stress Index **S2:** Child-Rearing Practices Report, Responses to Children's Emotions **S3:** Parenting Styles and Dimensions Questionnaire
Maternal Emotionality Negative	**S1, S3:** EAS-Adult **S2:** Positive and Negative Affect Scales (PANAS)
Socioeconomic Stress Family SES	**All:** Income, Education (Mother/Father), Occupational Prestige

Notes. **S1**: Sample 1 (Concordia Project), **S2**: Sample 2 (Preschool Adjustment), **S3**: Sample 3 (Shame in Childhood).

Table 3. Instruments Used to Create Parallel Measures Across Samples

	Sample 1	Sample 2	Sample 3
Temperament			
Activity-Level	Prefers quiet, inactive games R	Doesn't care for quiet games	Prefers quiet activities R
	Very energetic	Worked up after exciting event	Full of energy
	Off and running	Trouble sitting still	Tends to run rather than walk
	Always on the go	Shifts quickly from activities	Always in a hurry
	Moves slowly R	Moves on without completing task	Moves actively when playing
Emotion Reactivity	Tends to be emotional	Tends to stay upset	Tends to stay upset
	Gets upset easily	Cheers up quickly R	Cheers up quickly R
	Reacts intensely when upset	Very difficult to soothe	Very difficult to soothe
Parenting			
Positive	PSI-expected warmer feelings R	Have warm intimate times	Have warm intimate times
	PSI (feel unliked/unappreciated R)	I give comfort & understanding	I give comfort & understanding
	PDI-likely to discuss situation	(Reason with/RCE-find out why)	(Give reason/emphasize reason)
Critical	Insult child or say mean things	(Tease/RCE-call silly/RCE-angry)	Scold and criticize
	Get on child's back/curse	Scolding makes child improve	Scold when falls short
	(Hold grudge/things build up)	(Ashamed/often angry)	PCS (silent/unfriendly/disappointed)
Punitive	Child can see I'm upset	When angry, I show it	Explode in anger
	Speak to my child calmly R	RCE-yell at my child	Yell or shout
	(Spank, grab, hit/PDI-physical)	(Physical/conflict/RCE-punish)	(Spank/grab/slap/shove)
Parent emotionality			
Negative	Many things annoy me	Irritable	Many things annoy me
	When I get scared, I panic	Calm R	When I get scared, I panic
	Fewer fears than most R	Afraid	Fewer fears than most R
	Easily emotionally upset	Upset	Easily emotionally upset
	Takes a lot to make me mad R	Angry	Takes a lot to make me mad R
	Events make me fretful	Nervous	Events make me fretful
	Frequently get distressed	Distressed	Frequently get distressed
	Easily frightened	Frightened	Easily frightened

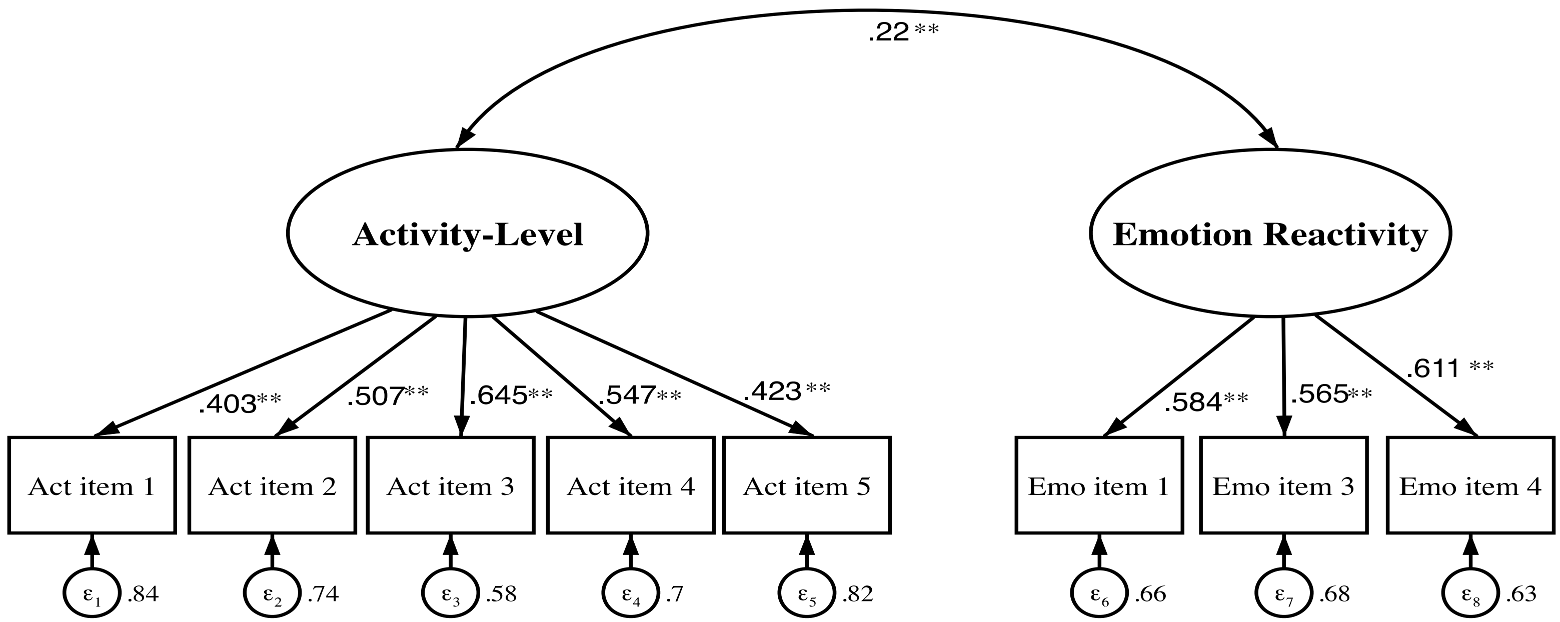
Notes. Parenting was assessed primarily by the Parenting Scale (PS; Arnold et al., 1993) in sample 1, the Child Rearing Practices Report (CRPR) Q-sort (Block, 1981) in sample 2, and the Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson et al., 2001) in sample 3. Where a specified item was used from one of the following instruments, the source is referenced beside the item: RCE = Responses to Children's Emotions (Hastings & De, 2008); PCS = Psychological Control Scale (Olsen et al., 2002); PDI = Parenting Dimensions Inventory (Slater & Power, 1987); PSI = Parenting Stress Index-short form (Abidin, 1995). Response scales ranged from 1 to 7 for the PS and CRPR, from 1 to 5 for the PSI, RCE, PSDQ, and PCS, and from 0 to 3 for the PDI. Depicted in parentheses are composite items created by averaging component items, which are separated by slashes. R = reverse-scored. Items with parallel content across instruments were used to create measures of *Positive Parenting* (in sample 1, 3 of 12 parent-child dysfunctional interaction items from the PSI, and all five discuss items from the PDI; in sample 2, 2 of 7 accept items from the CRPR, and 2 of 3 reward items from the RCE; in sample 3, 2 of 5 warmth/support, and 2 of 5 reasoning/induction items from the PSDQ), *Critical Parenting* (in sample 1, 5 of 10 overreactivity items from the PS, in sample 2, 2 of 5 reject and 2 of 16 authoritarian items from the CRPR, and 1 of 3 punish and 1 of 3 magnify items from the RCE; in sample 3, 2 of 4 verbal hostility items from the PSDQ, and 3 love withdrawal/guilt induction items from the PCS), and *Punitive Parenting* (in sample 1, 3 of 10 overreactivity items from the PS, and all 5 physical items from the PDI; in sample 2, 3 of 16 authoritarian items the CRPR, and 1 of 3 punish items and 1 of 3 magnify items from the RCE; in sample 3, 2 of 4 verbal hostility, and all four physical coercion items from the PSDQ). See Mills et al. (2011), for more details regarding construction of the specified parenting measures.

Table 4. Descriptive Statistics and Reliabilities of the Measures by Sample

	Sample 1			Sample 2			Sample 3			Integrated Sample		
Variables	*M* or %	*SD* or N	α	*M* or %	*SD* or N	α	*M* or %	*SD* or N	α	*M* or %	*SD* or N	α
Temperament												
Activity-Level	5.25	1.04	.63	3.41	.98	.59	4.95	.95	.68	4.66	1.21	.63
Emotion Reactivity	3.16	1.23	.51	3.07	1.34	.72	2.92	1.09	.63	3.02	1.19	.61
Parenting												
Positive	6.18	1.01	.66	6.29	.66	.47	5.93	.69	.45	6.09	.79	.54
Critical	2.03	.60	.43	1.55	.65	.58	2.39	.79	.53	2.08	.79	.51
Punitive	3.26	1.01	.53	3.27	.87	.54	2.48	.77	.71	2.89	.95	.61
Maternal Emotionality												
Negative	2.19	.69	.79	2.23	.70	.82	2.33	.70	.78	2.27	.70	.77
Family Socioeconomic Stress												
Mother Education	2.16	.94		3.69	.92		3.23	.76		3.08	1.03	
Father Education	2.14	.85		3.58	.99		3.10	.89		3.00	1.05	
Occupation Prestige	40.94	12.09		54.07	12.15		51.93	11.31		49.78	12.79	
Family Income	4.10	1.75		5.73	1.54		5.25	1.64		5.08	1.75	
Family SES (*z*)	-.05	.75	.67	-.02	.75	.68	-.01	.79	.78	-.02	.77	.74
Family Structural Stress												
Dual Vs. Single	(81.0)	(102)		(82.7)	(110)		(89.6)	(216)		(85.6)	(428)	
2 Vs. fewer bio[a]	(73.8)	(93)		(78.2)	(104)		(83.4)	(201)		(79.6)	(398)	
Children < Age 7	1.65	.65		1.60	.65		1.97	.73		1.79	.71	
Child Behaviour Problems												
IP[b]	52.40	8.49	.85/.70	54.47	10.21	.85	51.11	9.15	.81	52.33	9.37	
EP[b]	53.00	8.40	.91/.79	48.23	10.33	.92	50.27	9.73	.90	50.42	9.72	

Notes. For the integrated sample, Cronbach's alpha reliabilities were computed using centered data to control for between-group variance.
[a] Refers to the number of biological parents in the home, dichotimized as 2 biological parents versus one or fewer biological parents.
[b] Means and standard deviations are for T-scores; sample 1 alphas are for the 2-3 and 4-18 versions, respectively, of the CBCL.

Figure 1. Confirmatory Factor Analysis of Activity-Level and Emotion Reactivity



Notes. **p* < .05, ** *p* < .001; standardized path coefficients.

Table 5. Zero-order Correlations among Variables in the Integrated Sample

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Child Age									
2. Family SES	-.01								
3. IP	.02	-.12**							
4. EP	-.01	-.21**	.53**						
5. Punitive	.04	-.10*	.13**	.34**					
6. Critical	.05	.00	.16**	.23**	.37**				
7. Positive	-.09*	.10*	-.16**	-.22**	-.28**	-.13**			
8. M. Negative Emotion[a]	-.06	-.03	.24**	.23**	.30**	.22**	-.18**		
9. Emotion Reactivity	.13**	-.01	.29**	.34**	.14**	.07	-.12*	.16**	
10. Activity-Level	-.05	-.07	.12**	.45**	.19**	.14**	-.03	.16**	.15**

Notes. M. Negative Emotion[a] = Maternal Negative Emotionality; *$p < .05$, ** $p < .01$.

Table 6. Hierarchical Regression Predicting Externalizing Problems

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.05**	**24.03****
Family SES	-0.22	0.05	-4.90**		
Step 2				**0.01**	**2.47**
Family SES	-0.22	0.05	-4.94**		
Child Sex[a]	0.09	0.01	2.08*		
Child Age	-0.04	0.00	-0.85		
Step 3				**0.32**	**47.76****
Family SES	-0.17	0.03	-4.69**		
Child Sex[a]	0.00	0.00	-0.01		
Child Age	-0.06	0.00	-1.64		
Activity-Level	0.34	0.10	8.78**		
Emotion Reactivity	0.26	0.07	6.96**		
Punitive	0.15	0.02	3.64**		
Critical	0.10	0.01	2.57*		
Positive	-0.12	0.01	-2.99*		
	R = 0.38		$R^2_{Adj} = 0.37$		F = 35.32**

Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Table 7. Hierarchical Regressions Predicting Externalizing Problems

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.05**	**22.08****	Step 1				**0.05**	**24.03****
Family SES	-0.21	0.05	-4.70**			Family SES	-0.22	0.05	-4.90**		
Step 2				**0.01**	**3.11***	Step 2				**0.01**	**2.47**
Family SES	-0.21	0.05	-4.75**			Family SES	-0.22	0.05	-4.94**		
Child Sex[a]	0.11	0.01	2.38*			Child Sex[a]	0.09	0.01	2.08*		
Child Age	-0.04	0.00	-0.84			Child Age	-0.04	0.00	-0.85		
Step 3				**0.26**	**44.03****	Step 3				**0.22**	**34.73****
Family SES	-0.16	0.02	-4.09**			Family SES	-0.20	0.04	-4.96**		
Child Sex[a]	0.01	0.00	0.27			Child Sex[a]	0.06	0.00	1.43		
Child Age	-0.03	0.00	-0.70			Child Age	-0.09	0.01	-2.29*		
Activity-Level	0.38	0.14	9.61**			Emotion React[b]	0.31	0.09	7.60**		
Punitive	0.18	0.02	4.04**			Punitive	0.20	0.03	4.36**		
Critical	0.10	0.01	2.39*			Critical	0.13	0.02	3.07*		
Positive	-0.13	0.02	-3.15*			Positive	-0.10	0.01	-2.48*		
	R = 0.56		$R^2_{Adj} = 0.31$	F = 30.72**			R = 0.53		$R^2_{Adj} = 0.27$	F = 25.21**	

Notes. [a] -1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; *$p < .05$, **$p < .001$

Table 8. Hierarchical Regression Predicting Externalizing Problems

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**14.00****
Family SES	-0.17	0.03	-3.74**		
Step 2				**0.02**	**3.57***
Family SES	-0.17	0.03	-3.71**		
Child Sex[a]	0.12	0.01	2.61*		
Child Age	-0.03	0.00	-0.73		
Step 3				**0.14**	**18.84****
Family SES	-0.14	0.02	-3.32**		
Child Sex[a]	0.09	0.01	2.19*		
Child Age	-0.04	0.00	-1.02		
Punitive	0.21	0.04	4.35**		
Critical	0.11	0.01	2.44*		
Positive	-0.10	0.01	-2.15*		
M. Negative Emotion[b]	0.12	0.01	2.68*		
	R = 0.43		$R^2_{Adj} = 0.17$		F = 14.29**

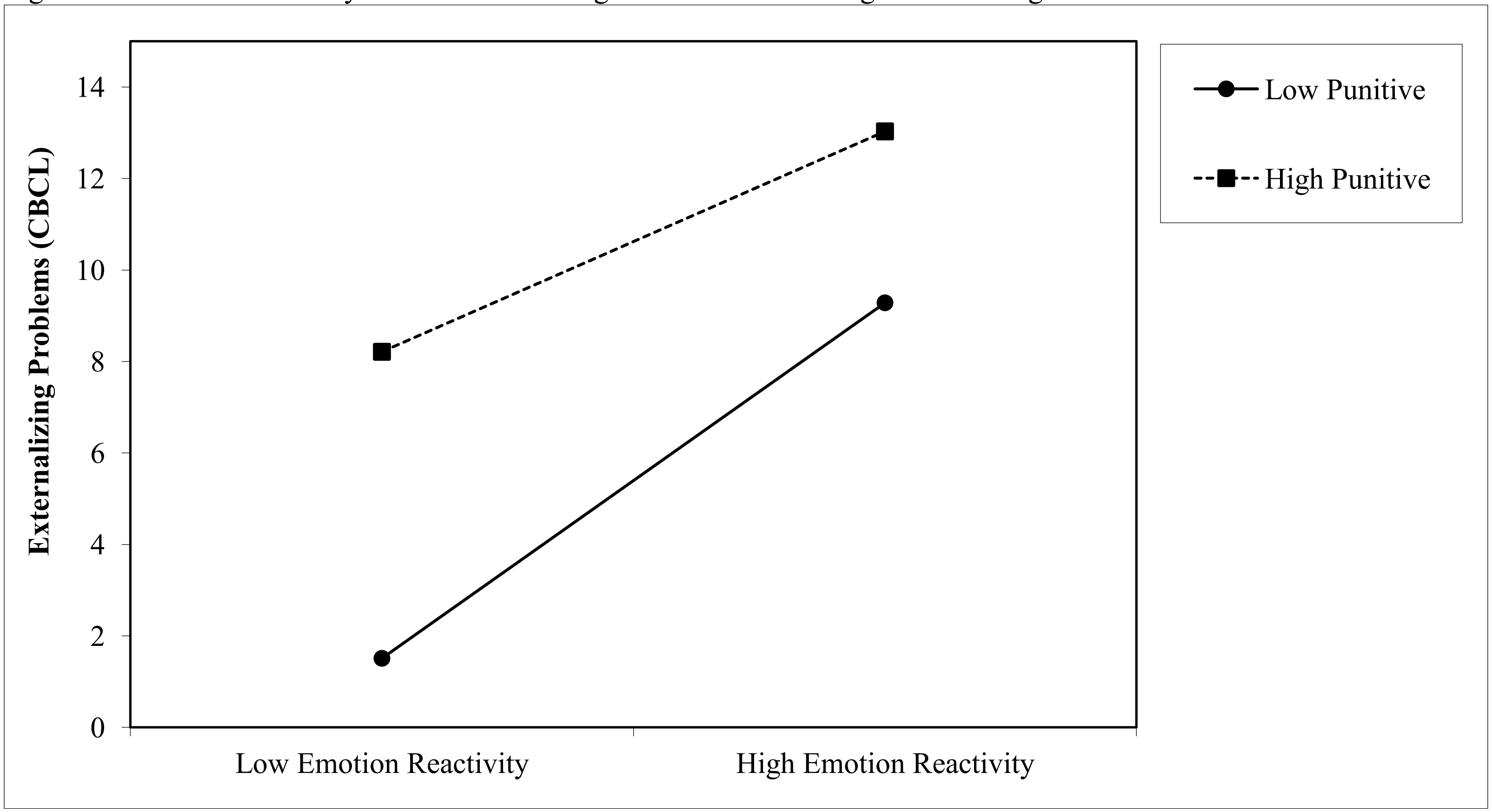
Notes. [a]-1 = Male, 1 = Female; M. Negative Emotion[b] = Maternal Negative Emotionality; *$p < .05$, **$p < .001$.

Table 9. Hierarchical Regressions Predicting Externalizing Problems

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.05**	**24.03****	Step 1				**0.05**	**24.03****
Family SES	-0.22	0.05	-4.90**			Family SES	-0.22	0.05	-4.90**		
Step 2				**0.01**	**2.47**	Step 2				**0.01**	**2.47**
Family SES	-0.22	0.05	-4.94**			Family SES	-0.22	0.05	-4.94**		
Child Sex[a]	0.09	0.01	2.08*			Child Sex[a]	0.09	0.01	2.08*		
Child Age	-0.04	0.00	-0.85			Child Age	-0.04	0.00	-0.85		
Step 3				**0.33**	**61.00****	Step 3				**0.35**	**89.26****
Family SES	-0.16	0.03	-4.39**			Family SES	-0.15	0.02	-4.01**		
Child Sex[a]	0.02	0.00	0.57			Child Sex[a]	0.01	0.00	0.33		
Child Age	-0.08	0.01	-2.19*			Child Age	-0.07	0.01	-1.89		
IP	0.40	0.14	10.15**			IP	0.42	0.15	10.86**		
Emotion React[b]	0.22	0.04	5.64**			Emotion React[b]	0.20	0.04	5.33**		
Critical	0.15	0.02	3.92**			Punitive	0.24	0.05	6.48**		
Positive	-0.11	0.01	-2.86*								
	R = 0.62		R^2_{Adj} = 0.38	F = 41.16**			R = 0.64		R^2_{Adj} = 0.40	F = 52.24**	

Notes. [a] -1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; **p* < .05, ***p* < .001

Figure 2. Emotion Reactivity x Punitive Parenting Interaction Predicting Externalizing Problems



Note. $p < .05$

Table 10. Emotion Reactivity x Punitive Parenting Interaction Predicting Externalizing Problems

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.05**	**24.03****
Family SES	-0.22	0.05	-4.90**		
Step 2				**0.01**	**2.47**
Family SES	-0.22	0.05	-4.94**		
Child Sex[a]	0.09	0.01	2.08*		
Child Age	-0.04	0.00	-0.85		
Step 3				**0.19**	**59.84****
Family SES	-0.20	0.04	-4.91**		
Child Sex[a]	0.06	0.00	1.47		
Child Age	-0.08	0.01	-1.99*		
Emotion Reactivity	0.32	0.10	7.74**		
Punitive	0.27	0.07	6.66**		
Step 4				**0.01**	**3.83***
Family SES	-0.20	0.04	-4.91**		
Child Sex[a]	0.06	0.00	1.54		
Child Age	-0.08	0.01	-1.98*		
Emotion Reactivity	0.33	0.10	7.97**		
Punitive	0.27	0.07	6.72**		
Emotion Reactivity x Punitive	-0.08	0.01	-1.96*		
	R = 0.51		$R^2_{Adj} = 0.25$		F = 26.83**

Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Table 11. Family Socioeconomic Stress x Internalizing Problems Interaction Predicting Externalizing Problems

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.04**	**22.74****
Family SES	-0.21	0.04	-4.77**		
Step 2				**0.01**	**3.41***
Family SES	-0.21	0.05	-4.85**		
Child Sex[a]	0.11	0.01	2.60*		
Child Age	-0.02	0.00	-0.39		
Step 3				**0.24**	**169.92****
Family SES	-0.15	0.02	-3.91**		
Child Sex[a]	0.04	0.00	1.10		
Child Age	-0.02	0.00	-0.52		
IP	0.50	0.24	13.04**		
Step 4				**0.01**	**8.63****
Family SES	-0.15	0.02	-3.86**		
Child Sex[a]	0.04	0.00	1.13		
Child Age	-0.02	0.00	-0.51		
IP	0.51	0.25	13.23**		
Family SES x IP	-0.11	0.01	-2.94*		
	R = 0.56		$R^2_{Adj} = 0.30$		F = 44.36**

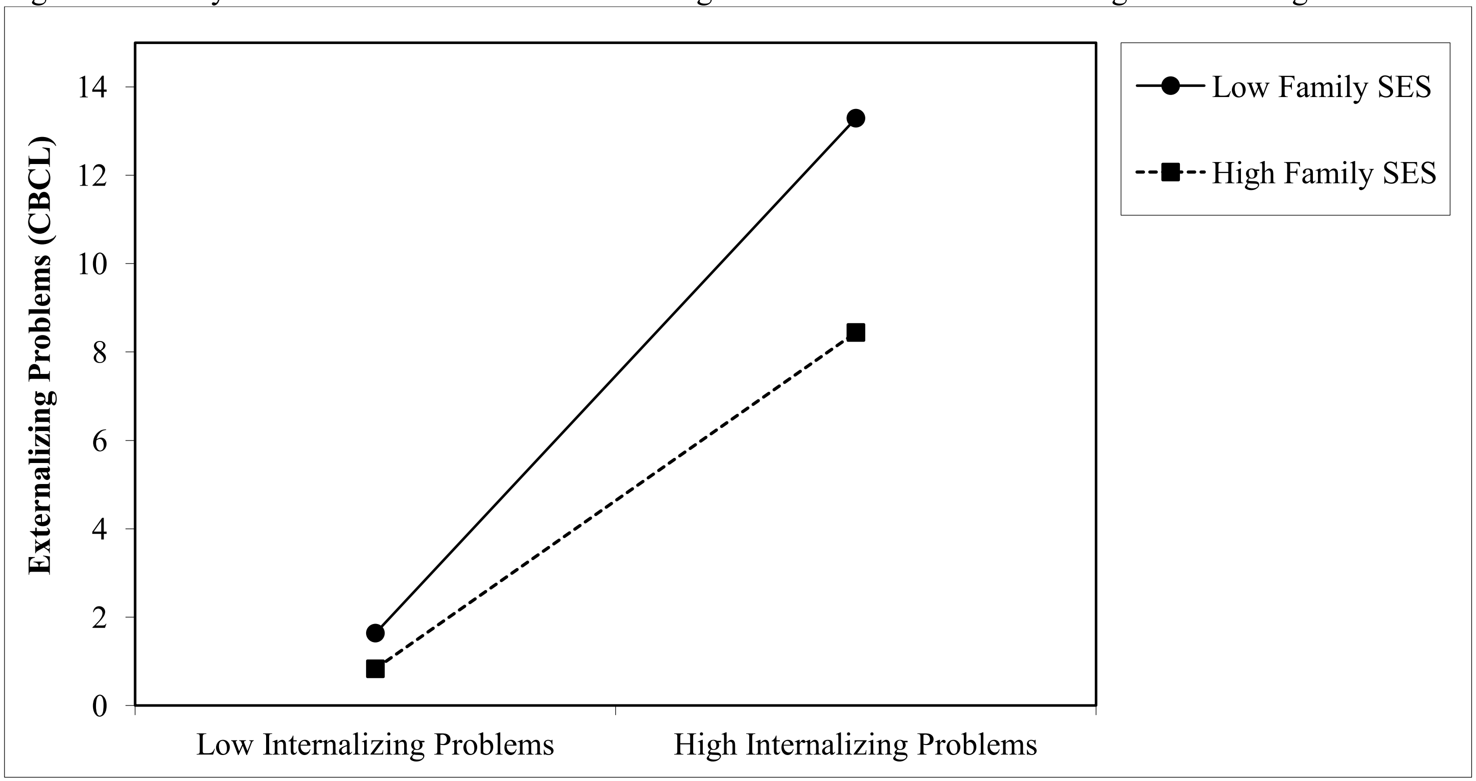
Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Table 12. Family Socioeconomic Stress x Emotion Reactivity Interaction Predicting Externalizing Problems

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.05**	**24.01****
Family SES	-0.22	0.05	-4.90**		
Step 2				**0.01**	**2.50**
Family SES	-0.22	0.05	-4.93**		
Child Sex[a]	0.10	0.01	2.12*		
Child Age	-0.04	0.00	-0.79		
Step 3				**0.12**	**68.03****
Family SES	-0.22	0.05	-5.32**		
Child Sex[a]	0.08	0.01	1.89		
Child Age	-0.08	0.01	-1.83		
Emotion Reactivity	0.35	0.12	8.25**		
Step 4				**0.01**	**3.70***
Family SES	-0.23	0.05	-5.46**		
Child Sex[a]	0.08	0.01	1.86		
Child Age	-0.08	0.01	-1.89		
Emotion Reactivity	0.35	0.12	8.32**		
SES x Emotion Reactivity	-0.08	0.01	-1.92*		
	$R = 0.43$		$R^2_{Adj} = 0.18$		$F = 21.13$**

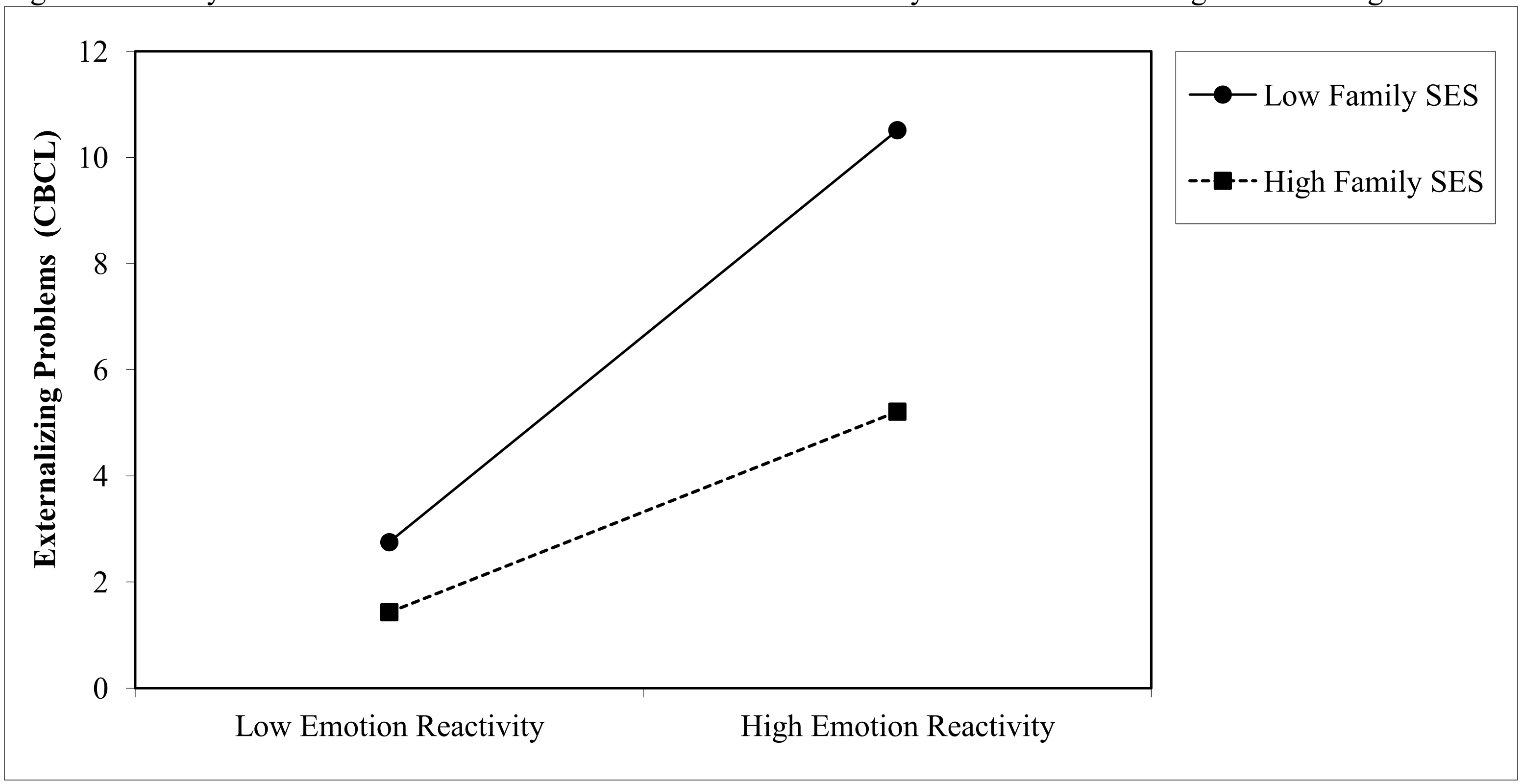
Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Figure 3. Family Socioeconomic Stress x Internalizing Problems Interaction Predicting Externalizing Problems



Note. $p < .05$

Figure 4. Family Socioeconomic Stress Interaction x Emotion Reactivity Interaction Predicting Externalizing Problems



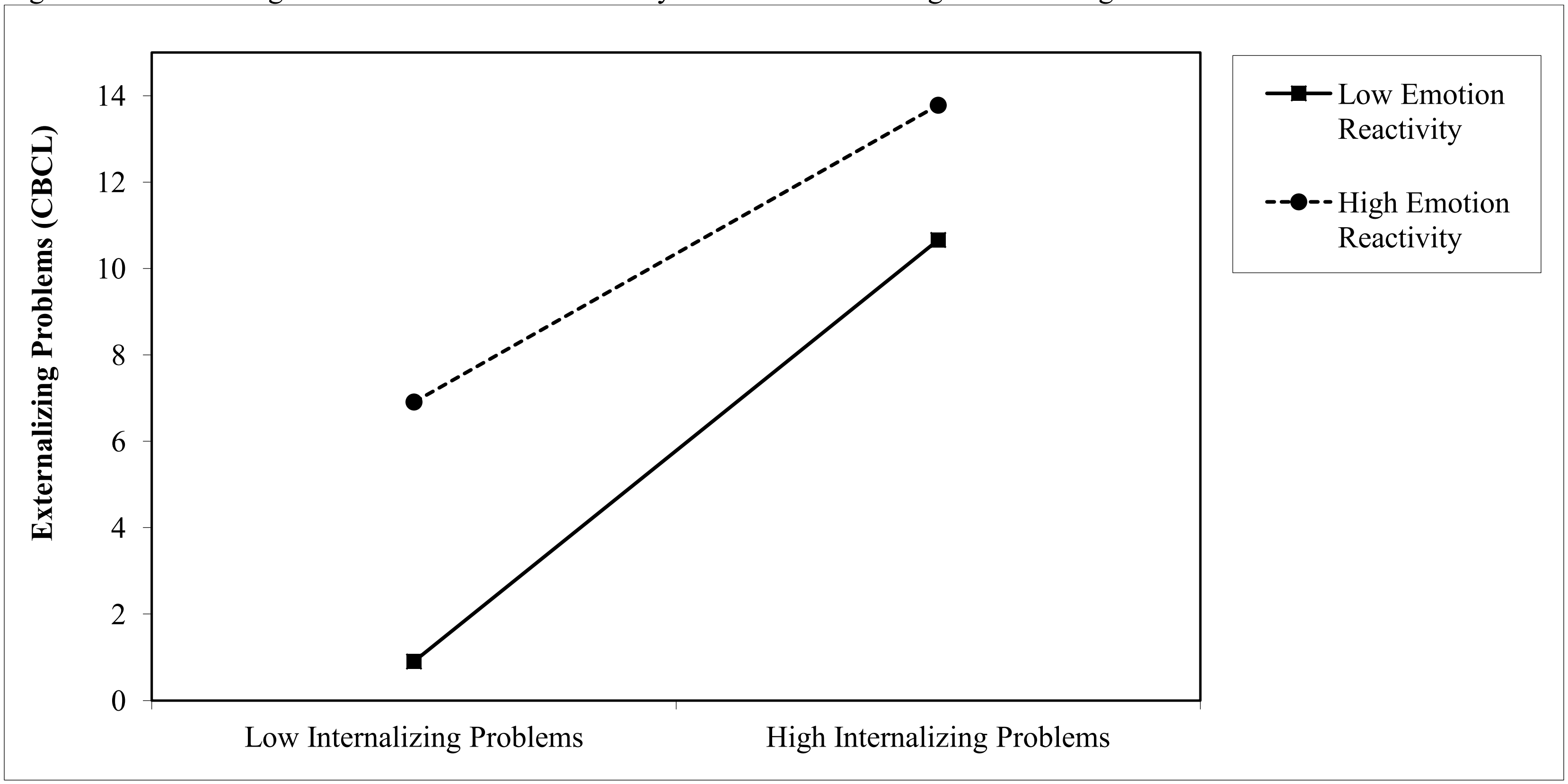
Note. *p* < .05

Table 13. Internalizing Problems x Emotion Reactivity Interaction Predicting Externalizing Problems

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.05**	**24.01****
Family SES	-0.22	0.05	-4.90**		
Step 2				**0.01**	**2.50**
Family SES	-0.22	0.05	-4.93**		
Child Sex[a]	0.10	0.01	2.12*		
Child Age	-0.04	0.00	-0.79		
Step 3				**0.29**	**103.50****
Family SES	-0.17	0.03	-4.36**		
Child Sex[a]	0.03	0.00	0.70		
Child Age	-0.07	0.00	-1.72		
Emotion Reactivity	0.23	0.05	5.72**		
IP	0.44	0.17	11.02**		
Step 4				**0.01**	**4.01***
Family SES	-0.17	0.03	-4.47**		
Child Sex[a]	0.03	0.00	0.71		
Child Age	-0.07	0.00	-1.79		
Emotion Reactivity	0.24	0.05	6.00**		
IP	0.43	0.16	10.79**		
IP x Emotion Reactivity	-0.08	0.01	-2.00*		
	R = 0.56		$R^2_{Adj} = 0.35$		F = 42.43**

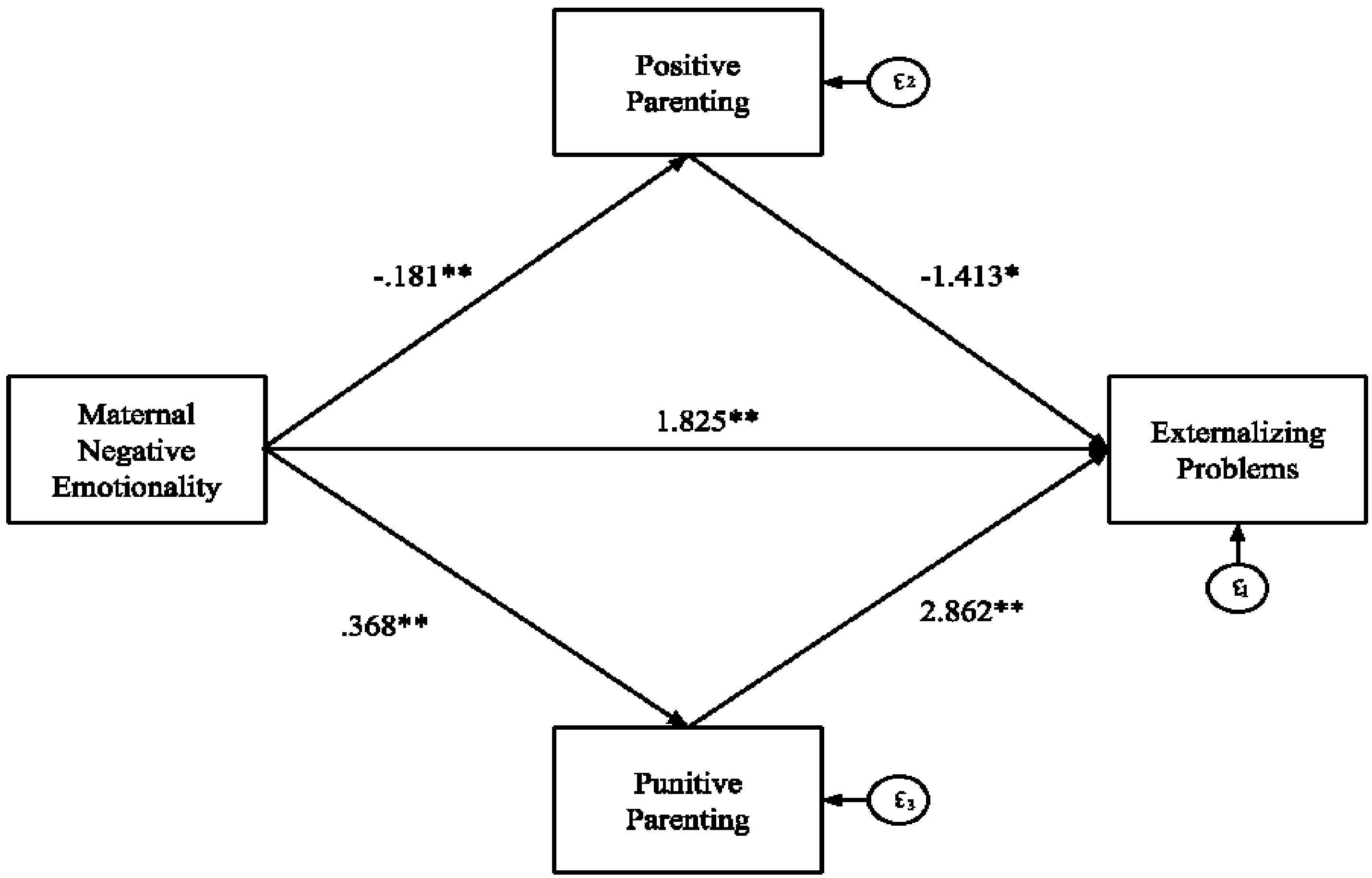
Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Figure 5. Internalizing Problems x Emotion Reactivity Interaction Predicting Externalizing Problems



Note. $p < .05$

Figure 6. Direct and Indirect Effects of Maternal Negative Emotionality on Externalizing Problems via Parenting



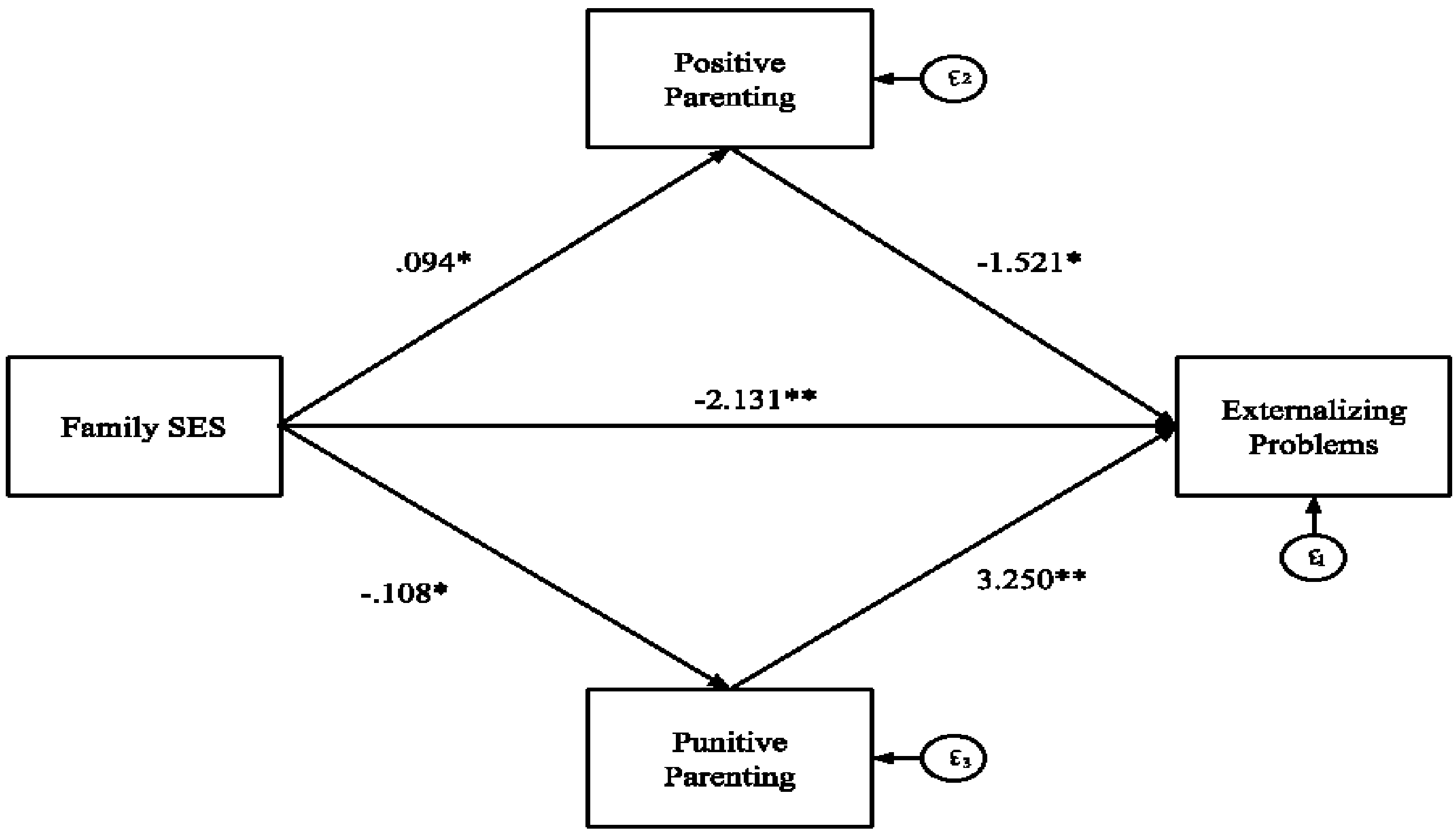
Notes. *p < .05, **p < .001; unstandardized path coefficients depicted.

Table 14. Indirect Effects of Maternal Negative Emotionality on Externalizing Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	1.05	.25	4.27	.58	1.64
Positive	.26	.13	2.03	.07	.56
Total	1.31	.27	4.87	.81	1.95
Contrast					
Positive vs. Punitive	-.80	.28	-2.80	-1.44	-.23

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 7. Direct and Indirect Effects of Family Socioeconomic Stress on Externalizing Problems via Parenting



Notes. *p < .05, **p < .001; unstandardized path coefficients depicted.

Table 15. Indirect Effects of Family Socioeconomic Stress on Externalizing Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	-.35	.17	-2.04	-.71	-.03
Positive	-.14	.08	-1.70	-.37	-.02
Total	-.49	.20	-2.44	-.90	-.13
Contrast					
Positive vs. Punitive	.21	.18	1.15	-.14	.59

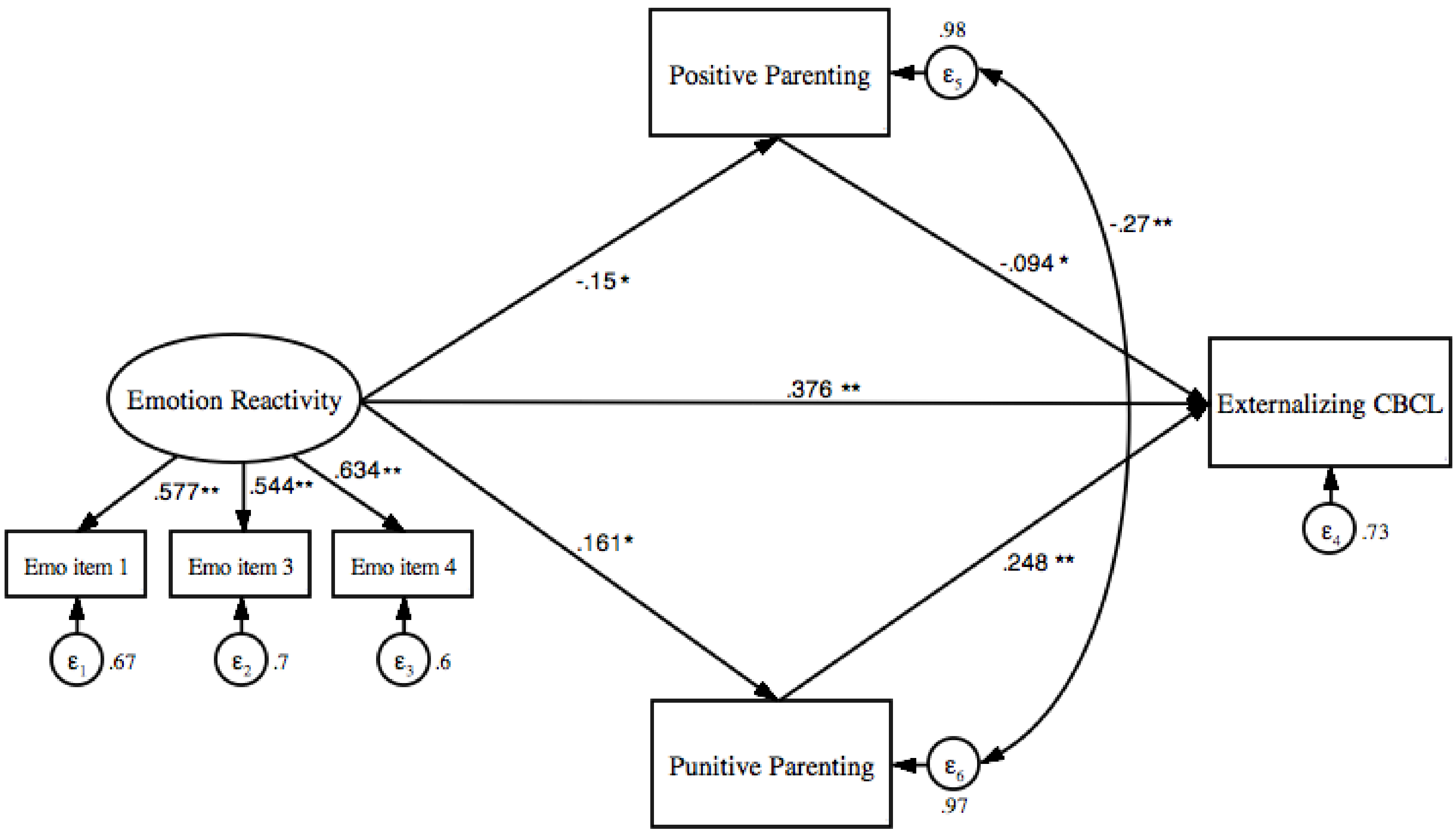
Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Table 16. Indirect Effects of Emotion Reactivity on Externalizing Problems via Parenting

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	*Z*	Lower	Upper
Indirect Effects					
Punitive	.28	.11	2.62	.09	.52
Positive	.10	.06	1.81	.02	.26
Total	.39	.13	3.05	.15	.65
Contrast					
Punitive vs. Positive	.18	.12	1.52	-.03	.43

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 8. Direct and Indirect Effects of Emotion Reactivity on Externalizing Problems via Parenting



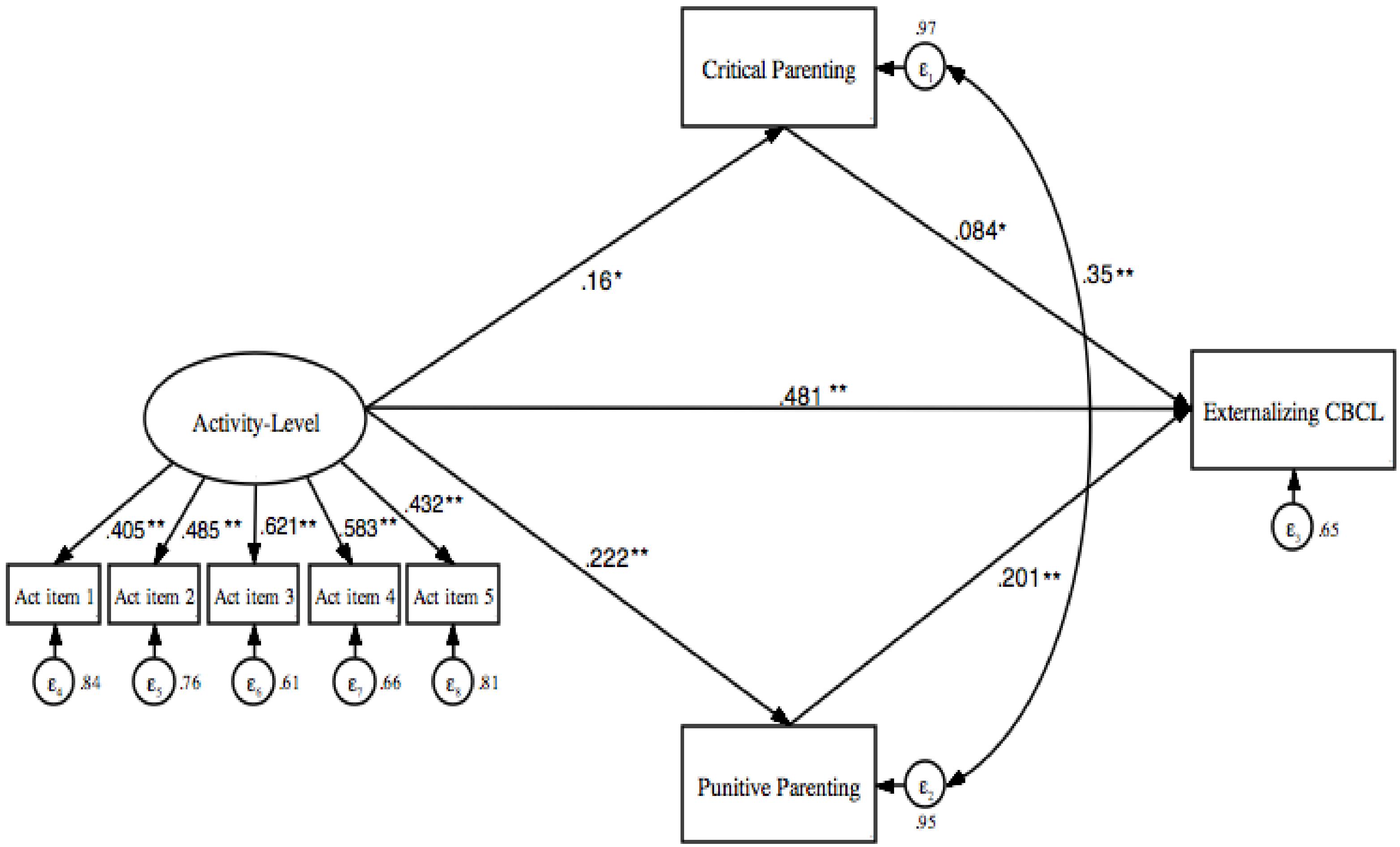
Notes. **p* < .05, ***p* < .001; standardized path coefficients depicted.

Table 17. Indirect Effects of Activity-Level on Externalizing Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	.41	.13	3.23	.19	.67
Critical	.12	.07	1.76	.01	.30
Total	.53	.14	3.70	.26	.84
Contrast					
Punitive vs. Critical	.29	.15	1.95	.02	.59

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples. *BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 9. Direct and Indirect Effects of Activity-level on Externalizing Problems via Parenting



Notes. **p* < .05, ***p* < .001; standardized path coefficients depicted.

Table 18a. Indirect Effects of Parenting on Externalizing Problems via Emotion Reactivity

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	*Z*	Lower	Upper
Indirect Effect of Punitive Parenting					
Emotion Reactivity	.45	.17	2.70	.12	.87
Total	.45	.17	2.70	.12	.87
Indirect Effect of Positive Parenting					
Emotion Reactivity	-.47	.20	-2.39	-1.02	-.03
Total	-.47	.20	-2.39	-1.02	-.03
Indirect Effect of Critical Parenting					
Emotion Reactivity	.30	.21	1.44	-.09	.80
Total	.30	.21	1.44	-.09	.80

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of a significant mediation effect.

Table 18b. Indirect Effects of Parenting on Externalizing Problems via Activity-Level

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effect of Punitive Parenting					
Activity-Level	.82	.22	3.76	.40	1.29
Total	.82	.22	3.76	.40	1.29
Indirect Effect of Critical Parenting					
Activity-Level	.81	.27	2.95	.28	1.37
Total	.81	.27	2.95	.28	1.37
Indirect Effect of Positive Parenting					
Activity-Level	-.14	.26	-.54	-.63	.33
Total	-.14	.26	-.54	-.63	.33

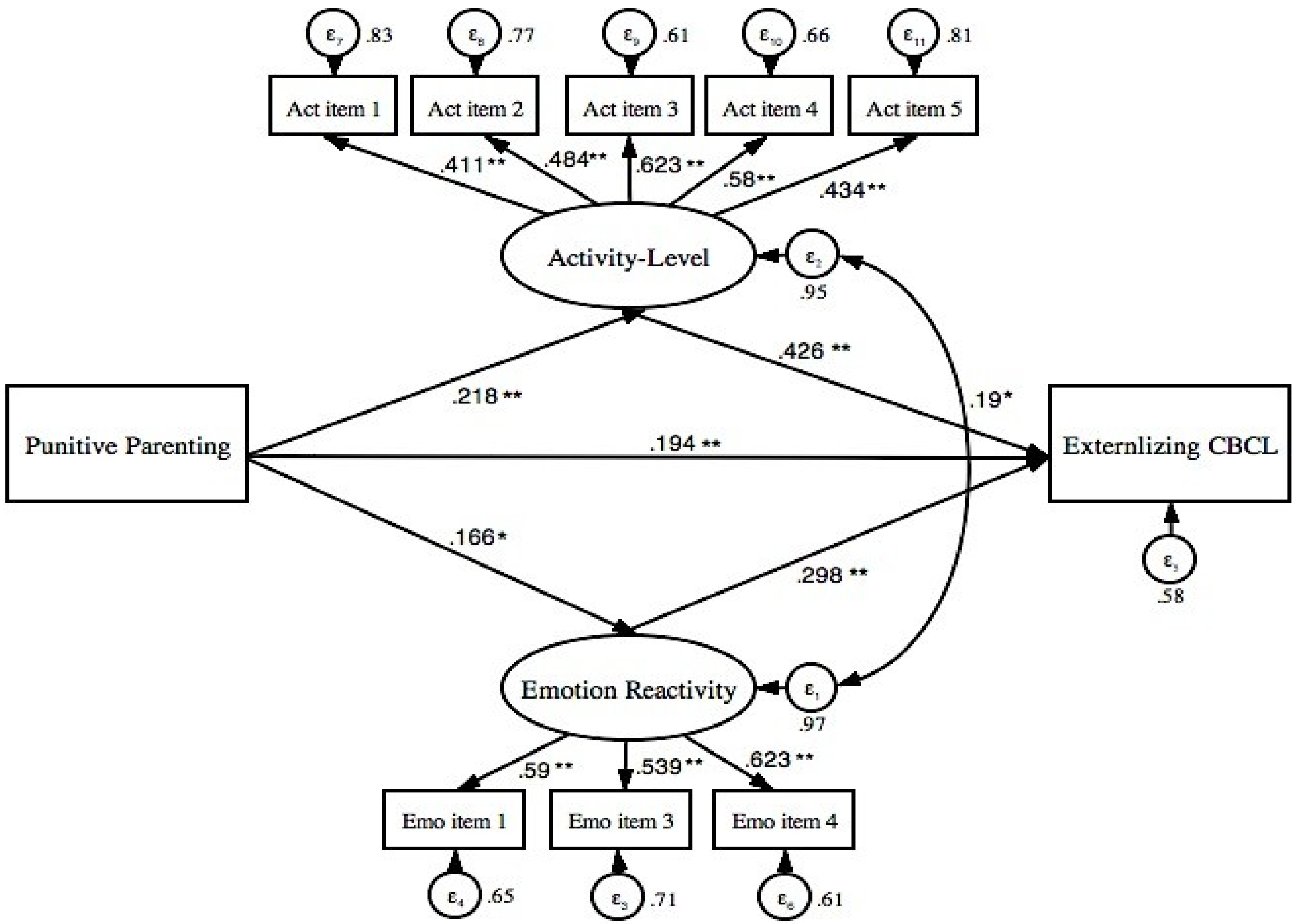
Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of a significant mediation effect.

Table 19. Indirect Effects of Punitive Parenting on Externalizing Problems via Temperament

		Product of Coefficients		Bootstrapping	
				BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Activity-Level	.73	.20	3.69	.37	1.16
Emotion Reactivity	.39	.14	2.67	.11	.75
Total	1.12	.25	4.38	.65	1.63
Contrast					
Activity vs. Emotion	.34	.23	1.47	-.16	.89

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 10. Direct and Indirect Effects of Punitive Parenting on Externalizing Problems via Temperament



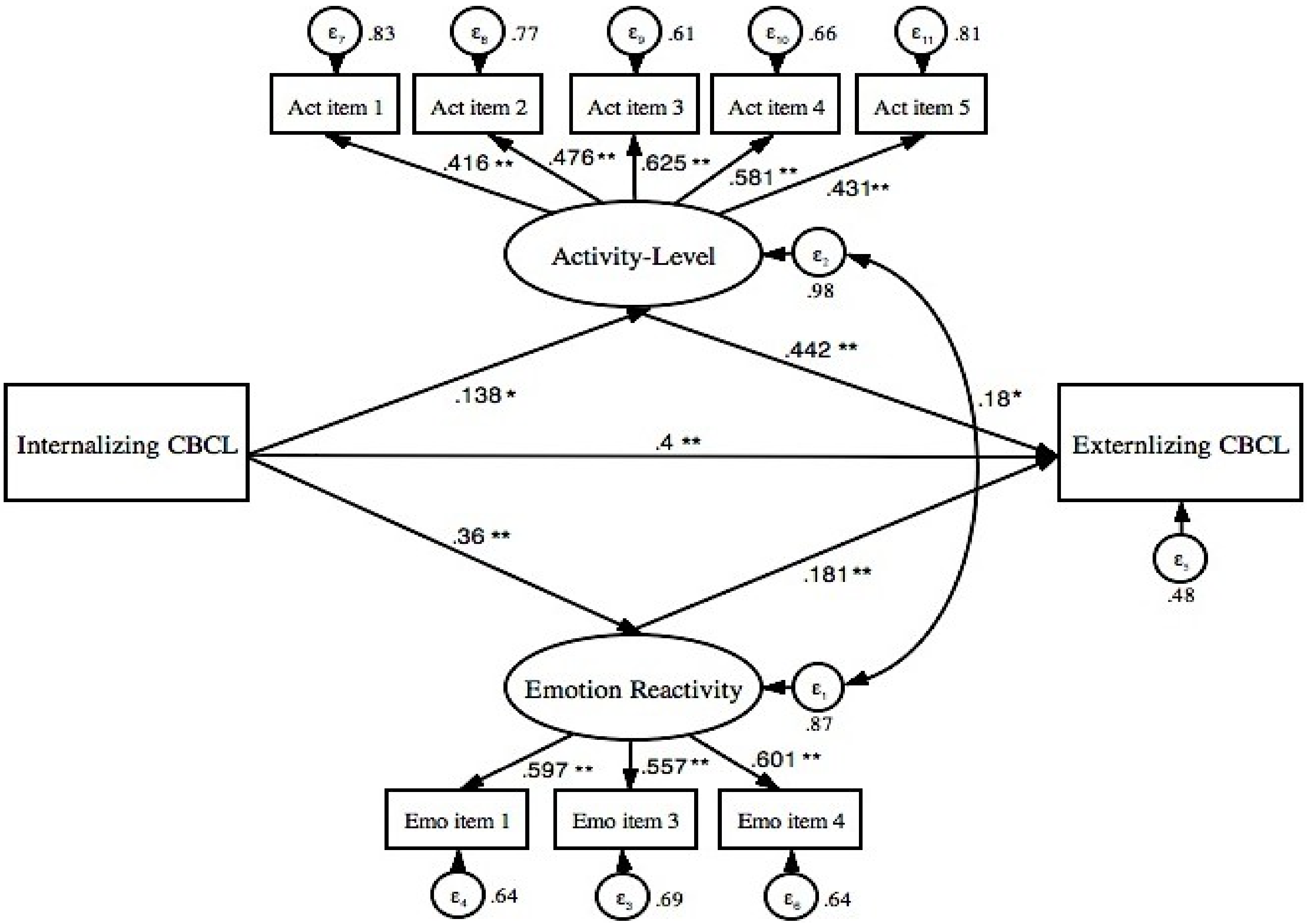
Notes. **p* < .05, ***p* < .001; standardized path coefficients depicted.

Table 20. Indirect Effects of Internalizing Problems on Externalizing Problems via Temperament

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Activity-Level	.05	.02	2.48	.01	.09
Emotion Reactivity	.05	.01	3.74	.02	.09
Total	.10	.02	4.13	.05	.15
Contrast					
Activity vs. Emotion	-.00	.02	-.22	-.05	.05

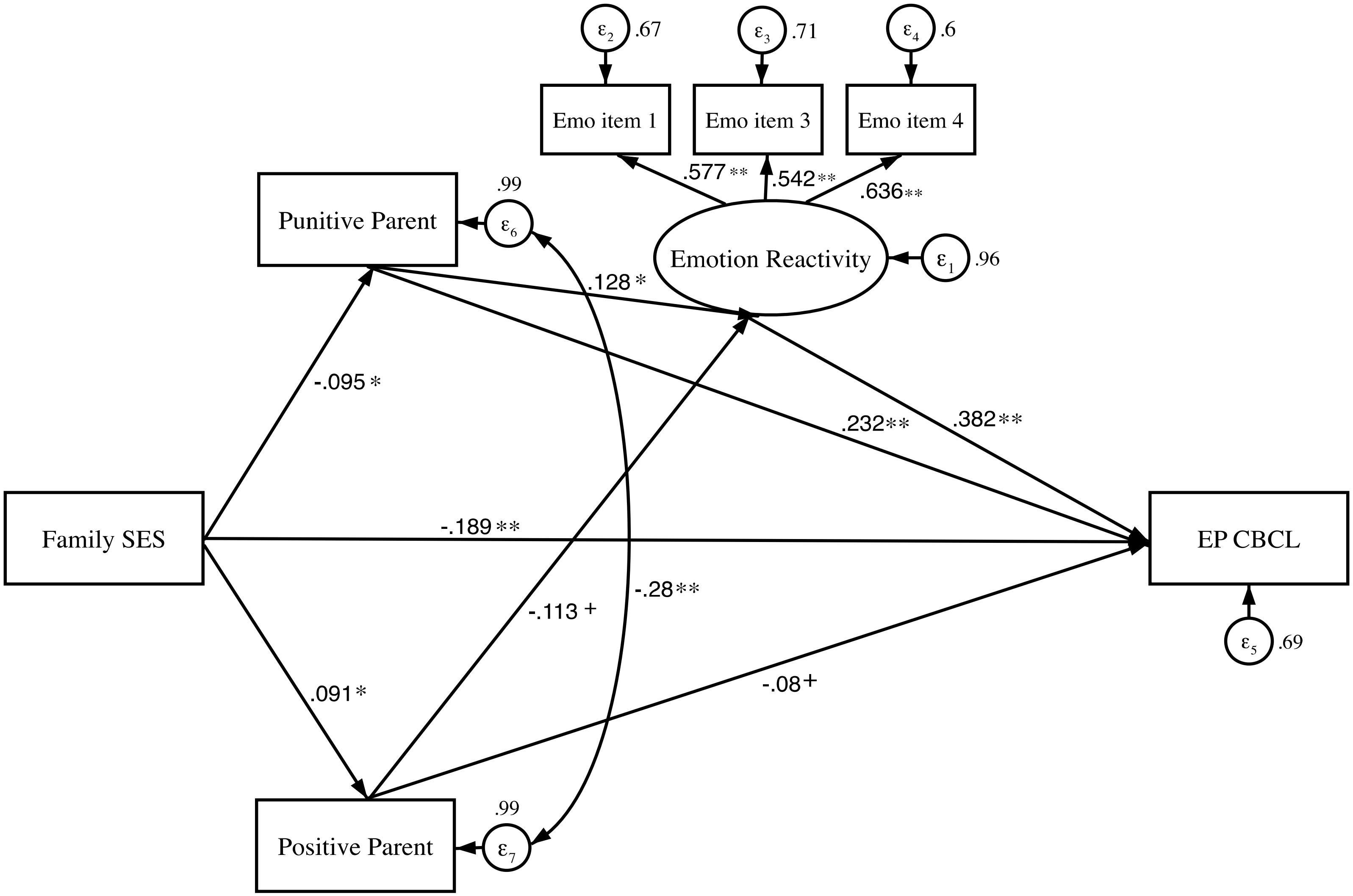
Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 11. Direct and Indirect Effects of Internalizing Problems on Externalizing Problems via Temperament



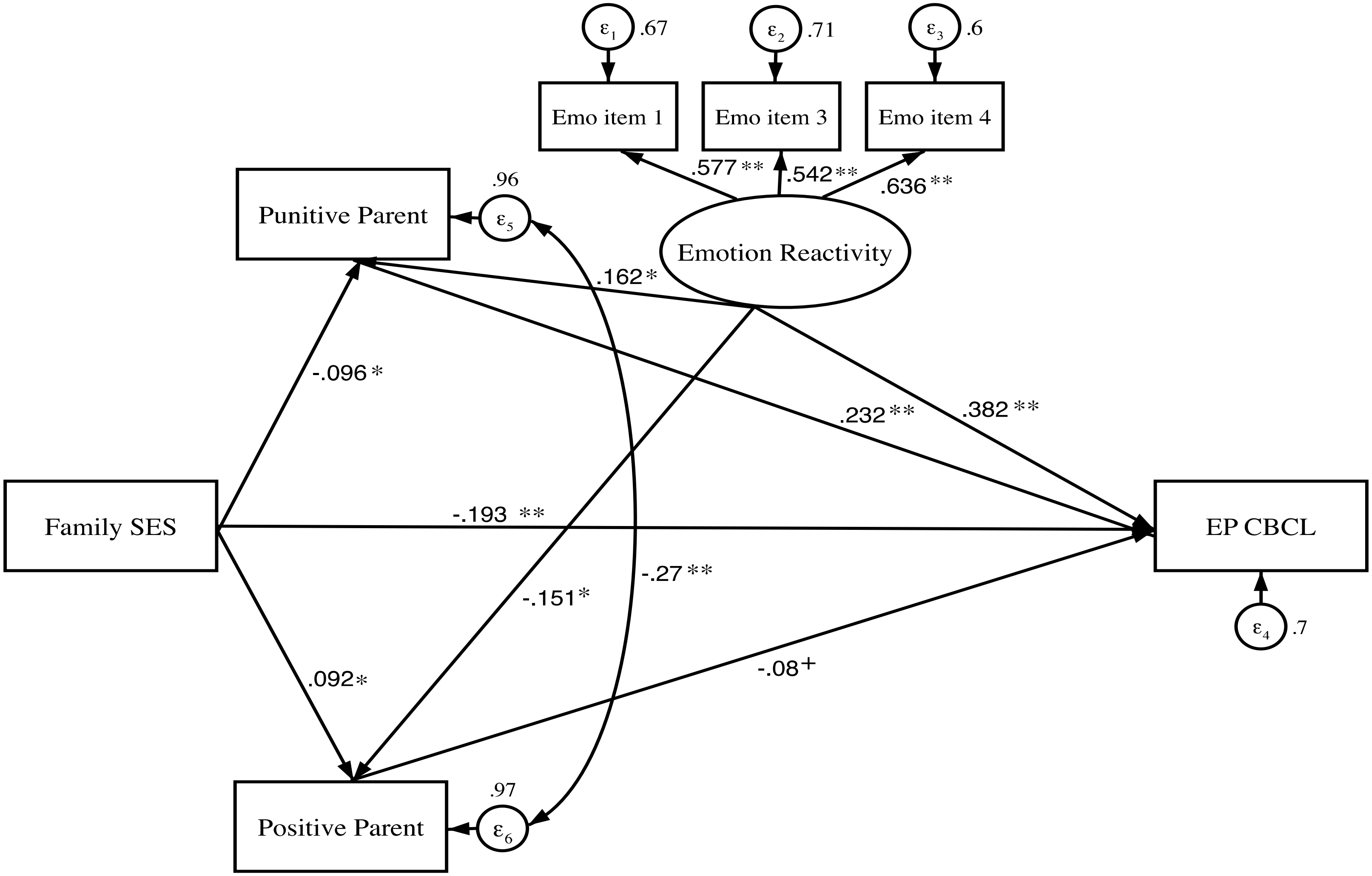
Notes. **p* < .05, ***p* < .001; standardized path coefficients depicted.

Figure 12. Emotion Reactivity SEM Model



Notes. $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .001$; χ^2 (9) = 11.23, $p = .26$, CFI = .993, TLI = .984, SRMR = .019, RMSEA = .023.

Figure 13. Inverse Emotion Reactivity SEM Model



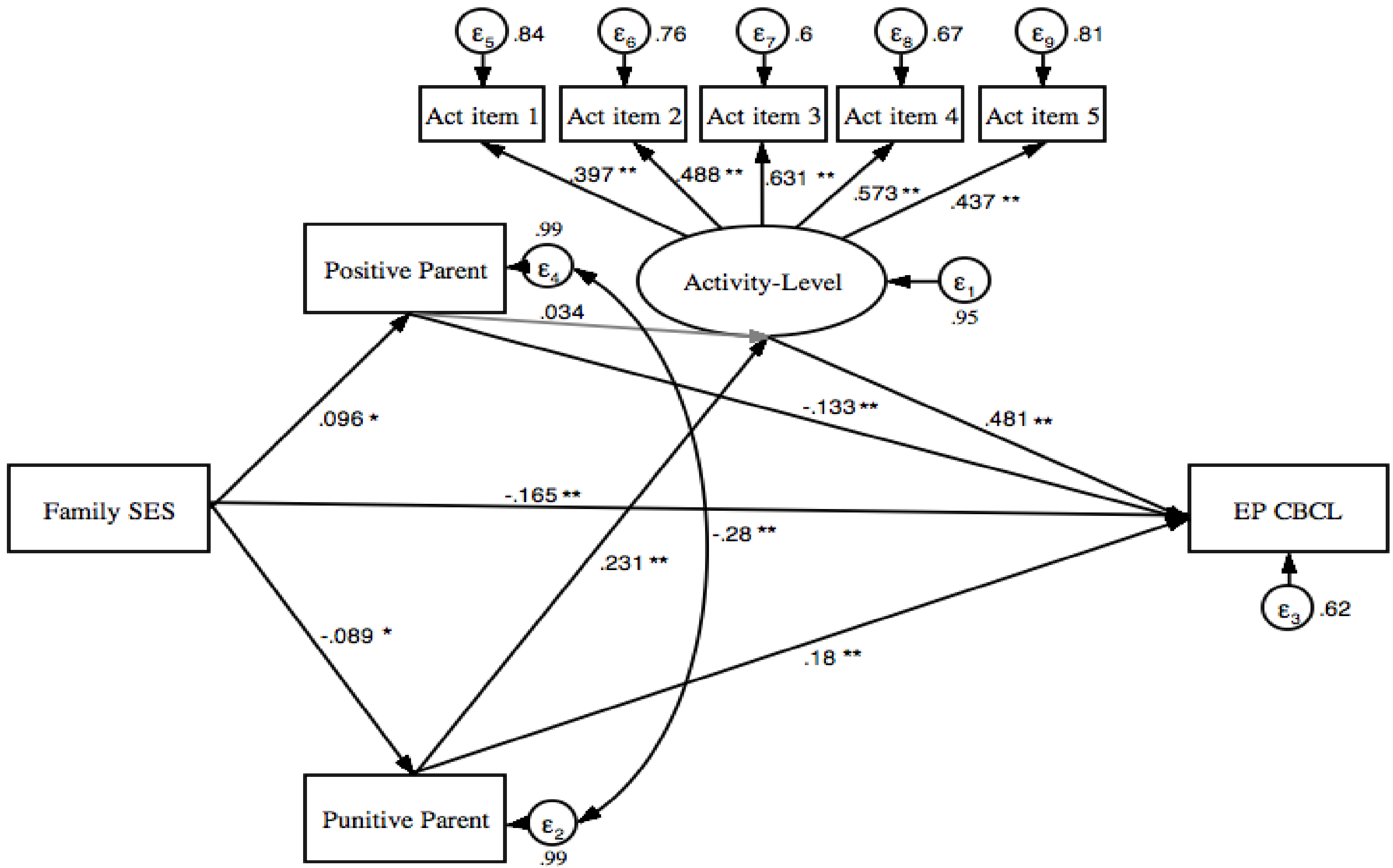
Notes. $^{+}p < .1$, $*p < .05$, $**p < .001$; χ^2 (9) = 10.99, $p = .28$, CFI = .994, TLI = .986, RMSEA = .022, SRMR = .018.

Table 21. Summary of Fit Indices for all SEM Models

Model	χ^2	*df*	*p*	CFI	TLI	RMSEA	SRMR
1. Emotion Reactivity Model	11.23	9	.26	.993	.984	.023	.019
(a) Removal SES-to-EP Path	32.87	10	< .001	.993	.855	.070	.019
(b) Removal Punitive-to-EP Path	38.50	10	< .001	.993	.820	.078	.019
2. Inverse Emotion Reactivity Model	10.99	9	.28	.994	.986	.022	.018
(a) Removal SES-to-EP Path	33.36	10	< .001	.994	.852	.070	.018
(b) Removal Punitive-to-EP Path	38.15	10	< .001	.994	.822	.077	.018
3. Activity-Level Model	28.83	22	.15	.985	.975	.026	.030
4. Inverse Activity-Level Model	29.50	22	.13	.983	.973	.027	.031
5. Integrative Model	62.90	45	< .05	.973	.960	.029	.037
6. Inverse Integrative Model	63.45	45	< .05	.972	.959	.030	.038

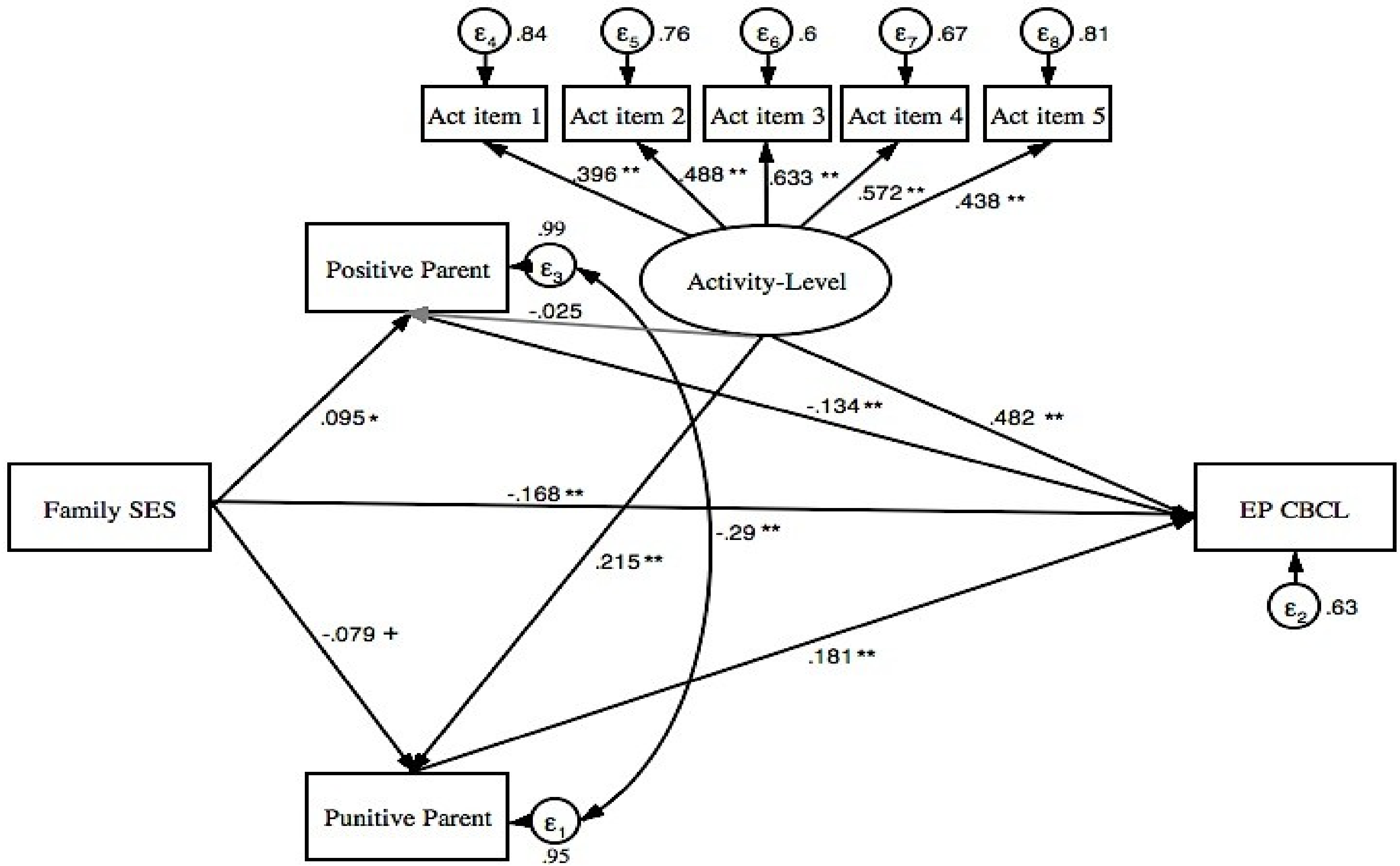
Notes. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.

Figure 14. Activity-Level SEM Model



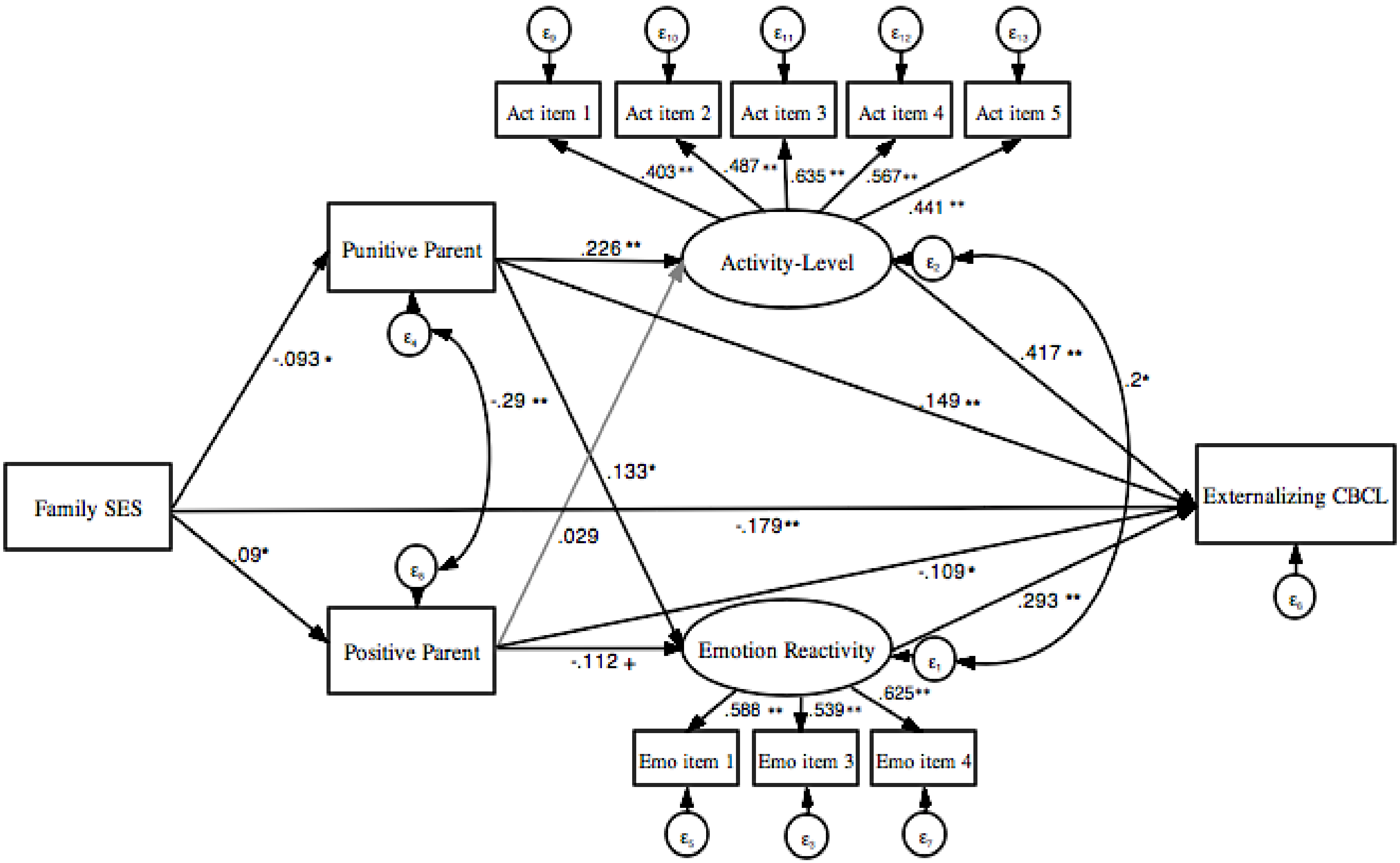
Notes. Non-significant path in grey; $*p < .05$, $**p < .001$; χ^2 (22) = 28.83, p = .15, CFI = .985, TLI = .975, RMSEA = .026, SRMR = .030.

Figure 15. Inverse Activity-Level SEM Model



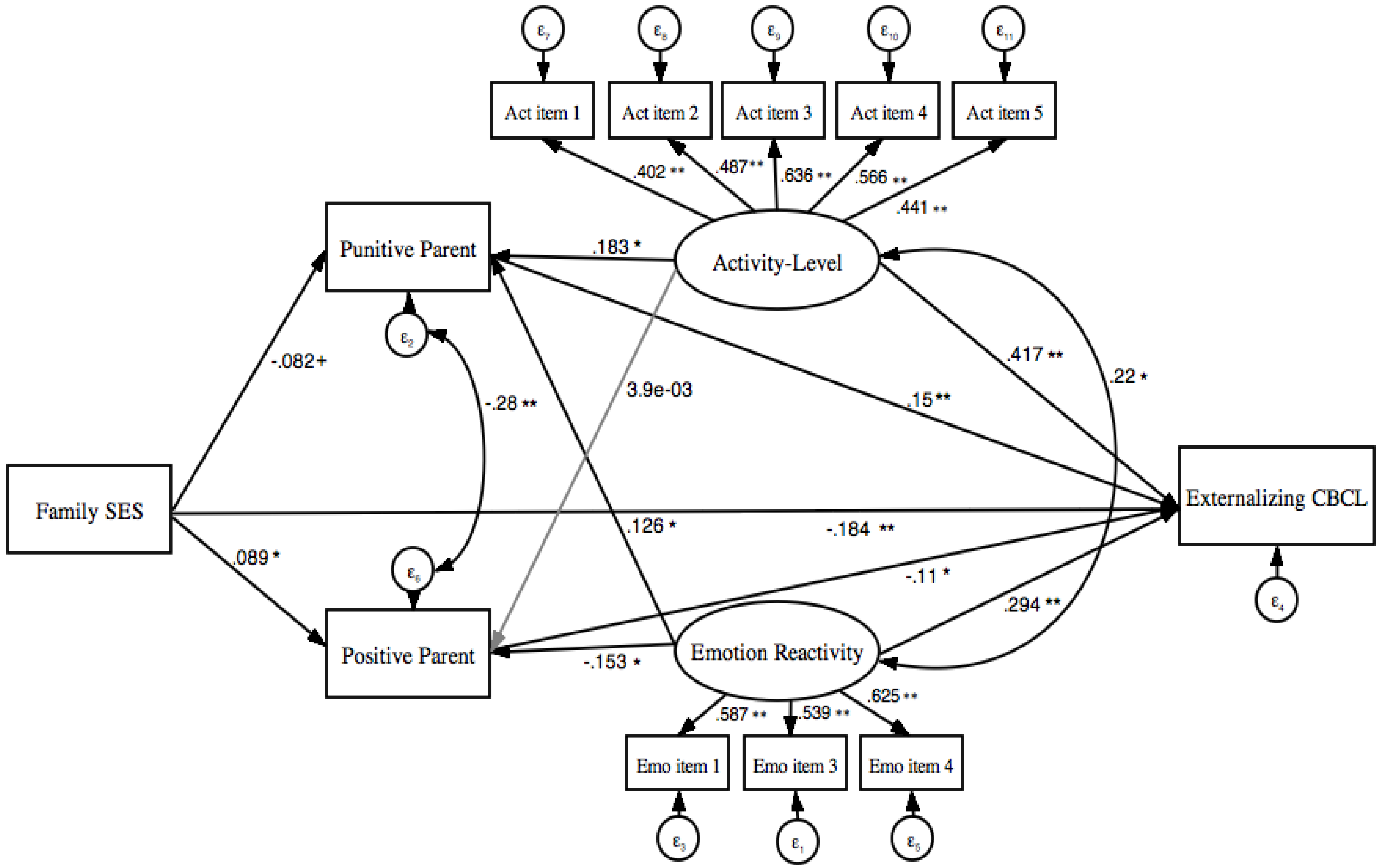
Notes. Non-significant path is in grey; $^{+}p < .1$, $*p < .05$, $**p < .001$; χ^2 (22) = 29.50, p = .13, RMSEA = .027, CFI = .983, TLI = .973, SRMR = .031.

Figure 16. Integrative SEM Model



Notes. Non-significant path in grey; $^{+}p < .1$, $*p < .05$, $**p < .001$; χ^2 (45) = 62.90, $p < .05$, RMSEA = .029, SRMR = .037, CFI = .973, TLI = .960.

Figure 17. Inverse Integrative SEM Model



Notes. Non-significant path in grey; $^{+}p < .1$, $*p < .05$, $**p < .001$; χ^2 (45) = 63.45, $p < .05$, RMSEA = .030, SRMR = .038, CFI = .972, TLI = .959.

Chapter 3: Transition Statement from Study 1 to Study 2

The salience of the preschool years in predicting children's adaptation and success in kindergarten and elementary school is well documented within the current literature. Early regulation of emotions and behaviour appear to play a fundamental role in preschoolers' capacity to adjust to the novel classroom environment both concurrently and longitudinally across middle childhood and beyond (McLelland, Cameron, Connor, Farris, Jewkes, & Morrison, 2007; Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Denham et al., 2014). While the first study of the present dissertation focused on concurrent relationships between multi-level factors predicting early-onset EP, the second study's longitudinal design allowed for exploration of the ways in which these factors may continue to influence developmental outcomes at school age.

Elementary school entry represents a pivotal transition and an important developmental milestone during which children encounter multiple new challenges and situations. Adaptation to the school environment requires children to learn to adhere to classroom rules/routines, cooperate with authority figures (other than parents), establish peer relationships, and acquire novel academic skills (Pianta et al., 1995; Entwisle & Alexander, 1999). Children's capacity to negotiate pre-academic and social demands plays a critical role in their transition and adaptation to more formal schooling environments, and has long-term implications for educational achievement and interpersonal success (La Paro & Pianta, 2000; McClelland, Acock, & Morrison, 2006; Duncan et al., 2007). In support of this contention, studies have shown that gaps in achievement (e.g., language, pre-literacy, pre-numeracy skills) that are present upon kindergarten-entry tend to maintain relative stability and often become accentuated over time (Entwisle & Alexander, 1999; Zill, 2001; McClelland et al., 2006; von Suchodoletz, Trommsdorff, Heikamp, Wieber, & Gollwitzer, 2009; Bierman et al., 2013).

Consistency in patterns of underachievement likely reflects the cumulative consequences of adjustment problems in the early school years. Since the elementary school curriculum is typically taught in a series of graded steps, gaps in early learning tend to have a lasting influence on children's ability to profit from instruction (La Paro & Pianta, 2000; McClelland et al., 2006 Bierman et al., 2013). Moreover, research suggests that children's early behaviour and interactional styles shape the expectations that teachers hold for them, which in turn, affects classroom performance and achievement. In addition to teachers, social interactions with peers are important early experiences that facilitate the development of fundamental cognitive and self-regulatory skills, and thus, the acquisition of integral academic and interpersonal competencies (Duncan et al., 2007; von Suchodoletz et al., 2009; Blair & Raver, 2015). Poor social skills and/or aversive peer interactions may be particularly detrimental during the early school grades and have wide-ranging implications for future adjustment.

Taken together, a burgeoning body of literature reflects the significance of this early transition with respect to a range of developmental outcomes in middle childhood and beyond (Pulkkinen, 1995; Newman, Caspi, Moffit, & Silva, 1997; Duncan et al., 2007; von Suchodoletz et al., 2009; Bierman et al., 2013). In addition to achievement and cognitive abilities, it is now recognized that school adjustment depends on children's capacity to become an autonomous, sociable, and engaged learner/participant (Reynolds & Bezruczko, 1993; Ramey & Ramey, 1999; La Paro & Pianta, 2000; Blair & Raver, 2015). Accordingly, identifying the predictors of individual differences in behavioural and interpersonal competencies is particularly important during early childhood when school success is gauged largely by classroom behaviour and prosocial engagement with peers and teachers (Lonigan, Bloomfield, Anthony, Bacon, Phillips, Samwel, 1999; DuPaul McGoey, Eckert, VanBrakle, 2001; Rabiner & Malone, 2004; Miller, Goulet, Seifer, Dickstein, Shields, 2004).

As indicated by the Task Force on Dropout Prevention (Barclay & Doll, 2001; Doll & Hess, 2001; Vitaro, Brengden, Larose &, Tremblay, 2005), longitudinal studies beginning at preschool age are needed to delineate developmental precursors and contextual influences that promote early learning and school adjustment; ultimately, this will aid in the design of effective preventative interventions that could be implemented at younger ages before school problems become more entrenched and resistant to change. Consequently, Study 2 of the present dissertation followed a large-scale preschool sample across the transition to elementary school in order to investigate a range of multilevel factors, and their continuing influence on academic, social, and behavioural adjustment outcomes at school age. While findings from Study 1 underscored the contributions of temperament, parenting, maternal emotional expression, and family environment to EP at preschool age, Study 2 investigated direct, indirect, and interactive relationships between these factors and early-onset IP/EP in the context of a longitudinal design.

Chapter 4: Dissertation Study 2

Early Childhood Predictors of Adjustment Outcomes at School Age: A Longitudinal Investigation of Direct, Mediating, Moderating, and Bidirectional Relationships

Manuscript to be submitted

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Early Childhood Predictors of Adjustment Outcomes at School Age: A Longitudinal Investigation of Direct, Mediating, Moderating, and Bidirectional Relationships

The significance of academic and social competence throughout childhood and adolescence is well documented in the extant literature, as are the costs associated with educational and interpersonal problems. Patterns of underachievement, social withdrawal, and peer rejection or victimization have been linked to a number of maladaptive outcomes across the lifespan, including school failure and/or dropout, substance-use, delinquency, teenage pregnancy, unemployment, and welfare dependency (Baydar, Brooks-Gunn, & Furstenberg, 1993; Brier, 1995; Coley & Chase-Lansdale, 1998; Obot & Anthony, 2000; Duncan et al., 2007; Burt & Roisman, 2010). Given such wide-ranging implications, it is crucial to identify the factors that promote positive academic and social outcomes, as well as those associated with school failure and maladjustment.

While longitudinal research on school trajectories is predominantly focused on older child populations, studies have increasingly revealed the significance of early child development, and suggest that academic and interpersonal outcomes are largely contingent on the acquisition of fundamental competencies during this period (DiLalla, Marcus, & Wright-Phillips, 2004; Burt & Roisman, 2010; Blair & Raver, 2015; Waller et al., 2015). The ways in which children adapt to the early demands of the school environment appear to be implicated in trajectories toward high school graduation or dropout. Whereas positive academic and social experiences in the early grades typically forecast continued success, negative experiences (e.g., learning difficulties, peer rejection/victimization) tend to predict persistent psychosocial and educational struggles, including high school non-completion (Battin et al., 2000; Janosz et al., 2000; Bierman et al., 2013). Studies have shown that gaps in achievement that are present upon kindergarten-entry tend to maintain relative stability and often become accentuated over time (Entwisle & Alexander, 1999; Zill, 2001; Serbin, Stack, & Kingdon, 2013). Moreover, children's early behaviour and interactional styles have been found to shape the expectations that teachers hold for them, which in turn, affect classroom performance and achievement (Fantuzzo, Bulotsky-Shearer, Fusco, & McWayne, 2005; Webster-Stratton, Reid, & Stoolmiller, 2008). Social interactions with peers also represent important early experiences that facilitate the development of cognitive and self-regulatory skills, and thus, the acquisition of fundamental competencies.

Taken together, a burgeoning body of evidence reflects the significance of the early childhood period with respect to developmental outcomes at school age and beyond; aversive experiences during the school transition appear to be particularly deleterious and to place children at-risk for a variety of psychosocial and physical health problems (Pulkkinen, 1995; Newman, Caspi, Moffit, & Silva, 1997; Vitaro, Brendgen, Larose, & Tremblay, 2005; Burt & Roisman, 2010; Stack et al., 2012; Bierman et al., 2013). Consequently, school-entry represents a pivotal transition and an important developmental milestone during which multiple new challenges are faced. The capacity to meet these challenges early on is crucial for long-term adjustment, and academic and social success.

Despite the magnitude of the aforementioned findings, little is known about the factors that contribute to adjustment and/or maladjustment during this early transition, or the ways in which these factors shape developmental outcomes. To date, research with preschool populations has primarily focused on the contribution of emergent cognitive skills to subsequent achievement (e.g., Alexander & Entwisle, 1988; Fergusson & Lynskey, 1997; Bennett, Brown, Boyle, Racine, & Offord, 2003). Studies have shown that upon school-entry, deficits in working memory, verbal abilities, and pre-literacy skills hinder children's capacity to adapt to kindergarten and have lasting effects on learning, achievement, and classroom performance (Erickson & Pianta, 1989; Entwis,e & Alexander, 1999; Zill, 2001; Duncan et al., 2007). Albeit informative, such studies fail to provide information about the influence of the environment or related competencies/problems beyond cognitive skills (such as phonological awareness, print knowledge, letter-number recognition, and expressive/receptive vocabulary) on achievement at school age (Whitehurst & Lonigan, 1998). As children's cognitive abilities account for only 25% of the variance in academic outcomes overall (Pianta & McCoy, 1997; Pianta, Rimm-Kaufman, & Cox, 1999), there has been growing recognition of the need to consider developmental precursors to school adjustment from a broader, more integrative perspective (Chen, Huang, Chang, Wang, & Li, 2010; Bierman et al., 2013). Importantly, recent findings have demonstrated that children's behaviour prior to kindergarten entry represents a significant predictor of multiple areas of school difficulty (e.g., low GPA in the elementary years, grade retention in the secondary years; specialized classroom placement), even after controlling for concurrent cognitive skills (Bierman et al., 2013).

Focusing on early childhood risk factors and the variables that mitigate or compensate for early risk is likely to be more effective than addressing problems at later stages of development (Burt & Roisman, 2010; Ciciolla, Gerstein, & Crnic, 2014; Blair & Raver, 2015; Waller et al., 2015). As the pathways and mechanisms implicated in trajectories of adaptation and maladjustment remain largely elusive, a critical research objective of the current study was to clarify how these processes unfold over time (Bronfenbrenner & Morris, 1998; 2006; Vitaro, Brendgen, Larose, & Tremblay, 2005; Chen, Deater-Deckard, & Bell, 2014). In addition to investigating internal (child-level) and environmental factors, and their mechanisms of influence, the transactional or interactive contributions of multilevel factors were explored in the context of developmental outcomes at school age (Sameroff, 2009; 2010). In accord with a bioecological systems perspective (Bronfenbrenner & Morris, 1998; 2006) and transactional model of development (Sameroff, 2009; 2010), academic and social adjustment outcomes were conceptualized as emerging from multiple developmental pathways that encompassed ongoing transactions between multiple influences (Burgess, Rubin, Cheah, & Nelson, 2001; Weems & Stickle, 2005; Vitaro et al., 2005; Muris, 2006; Kingston, Huang, Calzada, Dawson-McClure, & Brotman, 2013).

In addition to emergent cognitive abilities, it is now recognized that school adjustment is contingent upon children's capacity to become autonomous, sociable, and engaged learners (Reynolds & Bezruczko, 1993; Ramey & Ramey, 1999; Vitaro et a., 2005; Burt & Roisman, 2010; Blair & Raver, 2015; Waller et al., 2015). Identifying the predictors of individual differences in behavioural and interpersonal competencies is particularly important during early childhood when school success is gauged largely by classroom behaviour and prosocial engagement with adults and peers.

Behaviour Problems and School Age Adjustment

Behavioural competence has been identified as one of the key components of early school success; children who are not behaviourally competent upon entry into kindergarten have been shown to be at increased risk for persistent internalizing and externalizing problems (IP, EP, respectively), social adversity, and underachievement (Raver, 2002; Raver & Knitze, 2002; Burt & Roisman, 2010; Metcalfe et al., 2013; Waller et al., 2015). It is suggested that early-onset behaviour problems interfere with normative development and with the acquisition of age-appropriate cognitive, academic, and interpersonal skills (Campbell, 2002; Doctoroff, Greer, &

Arnold, 2006; Metcalfe, Harvey, & Laws, 2013; Waller et al., 2015). As such, an area of particular interest for the present study was the early emergence of behaviour problems, and the ways in which children's environments may exacerbate or attenuate maladaptive patterns of internalizing and externalizing behaviours, and thereby affect subsequent adjustment.

The emergence of EP at preschool age has been shown to predict high school failure and non-completion above and beyond such factors as child sex and family socioeconomic status (SES; Vitaro, Larocque, Janosz, & Tremblay, 2001; Vitaro et al., 2005; Blair & Raver, 2015). Not only does early-onset EP confer increased risk for substance abuse, social problems, and learning difficulties, it is also associated with heightened levels of parental stress, familial conflict, and injury rates (Vitaro et al., 2005; Jackson, Choi, & Bentler, 2009; Burt & Roisman, 2010; Metcalfe et al., 2013). Such wide-ranging costs underscore the importance of early detection and intervention to minimize dysfunction, and to improve the prognosis for children and families (McGoey, Eckert, & Dupaul, 2001; Arons, Katz-Leavy, Wittig, & Holden, 2002; Smith & Corkum, 2007).

The adverse effects of early-emerging IP have also been documented (Pulkkinen, 1995; Newman, Caspi, Moffit, & Silva, 1997; Hirshfeld-Becker & Biederman, 2002; Gilliom & Shaw, 2004; Mills, Hastings, Serbin, Etezadi, Stack, et al., 2012). In addition to linkages with psychosocial impairment, low self-esteem, and substance use, results have indicated that early childhood represents one of the most common periods of onset, with IP often becoming more evident during the transition to elementary school (Rapee, 2002; Gilliom & Shaw, 2004; Clark, Rodgers, Caldwell, Power, & Stansfeld, 2007; Sterba, Prinstein, & Cox, 2007). In addition to social struggles, early-onset IP has been associated with underachievement and impairments in adaptive functioning, including deficits in expressive and receptive language (Coplan et al., 2001; Crozier & Perkins, 2002; Spinrad et al., 2004). Consequently, the emergence of IP in early childhood appears to confer increased risk for enduring patterns of problem behaviour and suboptimal adjustment outcomes across academic and interpersonal domains (Caprara et al., 2000; Welsh, Parke, Widaman, & O'Neil, 2001; Vitaro et al., 2005; Jackson et al., 2009; Metcalfe et al., 2013).

Temperament and School Age Adjustment

In addition to broadband behaviour problems, research has focused on children's emotional/behavioural styles and the role of temperament, or dispositional traits, in predicting adjustment-related outcomes (Guerin, Gottfried, Oliver, & Thomas, 1994; McClelland, Morrison, & Holmes, 2000). As mentioned previously, the commencement of formal schooling is an important transition requiring substantial adaptation on the part of the child; temperament characteristics are therefore likely to influence the ease with which children negotiate these pivotal changes (Sanson, Hemphill, & Smart, 2004; Burt & Roisman, 2010). Despite biological underpinnings, contextual parameters and environmental factors play a considerable role in the expression and modification of temperament over time; consequently, adjustment outcomes are partially contingent on the individual characteristics of the child, and partially contingent on the way in which those characteristics "fit" with the particular environment(s) provided (Thomas & Chess, 1986).

Given the range of demands inherent to the school context, it is likely that certain temperament characteristics may be more conducive to positive adaptation than others. As suggested by the existing literature, the constructs of activity-level and emotion regulation or reactivity represent important dispositional attributes that shape the way in which children negotiate and adapt to the school setting (Sanson et al., 2004). A child's capacity to regulate his/her emotions and behaviours is critical for acquiring emergent academic and social skills (McCoy & Raver, 2011; Chen, Deater-Deckard, & Bell, 2014). While normative maturation of self-regulatory abilities has been associated with greater achievement, peer acceptance, and behavioural and interpersonal competencies (Miller et al., 2006; Choe, Olson, & Sameroff, 2013; Blair & Raver, 2015), heightened emotion reactivity and temperamental activity-level have been associated with early-emerging and persistent problem behaviour (Goldsmith, Aksan, Smider, & Vandell, 2001; Blair 2002; Miller et al., 2004), social struggles (Denham et al., 2001), peer rejection, and poorer overall classroom adjustment (Miller & Olson, 2000; Shields et al., 2001; Fabes et al., 2002; Rubin, Burgess, & Hastings, 2002; Morris et al., 2006; Metcalfe, Harvey, & Laws, 2013); consequently activity-level and emotion reactivity were included in the present study as specific foci of interest.

Activity-Level. Given the propensity for young children to exhibit highly active motor behaviour and to become easily distracted, the early school transition represents a pivotal milestone that requires a marked shift toward sedentary, focused behaviour in a number of daily situations. Children's adaptation to such environmental constraints is far from uniform and is subject to the influence of dispositional characteristics such as activity-level. Parents and teachers often view high levels of physical activity as problematic and as an impediment to learning (Campbell, Eaton, & McKeen, 2002), and failure to modulate motor activity in early childhood has been associated with subsequent deficits in social competence, fine motor coordination, achievement, and verbal abilities (Strelau, 1998; Lonigan, Bloomfield, Anthony, Bacon, Phillips, Samwel, 1999; Nelson et al., 1999; Caspi et al., 2000; DuPaul McGoey, Eckert, VanBrakle, 2001; Rabiner & Malone, 2004; Miller, Goulet, Seifer, Dickstein, Shields, 2004; Chen et al., 2014). Although such findings suggest that lower activity may be advantageous, particularly in school settings where immobility is rewarded and often required, additional studies have documented significant inverse associations between activity-level and behavioural regulation, school marks, and other achievement variables, after controlling for the effects of IQ (Victor, Halverson, & Montague, 1985; Martin, 1989; Weithorn, Kagen, & Marcus, 1984; Bronson, 2000).

A conflicting line of research, however, suggests that high activity-level is adaptive in early childhood, not only for the development of physical and motor skills (Von Hofsten, 1993), but also for cognitive maturation (Dowsett & Livesey, 2000; Passolunghi & Siegel, 2001). Such studies have demonstrated significant positive relationships between motor activity and emergent cognitive functioning, and suggest that greater motor activity may contribute to improved inhibitory control and regulation of behaviour (Goldsmith, 1996; Bronson, 2000; Bull & Scerif, 2001; Blair & Razza, 2007). In light of these inconsistencies, a better understanding of the associations between early activity-level and later developmental outcomes is warranted, and may be particularly important in elucidating a more integrative view of the factors implicated in school/social adjustment (Eaton et al., 2001; Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Lengua, 2006; Blair & Raver, 2015).

Emotion Reactivity. Similar to activity-level and regulation of behaviour, adaptive developmental outcomes also appear to be contingent upon children's modulation and expression of emotions. As such, emotion regulation and reactivity represent important temperament constructs that may have profound implications for school and social adjustment outcomes, particularly during the early school transition. Research has suggested that emotion reactivity is associated with difficulties regulating negative emotions, and the processes of monitoring, evaluating, and modifying affective reactions (Campos et al., 1983, Zahn-Waxler, Klimes-Dougan, & Slattery, 2000). In this way, emotion reactivity appears to represent a biological propensity towards heightened physiological reactivity and a reduced capacity to regulate negative arousal, and associated affective experiences. Situations that are mildly stressful for most children, may elicit significantly greater levels of intense negative affect in children who are highly emotionally reactive. In this way, the school transition may evoke increased risk for the experience and expression of moderately high levels of fearfulness, distress, and anxious arousal for highly emotionally reactive children, and thereby confer greater risk for the emergence of school and social adjustment problems (Kagan, Reznick, & Snidman, 1988a; Kagan, Snidman, Zetner, & Peterson, 1999; Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Hirshfeld-Becker, Micco, Henin, Bloomfield, Biederman, & Rosenbaum, 2008).

Given that young children are reliant on and interact primarily with parents/caregivers during this period, temperament attributes, such as emotion reactivity and activity-level may have profound implications in shaping parent-child interactions, relationship quality, and parental socialization practices (e.g., Lehman, Steier, Guidash, & Wanna, 2002; van Bakel & Riksen-Walraven, 2002; Bryan & Dix, 2009; Chen et al., 2014; Waller et al., 2015).

Parenting and School Age Adjustment

The contribution of parents/caregivers to the acquisition of self-regulatory skills and developing competencies has received increasing attention given the primary role that parents are ascribed in managing children's early emotions and behaviours. In addition to self-regulation, studies have shown that parenting affects the development of cognitive and interpersonal competencies via dyadic teaching interactions that facilitate the acquisition of knowledge, and increasingly complex thinking and problem-solving skills (e.g., Belsky, Hsieh, & Crnic, 1998; Morris, Silk, Steinberg, Sessa, Avenevoli, & Essex, 2002).

In an effort to identify modifiable risk factors and to elucidate the constituents of adjustment problems, studies have investigated parenting practices and dyadic parent-child interactions. To date, parenting behaviours related to the dimensions of warmth and rejection have been a central focus in developmental research (e.g., Pettit, Bates, & Dodge, 1997; Domitrovich & Bierman, 2001; Joussemet, Koestner, Lekes, & Landry 2005; Stack, Serbin, Enns, Ruttle, & Barrieau, 2010; Chen et al., 2014). The impact of supportive parenting on children's adjustment to elementary school was investigated in a longitudinal study from preschool to third grade (Joussemet et al., 2005). Results demonstrated that highly supportive parenting in early childhood was predictive of greater achievement, classroom behaviour, and interpersonal competencies at school age after controlling for the effects of gender, IQ, and family SES, as well as for adjustment at preschool age. These findings revealed the lasting contribution of supportive parenting to preschoolers' adaptive functioning, and to the acquisition of social, self-regulatory, and academic competencies across the school transition. In contrast to supportive parenting, a considerable body of evidence has shown that preschoolers are more likely to exhibit behaviour and adjustment problems when parents are highly critical, derisive, and/or less responsive (Dumas & LaFreniere, 1993; Bayer, Sanson, & Hemphill, 2006; Calkins et al., 2007). Specifically, highly punitive parenting has been associated with behavioural and interpersonal problems in early childhood and following elementary school entry (Hart, DeWolf, Wozniak, & Burts, 1992; Choe, Olson, & Sameroff, 2013), as well as with underachievement, maladaptive classroom behaviour, and impaired social functioning with peers and teachers (Fletcher, Walls, Cook, Madison, & Bridges, 2008; Chen et al., 2014).

In accord with a bioecological systems perspective and transactional model of development, evidence has shown that parenting interacts with child characteristics to predict subsequent adjustment outcomes (Bronfenbrenner & Morris, 1998; 2006; Sameroff, 2009; 2010). While the majority of research has focused on the ways in which maladaptive parenting exacerbates temperamental vulnerabilities and heightens risk for academic and social problems (Rubin et al., 2001; Jackson, Choi, & Bentler, 2009; Chen et al., 2014; Ciciolla, Gerstein, & Crnic, 2014), certain studies have revealed the protective effects of positive parenting, which appears to promote adaptive functioning in temperamentally vulnerable children (Early, Rimm-Kaufmann, Cox, Saluja, Pianta, Bradley, & Payne, 2002; Waller et al., 2015). Specifically, Early and colleagues (2002) investigated maternal sensitivity in the context of observed child temperament and subsequent adjustment following kindergarten-entry. Their findings provided evidence of moderation via sensitive parenting for emotionally reactive children; relative to those whose mothers displayed less sensitive parenting, emotionally reactive children who experienced highly sensitive parenting were significantly less likely to manifest socially withdrawn and disengaged classroom behaviour at follow-up, and displayed higher levels of active engagement and prosocial classroom participation. Such results revealed the protective effects of positive parenting for emotionally reactive children, and suggest that early temperamental vulnerabilities may be overcome by maternal behaviour that is appropriately sensitive and responsive (Early et al., 2002; Stack et al., 2012; Serbin, Hubert, Hastings, Stack, & Schwartzman, 2014).

Additional research provides evidence that maladaptive parenting behaviour may exacerbate emotion reactivity and related dispositional tendencies during early childhood (Rubin, Cheah, & Fox 2001; Rubin, Burgess, & Hastings, 2002; Degnan, Henderson, Fox, & Rubin, 2007; Hane, Cheah, Rubin, & Fox, 2008; Chen et al., 2014). In their two-year longitudinal study, Rubin and colleagues investigated the effects of early childhood temperament and parenting behaviour (Rubin, Burgess, & Hastings, 2002). A significant interaction between child temperament and maternal behaviour suggested that emotion dysregulation was exacerbated by maternal behaviour that was highly critical or punitive in nature. Together, their results suggested that parenting may moderate the expression and continuity of temperament over time, and that critical maternal behaviour may be particularly detrimental for highly emotionally reactive children, and contribute to greater levels of subsequent behaviour and interpersonal problems (Rubin et al., 2002). Related longitudinal studies have demonstrated similar interactions between temperament and parenting in early childhood, and subsequent adjustment problems at school age. Overall, such evidence suggests that maladaptive parenting may be particularly detrimental for emotionally reactive and/or overly-active children, and may thereby contribute to the onset and/or persistence of increased behavioural, self-regulatory, academic, and interpersonal problems (Cheah, Rubin, & Fox, 1999; Degnan et al., 2008; Hane et al., 2008; Szabo et al., 2008; Choe et al., 2013; Chen et al., 2014).

Maternal Negative Emotionality and School Age Adjustment

In addition to parenting behaviour, parents' personal characteristics may also play an integral role in shaping developmental outcomes of offspring (Feng, Shaw, & Silk, 2008; Letcher, Smart, Sanson, & Toumbourou, 2008). Although prior studies have implemented measures of maternal depression (e.g., Rosenbaum et al., 2000; Degnan et al., 2008), fewer have assessed the effects of maternal emotionality on child behaviour or adjustment at school age. The extant literature suggests that psychologically vulnerable or depressed parents may be more likely to express negative affect, to direct feelings of frustration/distress toward their children, and to resort to more automatic, less effective parenting. Such research has demonstrated significant associations between maternal depression and the degree to which maladaptive parenting practices are implemented (Ginsburg & Schlossberg, 2002; Choe et al., 2013, Ciciolla et al., 2014). Evidence has further indicated that anxious/depressed parents display heightened levels of negative affect, and critical, coercive, and controlling behaviour during parent-child interactions, as well as lower levels of warmth, responsiveness, and sensitivity; this in turn, may compromise children's acquisition of emotional and behavioural self-regulatory abilities thereby leading to subsequent adjustment problems (Hudson & Rapee, 2001; Adam, Gunnar, & Tanaka, 2004; Ginsburg, Grover, & Ialongo, 2006; Bogels & Brechman-Toussaint, 2006; Choe et al., 2013).

Research supporting this contention has underscored the indirect effects of maternal characteristics on child adjustment outcomes by way of positive and/or negative parenting (Wright, George, Burke, Gelfand, & Teti, 2000; Sohr-Preston & Scaramella 2006; Jackson, Bentler, & Franke, 2006; Trapolini, McMahon, & Ungerer, 2007), as well as emotion and behavioural self-regulation (Choe et al., 2013; Blair & Raver, 2015). Findings have suggested that maternal negative emotionality contributes to maladaptive parenting, particularly when children exhibit more difficult temperament and/or interactional styles. Consequently, mediating relationships have been demonstrated between maternal negative emotionality and less optimal adjustment outcomes in children via more critical/punitive parenting (Feng et al., 2008; Letcher et al., 2008).

The nature of these associations, however, remains largely ambiguous as discrepant evidence indicates that characteristics of the child elicit specific types of parental behaviour regardless of maternal emotionality or diagnostic status (Woodruff-Borden et al., 2002; Turner et al., 2003; Moore, Whaley, & Sigman, 2004; Ginsburg et al., 2006). Such research suggests that parenting behaviour is driven by characteristics of the child, although additional longitudinal studies are required to elucidate this relationship more fully (Gar & Hudson, 2008). Accordingly, the present study not only explored the indirect effects of maternal negative emotionality on child adjustment via parenting, but also the indirect effects of parenting on adjustment outcomes by way of children's early temperament characteristics.

Contextual Family Risk

Contextual factors such as family socioeconomic status (SES) are similarly thought to influence child adjustment, in part, through their impact on parenting behaviour. Evidence suggests that socioeconomic disadvantage contributes to elevated levels of parental stress and depressive symptoms, which in turn, undermines parents' ability to respond nurturantly to their children (Jackson, Brooks-Gunn, Huang, & Glassman, 2000; Jackson, Choi, & Bentler, 2009; Kingston, Huang, Calzada, Dawson-McClure, & Brotman, 2013). Economic hardship has been linked to diminished parental responsiveness, warmth, and sensitivity, as well as to more critical, punitive, and rejecting parenting (Jackson, Bentler, & Franke, 2006). Studies have shown that young children from disadvantaged homes are at greater risk for school problems as they transition to elementary school, and exhibit persistent adjustment difficulties in interpersonal, behavioural, and educational domains. Compared to their higher SES counterparts, preschoolers from disadvantaged backgrounds typically have poorer emergent academic and social skills (Gershoff, Aber, Raver, & Lennon, 2007; Lapointe, Ford, & Zumbo, 2007; Lesaux, Vukovic, Hertzman, & Siegel, 2007; Jackson et al., 2009), as well as higher rates of behaviour problems, and poorer achievement throughout middle childhood and adolescence (McLoyd, 1998; Ackerman et al., 1999; Reynolds, Ou, & Topitzes, 2004; Entwisle, Alexander, & Olson, 2005).

Whereas greater risk for maladjustment may be partially attributable to the impact of socioeconomic disadvantage on parental stress, emotionality, and/or parenting practices, socioeconomic resources may also influence aspects of the home environment related to early learning and literacy, such as safety and organization, cognitive richness, and/or the provision of stimulating toys and learning materials (Halpern, 1990; Lee & Croninger, 1994). Greater levels of support, structure, and stimulation in the home have been associated with the acquisition of pre-academic and interpersonal skills (Luster & Dubow, 1992; Molfese, DiLalia, & Lovelace, 1996; Serbin et al., 2011; Kingston et al., 2013), while socioeconomic disadvantage has been shown to adversely affect the overall quality of the home environment, and the availability of material and emotional resources (Bradley & Corwyn, 2002; Mistry, Biesanz, Taylor, Burchinal, & Cox, 2004; Saltaris, Serbin, Stack, Karp, & Schwartzman, 2004; Paterson, Farr, & Hastings, 2015). The negative impact of poverty on children's achievement and cognitive, behavioural, and interpersonal functioning has been documented previously (Brooks-Gunn & Duncan, 1997; McLoyd, 1998; Ackerman, Brown, & Izard, 2004; Jackson et al., 2009), and it appears that long-term economic deprivation places young children at-risk for persistent academic and adjustment problems (Duncan et al., 1998; McLoyd, 1998; Raver, 2004; Paterson et al., 2015). Although numerous studies have demonstrated the aversive effects of socioeconomic disadvantage on developmental outcomes, there is limited understanding of the mechanisms through which socioeconomic context impacts academic and interpersonal functioning.

The Current Study

Despite the provision of valuable findings, the current literature is plagued by a number of methodological shortcomings, which have contributed to a relatively simplistic and static view of the factors that influence school and social adjustment. Prior research is limited by its narrow focus on independent predictors, or isolated risk and protective factors. Consequently, the pathways through which child characteristics and social systems combine to predict developmental outcomes are elusive. Given the significance of early childhood development, it is crucial to identify the risk and protective factors that may impact preschoolers' adaptation to the formal school environment. As such, in the present study a bioecological framework was adopted to examine a range of multilevel factors and their predictive contributions to academic and interpersonal outcomes from preschool-age to middle childhood. Direct and indirect pathways to adjustment outcomes were investigated from early child, familial, and contextual variables, as well as the way(s) in which these factors interacted to shape the course of development and adjustment following the school transition. Adjustment outcomes were thus considered from an integrative perspective that accounted for early childhood competencies and social influences that may have continued to impact development.

The present study was designed to investigate the nature of the relationships and predictive capacity of early childhood temperament (emotion reactivity, activity-level) and problem behaviour (IP, EP), positive and negative (punitive, critical) parenting, maternal expression of negative emotionality, and family socioeconomic stress in a large, representative, and heterogeneous Canadian sample of children and their mothers. Following these families over time provided the opportunity to explore children's transition and adjustment to elementary school, a fundamental developmental milestone that has long-standing implications for subsequent academic and interpersonal success.

Objectives. The specific research objectives addressed by the present study were threefold. The first objective was to determine the predictive contributions of family SES, maternal negative emotionality, parenting, early-onset behaviour problems (IP, EP), and temperamental activity-level and emotion reactivity to subsequent academic and social adjustment outcomes following children's transition to elementary school. It was hypothesized that in conjunction with temperamental over-activity and heightened emotion reactivity, early-onset problem behaviour, more punitive, critical, less positive parenting, as well as greater family socioeconomic stress and maternal expression of negative emotionality would predict poorer adjustment outcomes in middle childhood in the form of lower school marks and vocabulary scores, heightened EP, attention, and social problems, as well as poorer social skills.

The second objective was to determine the interactive contribution of children's early characteristics (temperament, behaviour problems) and environmental factors to subsequent adjustment outcomes at school age. It was hypothesized that links between early-onset problem behaviour and school age EP, attention, and/or social problems would be stronger among children who were overly active and/or emotionally reactive as preschoolers. Specifically, it was expected that early-onset EP would be exacerbated by temperamental over-activity and result in problematic adjustment outcomes in middle childhood, and that early-onset IP would be exacerbated by heightened emotion reactivity and also result in greater adjustment problems at school age. It was further hypothesized that links between parenting and school age EP, attention, and/or social problems would be stronger among children with higher levels of early-onset problem behaviour, or among those who were overly active and/or emotionally reactive as preschoolers. In contexts of greater familial socioeconomic stress, it was expected that links between family SES and problematic adjustment at school age would be stronger among children who experienced more punitive parenting and/or less positive parenting in early childhood.

The third objective sought to determine if environments of greater familial socioeconomic stress and/or maternal expression of negative emotionality contributed to adjustment problems via their impact on parental behaviour. It was hypothesized that the relationship between familial socioeconomic stress and school age EP, attention, and/or social problems would be mediated via parenting that was less positive, more punitive, and/or more critical in quality. This was also expected for maternal expression of negative emotionality such that relationships between adjustment problems and maternal negative emotionality would be mediated via less positive, more punitive, critical parenting. In addition to the role of parenting in mediating links between adjustment and both maternal negative emotionality and family SES, a corollary to the third objective addressed the nature of indirect relationships between child temperament and adjustment via parenting; more specifically, this involved examination of the role of parental behaviour in mediating relations between problematic adjustment at school age and temperamental activity-level and/or emotion reactivity. Alternatively, the role of temperament was also examined as mediating links between school age EP and parenting given empirical support for both variants of indirect effects models. It was hypothesized that parenting would contribute to adjustment problems both directly and indirectly through an impact on activity-level and emotion reactivity, and would thereby serve to mediate, at least partially, relations between child temperament and school age EP, attention, and/or social problems. Similar direct and indirect effects were expected in the context of child temperament, such that activity-level and emotion reactivity would serve to mediate, at least in part, relations between parental behaviour and adjustment problems.

Method

Participants

In all of the three samples described below, children were followed longitudinally from preschool to middle childhood to examine their transition and adaptation to elementary school. When children were between 6.62 and 11.67 years of age (M = 8.32, SD = .83) and had completed at least one year of primary school, families were invited to participate in a subsequent study of childhood adjustment; the interval between waves of data collection across samples was approximately 3 years. Overall, the final, integrated sample at follow-up comprised 382 children and their mothers with demographic characteristics as presented in Table 22. Individual sample differences in maternal age, education, and family income paralleled those documented at Time 1. More specifically, mothers in sample 1 were significantly younger than those in sample 2, $t(203) = -11.07$, $p < .001$, and in sample 3 $t(278) = -7.95$, $p < .001$, while mothers in samples 2 and 3 did not differ in age. In addition, proportionately more mothers had a low level of education (high school or less) in sample 1 (65 percent) than in sample 2 (12 percent) or sample 3 (14 percent), χ^2 (8, N = 382) = 157.94, $p < .001$, and proportionately more mothers were in a low income family (below $30,000/year) in sample 1 (40 percent), than in sample 2 (7 percent) or in sample 3 (13 percent), χ^2 (12, N = 375) = 70.64, $p < .001$. On average, children in sample 2 were approximately 13.5 months older than those in sample 1, $t(203) = 8.85$, $p < .001$, and approximately 11 months older than those in sample 3, $t(275) = 13.98$, $p < .001$, while children in samples 1 and 3 did not differ significantly in age $t(278) = 2.32$, $p > .05$. Details about individual samples are described below and are shown in Table 22 (Mills, Hastings, Serbin, Etezadi, Stack, et al., 2012).

Sample 1 (n = 104). The Concordia Longitudinal Risk Project (e.g., Ledingham, 1981; Schwartzman, Ledingham, & Serbin, 1985; Saltaris, Serbin, Stack, Karp, Schwartzman, &

Ledingham, 2004; Serbin, et al., 2004; De Genna, Stack, Serbin, Ledingham, & Schwartzman, 2006; Grunzeweig, Stack, Serbin, Ledingham, & Schwartzman, 2009) is an intergenerational study of long-term trajectories of childhood social withdrawal and aggression. The original sample included over 1770 Francophone (French-speaking) children predominantly from lower income Montreal neighbourhoods in 1976-78. As the original participants (now in their thirties and forties) became parents, assessments of their offspring were conducted at multiple points in time from toddlerhood through adolescence. Of over 469 representative participants in the ongoing Concordia project, 126 had children of an appropriate age (between 2.15 – 6.12 years-old) who agreed to participate at the first point in time (acceptance rate was approximately 78 percent of eligible families). Within-sample mean comparisons demonstrated that these parents did not differ significantly from either the ongoing longitudinal sample or the original Concordia sample of 1770 with regard to socio-demographic and behavioural characteristics, including maternal education, annual family income, occupational prestige, and parental childhood histories of aggression and social withdrawal (Appendix A). Of the 126 participants at Time 1, 104 were followed longitudinally and agreed to participate in the current study with their school age offspring. This is reflective of a relatively low rate of attrition (approximately 17.5 percent) between project phases in reference to comparable lower SES, longitudinal family samples. The 104 participants involved in the present study (55 boys) were second-generation children for whom target variables were assessed first at preschool age and subsequently in middle childhood, as well as their mothers. Within-sample mean comparisons indicated that mothers did not differ significantly from either the ongoing longitudinal sample ($N = 623$) or the original Concordia sample ($N = 1770$) with regard to annual family income or parental childhood histories of aggression and social withdrawal; minimal sample differences in maternal education and occupational prestige were found, such that mothers in the current sample had approximately 0.5 fewer years of education and lower occupational prestige by approximately 3 points (Appendix A). Assessments were done in the home and school settings when children were between 6.62–11.64 years of age ($M = 7.93$, $SD = 1.01$), at which time mothers and teachers completed questionnaires, and children completed a standardized test of verbal ability (vocabulary). Copies of children's final report cards were collected at the end of their respective academic year as a measure of achievement in core subjects (English, French, Math; e.g., Ledingham, 1981; Schwartzman, Ledingham, & Serbin, 1985; Saltaris et al., 2004; Serbin et al., 2004).

Sample 2 (n = 101). In the initial phase of the Daycare and Preschool Adjustment Study (e.g., Hastings, Sullivan, McShane, Coplan, Utendale, & Vyncke, 2008), targeted ads were used to recruit 133 families in greater metropolitan Montreal between 2002 and 2003. Children were between 2 and 5 years of age with varying levels of behaviour problems, ranging from average (at or below the norm) to clinically significant (Achenbach & Rescorla, 2001). Of the original 133 families involved in the initial phase, 101 consented to participate in the present study with their school age offspring. The second wave of data collection for the 101 participants (57 boys) for whom target variables were assessed first at preschool age and subsequently in middle childhood occurred between 2007 and 2009. Assessments were done in home and school when children were between 7.50 and 11.67 years of age (M = 9.07, SD = .81), at which time mothers and teachers completed questionnaires, and children completed a standardized test of verbal ability as well as self-report questionnaire measures. Copies of children's final report cards were collected at the end of their respective academic year as a measure of achievement in core subjects (English, French, Math; e.g., Hastings et al., 2008).

Sample 3 (n = 177). In the initial phase of the Shame in Childhood Study (e.g., Mills, Imm, Walling, & Weiler, 2008), a community sample of 241 families were recruited by Manitoba Health via a letter of invitation sent to 3,500 families drawn at random from 6,358 families residing in Winnipeg; a mid-size city (population 600,000) in the geographic center of Canada. Of the original 241 families involved in the initial phase, 177 consented to participation in the present study with their school age offspring. The 177 participants (76 boys) thus comprised children for whom target variables were assessed first at preschool age and subsequently in middle childhood, as well as their mothers. The first wave of data collection began in February 2003 when children were between 3 and 4 years of age, while the second phase occurred between 2006-2007; these assessments were done in home, school, and laboratory settings when children were between 7.00 and 9.42 years of age (M = 8.12, SD = .29), at which time mothers and teachers completed questionnaire instruments, and children completed a standardized test of verbal ability as well as self-report questionnaire measures. Copies of children's report cards were collected as a measure of achievement in core subjects (English, French, Math).

Measures

Child Behaviour and Adjustment Problems. In all samples, children's Externalizing behaviour, Social and Attention problems were assessed via maternal and teacher ratings on the *Child Behavior Checklist* and *Teacher Report Form* respectively (CBCL; TRF; Achenbach, 1991; Achenbach & Rescorla, 2001). These well-validated questionnaire measures provide information about children's behaviour, attention, and interpersonal functioning across home and school environments, and are among the most widely used tools for assessing problem behaviour in children and adolescents. With highly established internal consistency and test-retest reliability across clinical and community samples, the 113 items of the CBCL are rated on a 3-point response scale ranging from 0 (*not true as far as you know*) to 2 (*very true or often true)*. The Externalizing Problems index is one of two broadband scales and assesses behaviours related to hyperactivity, aggression, and defiance; the Social Problems and Attention Problems subscales were also used in the current study as measures of child adjustment. For all scales, maternal ratings on relevant items (i.e., raw scores) were converted to T-scores based on population norms according to age and gender.

Similar to the CBCL, the TRF has well-established internal consistency and test-retest reliability, and includes 113 items rated by teachers on a 3-point response scale (Achenbach, 1991; Achenbach & Rescorla, 2001). The TRF was designed to measure functional abilities across academic domains and assesses behaviours related to attention, impulsivity, and interpersonal problems, as well as broadband indices of Internalizing and Externalizing Problems (Achenbach, 1991; Achenbach & Rescorla, 2001). T-scores from the Social Problems and Attention Problems subscales were used in the current study, as well as T-scores from the Externalizing Problems index, which is comprised of Rule Breaking and Aggressive Behavior subscales.

Social Skills. Mothers and teachers in samples 2 and 3 completed the *Social Skills Rating System* (SSRS; Gresham & Elliot, 1990) to assess children's social skills across multiple settings. The 38-item SSRS-Parent Form encompasses 4 subscales in which parents rate the frequency and importance of children's social behaviours on a 4-point scale ranging from 0 (*never*) to 3 (*very often*). The Cooperation scale includes behaviours such as helping family members, completing household chores, and using time appropriately, while the Assertion scale includes initiating behaviours or interpersonal interactions, such as starting conversations, accepting friends' ideas for play, and reporting accidents to appropriate persons. The Self-Control scale targets behaviours that emerge in conflict situations, such as responding or speaking in an appropriate manner, receiving criticism, and controlling temper, while the Responsibility scale encompasses behaviours that demonstrate the ability to communicate with adults, as well as regard for property or work. In the current study, total scores were computed by averaging maternal ratings on each of the four aforementioned subscales of the Parent Form to obtain an overall measure of children's social skills as reported by mothers.

The 30-item SSRS-Teacher Form similarly comprises the Cooperation, Assertion, and Self-Control subscales in which children's classroom social behaviours are rated on a 4-point scale from 0 (*never*) to 3 (*very often*). The Cooperation scale includes such behaviours as sharing materials, following directions, and paying attention, while the Assertion scale includes initiating behaviours, such as starting conversations with peers, volunteering to help with classroom tasks, and asking for help when needed. Finally, the Self-Control scale assesses behaviours that emerge in conflict situations, such as responding appropriately to teasing, and in non-conflict situations that require taking turns and compromising. Total scores were computed by averaging teacher ratings on each of the three aforementioned subscales to obtain an overall measure of children's social skills as reported by teachers. For children in samples 2 and 3, SSRS-Total scores as rated by mothers and teachers served as measures of social competence at school age; however, because these data were not available for sample 1 participants, these children were excluded from corresponding analyses thereby reducing the size of the pooled sample.

Academic Achievement. Children's final report card marks during the most recently completed school year were collected to assess academic achievement in English, French, and Math. Because schools differed in their measurement of grades on report cards, school marks in each subject were converted to a 4-point scale ranging from 1 (*doesn't meet the expectation*) to 4 (*exceeds the expectation*), and subsequently averaged to create an overall measure of academic achievement (e.g., Ledingham, 1981; Schwartzman et al., 1985; Serbin et al., 2004; Serbin, Stack, & Kingdon, 2013).

Cognitive Verbal Ability. While all children completed a standardized measure of verbal ability in the form of a performance-based test of vocabulary, assessment instruments varied across samples. In sample 1, children (N = 104) completed the Vocabulary subtest of the *Stanford-Binet Intelligence Scale - Fourth Edition* (SB-IV; Thorndike, Hagen, & Sattler, 1986), while in sample 2, children completed either the Vocabulary subtest of the *Wechsler Intelligence*

Scale for Children - Fourth Edition (N = 19; WISC-IV; Wechsler, 2003), or the Verbal Knowledge subtest of the *Kaufman Brief Intelligence Test - Second Edition* (N = 82; KBIT-2; Kaufman & Kaufman, 2004). In sample 3, the Vocabulary subtest of the *Wechsler Abbreviated Scale of Intelligence – Second Edition* (WASI-II; Wechsler, 2011) was administered to children (N = 174) as an alternate form of the WISC-IV. Similar in structure and content, the SB-IV and Wechsler Vocabulary subtests (WISC-IV, WASI-II) were designed to measure word knowledge and verbal concept formation by requiring the child to provide a verbal definition for a range of items presented both visually and orally. Demonstrating high convergent validity with overall verbal IQ, the Wechsler Vocabulary subtests are highly correlated with academic achievement in such areas as Reading (.72), and both Oral and Written Language (.73 and .64, respectively; *WISC-IV Technical and Interpretive Manual,* The Psychological Corporation, 2003, Table 5.15). Significant correlations between verbal indices of the Wechsler Intelligence Scales and Stanford-Binet IV have been demonstrated by a range of independent studies (e.g., Rothlisberg, 1987; Phelps, Bell, & Scott, 1988; Carvajal et al., 1993; Lavin, 1996; Rust & Lindstrom, 1996), and evidence of strong psychometric properties of the SB-IV has been well documented.

Also highly correlated with verbal indices of the Wechsler Intelligence Scales (WISC-IV, WASI-II), is performance on the KBIT-2 Verbal Knowledge subtest, a 60-item measure of receptive vocabulary, verbal concept formation, and lexical knowledge associated with word meaning (Flanagan & Ortiz, 2001; Kaufman & Kaufman, 2004). Across age groups, verbal subtests of the Wechsler Intelligence Scales and KBIT-2 have demonstrated high internal consistency (WISC-IV Vocabulary = .89, KBIT-2 Verbal = .90) and test-retest reliability (WISC-IV Vocabulary = .85; KBIT-2 Verbal = .91), as well as strong concurrent, convergent, and discriminant validity with measures of cognitive ability and academic achievement (Kaufman & Lichtenberger, 2002; Kaufman & Kaufman, 2004; 2005; Wechsler, 2003; 2008c; 2011).

Within each of the individual samples, raw scores on each respective subtest were converted to scaled scores (M = 10, SD = 3) based on the child's performance and chronological age at the time of testing. Scaled scores were then centered within each sample separately prior to being pooled and added to the integrated sample.

Procedure

When children in each of the three samples reached school age, families were contacted in order to invite them to participate in a follow-up study of children's school adjustment. Parents provided verbal/written consent for research participation, which included laboratory or school-based testing, completion of questionnaire measures, and the release of their child's school records (i.e., report cards). Following agreement to participate, parents completed questionnaires assessing children's academic and interpersonal functioning (See Table 23 for assessment instruments used at both time points), and school principals and/or teachers were contacted regarding study enrollment. In samples 1 and 2, individual appointments with each child participant were arranged at his/her respective school setting; at the time of school visits, children's teachers were solicited to complete questionnaires targeting children's academic and social functioning, which they subsequently returned via mail. At the end of the school year, schools were re-contacted in order to obtain copies of children's final report cards. In sample 3, a laboratory visit was arranged with each family to complete individual testing, and teachers were subsequently contacted to request completion of relevant questionnaire measures. Data collection occurred across the period of a year and information from teachers was requested following laboratory visits.

Results

Preliminary Analyses. Analyses for the integrated sample were conducted using data centered within each constituent sample; mean centers were thus computed for each sample separately by subtracting individual scores from the sample mean. Centering served to control for between-group variance by ensuring that all variances would range around zero. Measures of school adjustment included vocabulary performance, mean report card marks (Math, French, English), and ratings of attention problems (CBCL, TRF) and classroom behaviour (TRF), while social adjustment was evaluated on the basis of maternal-report of problem behaviour (CBCL) and ratings of social problems (CBCL, TRF). In samples 2 and 3, additional adjustment measures comprised maternal and teacher ratings of children's overall social skills (SSRS-Total).

Sample Differences. Descriptive statistics and coefficient alpha reliabilities for the variables are shown in Table 24. To examine mean differences among the three samples, a series of one-way analyses of variance was performed with Bonferroni's correction applied to follow-up comparisons; only sample differences at $p < .001$ are reported. As at Time 1, children in samples 2 and 3 did not differ with respect to maternal or teacher ratings of *EP*, however, children in sample 1 evidenced significantly higher levels of teacher-reported *EP* than children in sample 3, $t(213) = 4.06$, and slightly higher levels of mother-reported *EP* than children in sample 3, although not below the Bonferroni criterion. Similarly, children in sample 1 exhibited significantly higher levels of teacher-reported *social problems* than children in sample 3, $t(203) = 4.10$, and significantly higher levels of mother-reported *social problems* than children in samples 2 and 3 respectively, $t(199) = 3.25$, $t(260) = 3.75$. This was also the case with respect to maternal and teacher ratings of *attention problems*, such that children in sample 1 evidenced significantly higher levels of teacher-reported *attention problems* than children in sample 3, $t(180) = 5.57$, and significantly higher levels of mother-reported *attention problems* than children in samples 2 and 3 respectively, $t(199) = 3.23$, $t(252) = 4.39$. In addition, children in sample 1 evidenced significantly lower *school marks* (Math, French, English) than children in sample 3, $t(167) = -3.71$, while mean school marks did not differ for children in samples 2 and 3. Children in samples 2 and 3 also did not differ with respect to mother or teacher ratings of overall *social skills*. In summary, sample heterogeneity was evidenced via differences on several measured variables, providing support for using an integrative approach in order to obtain a more heterogeneous sample (Schwartzman et al., 1985; Serbin et al., 2004; Hastings et al., 2008; Mills et al., 2008; 2012; Curran & Hussong, 2009).

Correlations among Variables. Zero-order correlations among variables measured at school age were computed and summarized in Table 25 for the integrated sample. As shown in Table 25, children with elevated levels of teacher-rated EP had significantly more social problems ($r = .59$, $p < .01$ TRF; $r = .20$, $p < .01$ CBCL) and attention problems ($r = .60$, $p < .01$ TRF; $r = .23$, $p < .01$ CBCL), as well as poorer social skills ($r = -.63$, $p < .01$), and lower school marks ($r = -.23$, $p < .01$). Elevated maternal ratings of EP were similarly associated with significantly greater social problems ($r = .18$, $p < .01$ TRF; $r = .58$, $p < .01$ CBCL), attention problems ($r = .17$, $p < .01$ TRF; $r = .59$, $p < .01$ CBCL), and poorer social skills ($r = -.24$, $p < .01$ SSRS-Total Teacher; $r = -.49$, $p < .01$ SSRS-Total Mother). In addition, children with increased social problems as rated by both teachers and mothers, had significantly higher attention problems ($r = .62$, $p < .01$ TRF; $r = .68$, $p < .01$ CBCL), lower school marks ($r = -.30$, $p < .01$; $r = -.13$, $p < .05$), and poorer social skills ($r = -.48$, $p < .01$; $r = -.42$, $p < .01$). Heightened maternal and teacher ratings of attention problems were also associated with significantly lower school marks ($r = -.39$, $p < .01$; $r = -.22$, $p < .01$), and poorer social skills ($r = -.63$, $p < .01$; $r = -.41$, $p < .01$). Of further relevance was the significant relationship between school marks and vocabulary performance ($r = .29$, $p < .01$), both of which were significantly associated with enhanced social skills ($r = .30$, $p < .01$; $r = .18$, $p < .01$). Consistent with hypotheses and with prior research, such findings reflect the interrelations between domains of adjustment during middle childhood and specifically, the relationships between social, behavioural, and academic competencies.

In addition to the aforementioned concurrent associations, zero-order correlations were computed for the integrated sample to explore longitudinal relationships between variables assessed at preschool age and adjustment outcomes in middle childhood. As shown in Table 26, school age children with elevated levels of maternal-reported EP had significantly higher rates of IP and EP at preschool age ($r = .30$, $p < .01$; $r = .57$, $p < .01$), were more active ($r = .31$, $p < .01$) and emotionally reactive ($r = .21$, $p < .01$), and had parents who were more punitive ($r = .27$, $p < .01$), critical ($r = .19$, $p < .01$), and less positive ($r = -.22$, $p < .01$) in early childhood. These children were also from lower SES families ($r = -.16$, $p < .01$) and had mothers who expressed significantly more negative emotionality ($r = .22$, $p < .01$). Elevated teacher-reported EP at school age was similarly associated with heightened EP in early childhood ($r = .21$, $p < .01$), higher activity-level ($r = .25$, $p < .01$), more punitive parenting ($r = .18$, $p < .01$), and lower family SES ($r = -.16$, $p < .01$).

As with EP, school age children with higher maternal ratings of social problems (CBCL) displayed higher levels of IP and EP at preschool age ($r = .21$, $p < .01$; $r = .37$, $p < .01$), greater temperamental activity ($r = .23$, $p < .01$) and emotion reactivity ($r = .12$, $p < .05$), and had parents who were more punitive ($r = .26$, $p < .01$), critical ($r = .15$, $p < .01$), and less positive ($r = -.18$, $p < .01$). These children also had mothers who expressed significantly more negative emotionality ($r = .18$, $p < .01$), and were from lower SES families ($r = -.14$, $p < .01$). Elevated maternal and teacher ratings of attention problems were further associated with lower family SES ($r = -.11$, $p < .05$ CBCL; $r = -.17$, $p < .01$ TRF), as were poorer vocabulary scores and lower school marks. Additionally correlated with maternal-reported attention problems were heightened levels of early emerging IP ($r = .20$, $p < .01$), EP ($r = .35$, $p < .01$) and temperamental activity ($r = .26$, $p < .01$), as well as more punitive ($r = .22$, $p < .01$), critical ($r = .16$, $p < .01$), less positive parenting ($r = -.17$, $p < .01$), and greater maternal negative emotionality ($r = .15$, $p < .01$).

Finally, as shown in Table 27 for children in samples 2 and 3, significant inverse associations were demonstrated between maternal ratings of social skills and early emerging IP and EP ($r = -.23, p < .01$; $r = -.37, p < .01$), temperamental activity ($r = -.20, p < .01$) and emotion reactivity ($r = -.20, p < .01$), punitive ($r = -.22, p < .01$) and positive parenting ($r = .29, p < .01$), as well as maternal expression of negative emotionality ($r = -.21, p < .01$). Teacher ratings of social skills were also inversely associated with early emerging EP ($r = -.17, p < .05$), punitive parenting ($r = -.17, p < .05$), and family SES ($r = .19, p < .01$).

Objective 1: Longitudinal Predictors of School Age Adjustment Outcomes

The first objective was to determine the extent to which the following theoretically-linked, multilevel factors, assessed in early childhood, were predictive of subsequent school and social adjustment outcomes after children transitioned to elementary school; family SES, maternal negative emotionality, parenting (punitive, critical, positive), early-onset behaviour problems (IP, EP), and temperament (emotion reactivity, activity-level).

To investigate the longitudinal predictors of adjustment outcomes at school age, a series of hierarchical multiple regressions were conducted controlling for family SES, child sex, and child age. Order of variable entry was as follows: Step 1: Family socioeconomic stress (Family SES), Step 2: Child sex and child age, Step 3: Temperament/Behaviour problems and/or parental predictors. As such, the predictive contribution of contextual (family SES), parental (maternal negative emotionality, parenting), and early child-level factors (temperament, behaviour problems) were explored in the context of academic, social, and behavioural outcomes at school age.

1a: Predicting Externalizing Problems. Consistent with findings at Time 1, analyses demonstrated that heightened EP (CBCL) at school age was predicted by elevations in both emotion reactivity and activity-level, as well as by lower family SES, and by either less positive, more punitive parenting, or by less positive, more critical parenting (Table 28).

When parenting variables were replaced by maternal negative emotionality, an analogous pattern emerged whereby heightened EP (CBCL) was predicted by lower family SES, greater maternal expression of negative emotionality, as well as elevations in both emotion reactivity and activity-level (Table 29).

Given the frequency of comorbid behaviour problems, particularly in early childhood, hierarchical regressions predicting school age EP were computed with early-onset IP, individual temperament factors, and parenting variables entered simultaneously in the third step. Analyses indicated that heightened maternal ratings of child EP were predicted by early-onset IP in conjunction with either emotion reactivity or activity-level, as well as lower family SES, and more punitive, less positive parenting (Table 30).

As with emotion reactivity in children, higher levels of negative emotionality in mothers also predicted greater child EP (CBCL), in combination with lower family SES, child male sex, and less positive, more punitive parenting, or less positive, more critical parenting (Table 31).

Results further reflected the significance of early-onset EP as a predictor of both maternal and teacher ratings of EP at school age. When tested simultaneously with temperament, parental, and control variables, early-onset EP emerged as the sole significant predictor of subsequent EP as rated by mothers; for greater teacher ratings of EP, however, early-onset EP was accompanied by child age and either higher activity-level, or lower family SES and more punitive parenting as significant predictors (Tables 32, 33). Heightened teacher ratings of child EP were also predicted by lower family SES, child age, higher temperamental activity, and more punitive parenting (Table 33).

1b: Predicting School Adjustment. In addition to child EP, hierarchical regressions were computed to predict such indices of school adjustment as mean school marks (English, French, Math), vocabulary performance, and attention problems (CBCL, TRF). Variable entry was identical to that described above. Such analyses demonstrated that counter to hypotheses, significant longitudinal predictors of higher marks comprised only higher family SES and younger child age (Table 34); all other variables, including, maternal negative emotionality, parenting, temperament factors, and behaviour problems were rendered non-significant (see Appendix H).

As with school marks, higher family SES was also found to predict better vocabulary scores in combination with less punitive parenting (Table 35), whereas lower family SES was predictive of heightened teacher ratings of attention problems (Table 36). Although analyses failed to demonstrate any further predictors of teacher-reported attention problems, more punitive parenting approached significance when entered in the third and final step (Appendix I).

For maternal-rated attention problems, findings reflected the significant contribution of more punitive parenting in combination with either early-onset EP or IP, as well as more critical, less positive parenting in combination with early-onset IP (Tables 37, 38). Also predictive of heightened maternal-reported attention problems (CBCL) was more critical, less positive parenting, and higher temperamental activity, as well as lower family SES, more punitive parenting, and higher temperamental activity (Tables 38, 39).

1c: Predicting Social Adjustment. Complementary analyses were computed to predict such indices of social adjustment as maternal and teacher-rated social problems (CBCL, TRF), as well as social skills (SSRS-Total Parent/Teacher) for a subsample of children (samples 2 and 3 only). Variable entry was identical to that described above. Findings indicated that, when entered separately, increased emotion reactivity and activity-level were each significant predictors of higher maternal-reported social problems in combination with lower family SES (Table 40); when entered simultaneously, however, emotion reactivity was rendered non-significant while higher activity-level and lower family SES remained significant predictors of elevated social problems as rated by mothers (Appendix I).

Consistent with analyses predicting attention problems (CBCL), results revealed that higher maternal ratings of social problems were predicted by lower family SES and higher temperamental activity, in combination with either more critical, less positive parenting (Table 41), or more punitive parenting (Table 41). When emotion reactivity was tested in place of activity-level, however, maternal-reported social problems were predicted by lower family SES, and more critical, less positive parenting, while emotion reactivity approached significance (Table 42); when entered simultaneously with punitive parenting, emotion reactivity was rendered non-significant (Appendix I). Further predictors of elevated social problems (CBCL) comprised early onset-EP and more punitive parenting, as well as early-onset IP, more punitive parenting, and lower family SES (Tables 42, 43). The combination of early-onset IP, child female sex, lower family SES, and either less positive parenting or more critical parenting also predicted elevated social problems as rated by mothers (Tables 43, 44).

Although none of the aforementioned variables were significant predictors of teacher-reported social problems (Appendix J), analyses indicated that higher teacher ratings of children's social skills (SSRS-Total) were predicted by greater family SES, child sex, and less punitive parenting (Table 45).

Increased maternal ratings of children's social skills (SSRS-Total) were similarly predicted by child sex and less punitive parenting, in conjunction with either lower temperamental activity or emotion reactivity (Table 46); the combination of child sex, more positive parenting, and lower temperamental activity and emotion reactivity further predicted heightened maternal ratings of social skills (Table 47). In addition to children's temperament characteristics, early emerging internalizing and externalizing problems were explored in the context of social skills. Regression analyses reflected the significance of early-onset problem behaviour with respect to the acquisition of social skills at school age, such that higher maternal ratings of social skills (SSRS-Total) were predicted by child sex, lower levels of early-onset EP, and more positive parenting, as well as by child sex, lower levels of early-onset IP, more positive parenting, and less punitive parenting (Tables 47, 48). Also predictive of improved social skills (SSRS-Total Mother) were child sex, more positive parenting, and reduced maternal expression of negative emotionality, in combination with either lower IP or emotion reactivity at preschool age (Tables 48, 49).

Objective 2: Moderating Effects Predicting School Age Adjustment Outcomes

The second objective was to explore the interactive contributions of Time 1 predictors, assessed in early childhood, to school and social adjustment outcomes evaluated in middle childhood.

2a: Temperament x Behaviour Interactions. The first part of the second objective was to elucidate the interactive contribution of early emerging problem behaviour (IP/EP) and temperament characteristics (emotion reactivity, activity-level) to subsequent adjustment outcomes in middle childhood. The interactive contribution of early-onset problem behaviour and temperament was investigated via a series of regression analyses predicting each outcome variable, in which entrance of individual predictors preceded the entrance of their corresponding interaction term. Specifically, hierarchical regressions controlling for family SES, child age, and child sex were completed in a four-step manner, with temperament/behavioural predictors entered in step three, followed by their corresponding interaction term in step four. Order of entry was as follows; Step 1: Family SES, Step 2: Child sex and child age, Step 3: Early-onset IP/EP and temperament (emotion reactivity, activity-level) predictors, Step 4: Interaction term. Simple slope analyses were subsequently conducted using the Johnson-Neyman (J-N) technique to probe interactions in significant linear models. This technique identifies regions in the range of the moderator variable where the effect of the focal predictor on the outcome is significant and the critical cutoff value above which the effect becomes non-significant (Hayes & Matthes, 2009).

Moderating effects were evident for the interaction between emotion reactivity and early-onset IP in the prediction of EP at school age. In addition to a significant interaction effect, lower family SES and child sex were significant individual predictors of heightened maternal-rated EP (Table 50). While emotion reactivity appeared to have minimal effect at high levels of IP, for children with low IP, heightened emotion reactivity predicted greater levels of EP at school age than for those less emotionally reactive children (Figure 18; J-N significance region = .85, gradient of simple slope = .15, t (345) = 1.97, p < .05).

Similar to the aforementioned interaction between early-onset IP and emotion reactivity, results revealed the interactive contribution of early-onset EP and activity-level to maternal ratings of attention problems (CBCL) at school age (Table 51). Unlike preschoolers with low EP, preschoolers with elevated EP had significantly reduced maternal-rated attention problems at school age when temperamental activity-level was lower rather than higher (Figure 19; J-N significance region = -1.31, gradient of simple slope = .12, t (337) = 1.97, p < .05).

2b: Child x Environment Interactions. The second part of objective 2 was to determine the ways in which children's early characteristics (temperament, IP/EP) and/or aspects of their environment (parenting, family SES) at Time 1 interactively contributed to subsequent adjustment outcomes at school age (Time 2). This was investigated via a series of regression analyses in which order of variable entry was consistent with that described above and was as follows: Step 1: Family SES, Step 2: Child sex and child age, Step 3: Temperament/Problem behaviour and/or parenting, Step 4: Interaction term. Simple slope analyses were subsequently conducted using the Johnson-Neyman (J-N) technique to probe interactions in significant linear models (Hayes & Matthes, 2009).

Counter to hypotheses but consistent with (earlier) findings in Study 1, analyses predicting EP at school age failed to reflect significant moderating effects by activity-level for the interaction with punitive, critical, and positive parenting (Appendix K), or by emotion reactivity for interactions with respective parenting variables (Appendix L). In the context of maternal ratings of attention problems, however, results revealed that the interaction between early-onset IP and positive parenting was significant over and above the individual contributions of these variables (Table 52). Whereas the presence of positive parenting had little effect on the development of attention problems for children with low levels of early-onset IP, children with elevated levels of early-onset IP displayed significantly less attention problems at school age when parenting was more positive relative to when it was less positive (Figure 20; J-N significance region = .34, gradient of simple slope = .08, t (347) = 1.97, $p < .05$).

In contrast to the protective capacity of positive parenting in early childhood, the interaction between family SES and punitive parenting demonstrated the detrimental effects of maladaptive parenting on the emergence of maternal-rated attention problems at school age for children from lower SES/disadvantaged families (Table 53). Relative to children from higher SES families who experienced more punitive parenting, those from lower SES families who experienced more punitive parenting developed significantly greater levels of attention problems at school age (Figure 21; J-N significance region = .61, gradient of simple slope = 1.00, t (347) = 1.97, $p < .05$).

Objective 3: **Mediation Effects on School Age Adjustment Outcomes**

The third objective was to explore direct and indirect effects of Time 1 variables as assessed in early childhood, on school and social adjustment outcomes evaluated in middle childhood at Time 2.

3a. Indirect Effects of Maternal Negative Emotionality via Parenting. The first part of the third objective was to determine the direct and indirect effects of maternal negative emotionality on adjustment outcomes at school age via parenting practices, as well as the direct and indirect effects of family SES on adjustment outcomes via parenting practices. In addition to moderating relationships, mediation analyses were conducted to investigate the direct and indirect pathways to adjustment outcomes from maternal negative emotionality by way of parenting practices, and from family SES by way of parenting practices. As such, hypotheses were tested in simple and multiple mediation models by examining indirect effects estimated as the product of path coefficients linking the independent variable to the mediator(s) and linking the mediator(s) to the dependent variable (Preacher & Hayes, 2008). Estimates of all paths in both simple and multiple mediation models were investigated in SPSS 20.0 using OLS regression methods to produce Sobel tests (or normal theory tests) of total and specific indirect effects, as well as bootstrap confidence intervals (CI) for the indirect effects. Given recent controversy surrounding the Sobel test (Sobel, 1982, 1986), in which a p value for the indirect effect is derived in reference to the standard normal distribution, bootstrapping procedures have been increasingly regarded as a preferred method for testing mediation (Preacher & Hayes, 2008; Hayes, 2009).

Bootstrapping, a nonparametric resampling procedure, involves taking multiple random samples of observations from the original sample via replacement, and analyzing them to provide a distribution of parameter estimates. As assumptions of symmetry and normality of the sampling distribution are not imposed to estimate indirect effects, bootstrap confidence intervals are considered a more accurate assessment of mediating relationships than Sobel tests, particularly with smaller sample sizes (Preacher & Hayes, 2008; Hayes, 2009). Given that distributions of parameter estimates tend to be skewed (Bollen & Stine, 1990; Lockwood & MacKinnon, 1998; MacKinnon et al., 2002), bias-corrected and accelerated confidence intervals were computed and reported in the current study in tests of simple and multiple mediation (Efron & Tibshirani, 1993, MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2008). Significant multiple mediation analyses were also modeled in Stata 12 to provide a graphical depiction of the variables at-hand and to obtain supplementary information about the strength of model fit.

As at Time 1, it was hypothesized that maternal negative emotionality would be associated with EP at school age through its influence on parenting. To test the significance of these relationships, the bootstrapping method was used to estimate the indirect pathways from maternal negative emotionality to punitive parenting and from maternal negative emotionality to positive parenting, and finally, from punitive parenting and positive parenting to child EP (Preacher & Hayes, 2008). The 95% bias-corrected and accelerated confidence intervals computed for each indirect pathway were indicative of significant mediation effects as neither interval contained a value of zero (Table 54; Hayes, 2009). Consistent with hypotheses and with earlier findings, results provided evidence of significant mediation effects whereby maternal negative emotionality was associated with EP (CBCL) via more punitive parenting and via less positive parenting. Indirect effects are shown in Figure 22 by the significant paths to child EP from maternal negative emotionality through less positive parenting and through more punitive parenting. Because maternal negative emotionality was also related to EP directly, results were reflective of partial mediation as evidenced by the significant direct effects value (Table 54) for the independent variable on EP.

This pattern of findings was replicated in the context of attention problems (CBCL) at school age, and is depicted in Figure 23 by significant paths to attention problems from maternal negative emotionality via less positive parenting and via more punitive parenting. The bootstrapping method used to estimate indirect pathways yielded 95% confidence intervals for punitive and positive parenting that were reflective of significant mediation effects, as neither interval contained a value of zero (Table 55). Evidence of significant mediation is further represented in Figure 23 by the non-significant direct pathway from maternal negative emotionality to attention problems ($p = .22$).

Although critical parenting was not found to be a significant mediator when entered simultaneously with punitive and positive parenting, this may have been at least partially attributable to collinearity between parenting variables. According to Preacher and Hayes (2008), the effects of mediators on the dependent variable are often attenuated to the degree to which mediators are correlated; the specific indirect effect of any given mediator may thus be conditional upon the inclusion of other mediators in the model. Given the marked correlation between punitive and critical parenting ($r = .37$, $p < .01$), the previous mediation analyses were repeated with critical parenting replacing punitive parenting.

Results reflected a similar pattern providing evidence of significant indirect effects whereby critical and positive parenting served as mediators in the relationship between maternal negative emotionality and maternal ratings of child EP and attention problems, respectively. More specifically, the bootstrapping method was used to estimate the indirect pathways from maternal negative emotionality to critical parenting and from maternal negative emotionality to positive parenting, and finally from critical parenting and positive parenting to child EP (Preacher & Hayes, 2008). The 95% bias-corrected and accelerated confidence intervals computed for each indirect pathway were indicative of significant mediation effects as neither interval contained a value of zero (Hayes, 2009). Consistent with hypotheses, such results provided evidence of significant mediating relationships whereby maternal negative emotionality was associated with EP (CBCL) via more critical parenting and via less positive parenting. Indirect effects are represented in Figure 24 by the significant paths to EP from maternal negative emotionality through less positive parenting and through more critical parenting. Because maternal negative emotionality also impacted EP directly, results were reflective of partial mediation as evidenced by the significant direct effects value for the independent variable on child EP (Table 56).

The bootstrapping method was also used to estimate the indirect pathways from maternal negative emotionality to critical parenting and from maternal negative emotionality to positive parenting, and finally, from critical and positive parenting to child attention problems (Figure 25; Preacher & Hayes, 2008). The 95% bias-corrected and accelerated confidence intervals computed for each indirect pathway reflected significant mediation effects as neither contained a value of zero (Table 57; Hayes, 2009).

Although a similar pattern of findings was expected in the context of teacher-rated EP and attention problems, findings indicated that only punitive parenting served as a significant mediator in the relationship between maternal negative emotionality and EP at school age (TRF); analyses testing positive parenting as a mediator failed to reach significance (Appendix M). The bootstrapping method was used to estimate the indirect pathways from maternal negative emotionality to punitive parenting, and from punitive parenting to teacher ratings of child EP (Preacher & Hayes, 2008). As depicted in Table 58**,** the 95% bias-corrected and accelerated confidence interval computed for the indirect pathway did not contain the value zero and thereby was indicative of significant mediation effects; consequently, the relationship between maternal negative emotionality and teacher-rated EP was mediated by more punitive parenting.

Consistent with this pattern, further analyses provided support for the mediating role of punitive parenting in the relationship between maternal negative emotionality and vocabulary performance. The bootstrapping method was used to estimate the indirect pathways from maternal negative emotionality to punitive parenting, and from punitive parenting to children's vocabulary scores (Preacher & Hayes, 2008). As represented in Table 59 via the 95% bias-corrected confidence interval computed for the indirect pathway, results revealed a significant indirect effect of punitive parenting in the relationship between maternal negative emotionality and vocabulary performance whereby greater maternal negative emotionality was associated with poorer vocabulary scores by way of more punitive parenting (Hayes, 2009).

Although not significant when tested simultaneously, simple mediation analyses demonstrated that the relationship between maternal negative emotionality and increased mother-rated social problems (CBCL) was mediated by parenting that was either more punitive in quality or less positive (Table 60). When testing the indirect effects of critical and positive parenting in the relationship between maternal negative emotionality and social problems, however, results provided evidence of significant mediation by both parenting variables (Figure 26). The bootstrapping method was used to estimate the indirect pathways from maternal negative emotionality to critical parenting and from maternal negative emotionality to positive parenting, and finally, from critical and positive parenting to maternal-rated social problems (Preacher & Hayes, 2008). The 95% bias corrected and accelerated confidence intervals generated for the indirect pathways did not contain the value zero, and thereby were reflective of significant mediation effects (Table 61; Hayes, 2009).

In the context of maternal ratings of children's social skills (SSRS-Total), results similarly provided evidence of multiple mediation whereby both more punitive parenting and less positive parenting represented significant mediators in the relationship between maternal negative emotionality and children's poorer social skills (Figure 27). As in prior analyses, the bootstrapping method was used to estimate indirect pathways from maternal negative emotionality to punitive parenting and from maternal negative emotionality to positive parenting, and finally, from punitive and positive parenting to maternal-rated child social skills (Preacher & Hayes, 2008). As depicted in Table 62 by the 95% bias-corrected confidence intervals generated for the indirect pathways, results were indicative of significant mediation effects as neither interval contained a value of zero.

In contrast to hypotheses, results failed to demonstrate that the relationship between family SES and child adjustment outcomes were mediated by parenting variables; analyses testing the indirect effects of punitive or critical, and/or positive parenting failed to reach significance in the context of maternal and teacher-ratings of child EP, attention problems, social problems, and social skills (Appendix N).

3b: Indirect Effects of Parenting via Temperament. The second part of the third objective was to determine the direct and indirect effects of parenting practices on children's adjustment by way of their early temperament characteristics as rated by their mothers. As described above, mediation analyses were conducted investigating direct and indirect pathways to academic and social adjustment outcomes from each parenting variable via emotion reactivity and activity-level.

The bootstrapping method was used to estimate the indirect pathways from punitive parenting to activity-level and from punitive parenting to emotion reactivity, and finally, from activity-level and emotion reactivity to EP at school age (Preacher & Hayes, 2008). As the 95% bias corrected confidence intervals computed for the indirect pathways did not contain zero, results were reflective of significant mediation effects; consistent with hypotheses and with earlier findings, analyses indicated that the relationship between punitive parenting and child EP was partially mediated by both emotion reactivity and activity-level (Table 63; Hayes, 2009). Significant indirect effects are represented in Figure 28, by paths to EP from punitive parenting via emotion reactivity, and from punitive parenting via activity-level; as in prior analyses, the direct path from punitive parenting to child EP was also significant and thereby suggestive of partial mediation. In addition to significant path coefficients depicted in Figure 28, fit indices indicative of 'good model fit' provided further support for the strength of these mediating relationships; χ^2 (32) = 49.00, p = .03, RMSEA = .039, SRMR = .047, CFI = 0.950, TLI = .930.

Due to collinearity, multiple mediation analyses were repeated with critical parenting in place of punitive parenting, with all other variables and pathways held constant. The bootstrapping method was used to estimate the indirect pathways from critical parenting to activity-level and from critical parenting to emotion reactivity, and finally, from activity-level and emotion reactivity to maternal-ratings of child EP (Preacher & Hayes, 2008). As the 95% bias corrected confidence intervals generated for the indirect pathways did not contain zero, results were indicative of significant mediation effects, such that the relationship between critical parenting and child EP was partially mediated by both emotion reactivity and activity-level (Table 64; Hayes, 2009). Significant indirect effects are represented in Figure 29, by paths to EP from critical parenting via emotion reactivity, and from critical parenting via activity-level; as the direct path from critical parenting to child EP was also significant, results were suggestive of partial mediation. In addition to the significant path coefficients depicted in Figure 29, fit indices indicative of 'good model fit' provided further support for the strength of these mediating relationships; χ^2 (32) = 55.55, p = .006, RMSEA = .046, SRMR = .048, CFI = 0.929, TLI = .900. While this pattern of findings was significant in the context of maternal ratings of child EP, neither emotion reactivity nor activity-level served to mediate the relationship between punitive parenting and teacher-rated EP or between critical parenting and teacher-rated EP (Appendix O).

3c: Indirect Effects of Temperament via Parenting. As the third and final component of the third objective, bidirectional relationships between temperament and parenting were explored in the context of adjustment at school age; in a manner consistent with that described above, a series of mediation analyses was conducted to elucidate direct and indirect pathways to adjustment outcomes from each temperament factor by way of parenting.

The bootstrapping method was used to estimate the indirect pathway from emotion reactivity to child EP (CBCL) via punitive parenting (Table 65**;** Preacher & Hayes, 2008). As the 95% bias corrected confidence interval computed for the indirect pathway did not contain zero, results were reflective of a significant mediation effect; given that the direct pathway to child EP from emotion reactivity was also significant, findings were indicative of partial mediation (Figure 30**;** Hayes, 2009).

Analogous results were demonstrated when the bootstrapping method was used to estimate the indirect pathway to child EP from activity-level via punitive parenting (Table 65**;** Preacher & Hayes, 2008). As with emotion reactivity, the 95% bias corrected confidence interval computed for the indirect pathway did not contain zero and was thereby indicative of a significant mediation effect; partial mediation could be inferred from the significance of the direct pathway to child EP from activity-level (Figure 31**;** Hayes, 2009).

In addition to punitive parenting, critical parenting was also found to be a significant partial mediator in the relationship between emotion reactivity and child EP, and in the relationship between activity-level and child EP. When the bootstrapping method was used to estimate the indirect pathway to child EP from emotion reactivity via critical parenting, the 95% bias corrected confidence interval did not contain zero and was thereby indicative of a significant mediation effect (Table 66). This was also the case when the bootstrapping method was used to estimate the indirect pathway to child EP from activity-level via critical parenting, such that the corresponding 95% bias corrected confidence interval did not the value zero (Table 66**).** As direct pathways to child EP from both emotion reactivity and activity-level were significant, results were reflective of partial mediation by critical parenting.

In contrast to simple mediation effects, when the bootstrapping method was used to estimate indirect pathways to child EP from emotion reactivity via punitive and positive parenting, the 95% bias corrected confidence interval computed for the indirect pathway to EP via positive parenting contained zero, and was thereby not indicative of significant mediation effects (Appendix P). Analogous findings were demonstrated with critical parenting in place of punitive parenting (Appendix P), and when testing indirect pathways to child EP from activity-level via positive and punitive parenting (Appendix Q), and via positive and critical parenting (Appendix Q). Counter to hypotheses, the aforementioned analyses failed to provide evidence of significant mediation effects when testing multiple parenting variables simultaneously.

Discussion

The general purpose of the present study was to delineate the predictors and developmental pathways to academic and social adjustment outcomes from preschool age to middle childhood. The contribution and directionality of child, parental, and familial factors assessed in early childhood were explored in the context of their direct, indirect, and interactive contributions to adjustment outcomes at school age. By pooling participants from three independent Canadian studies, a large, diverse, and heterogeneous sample of similar-aged children and their mothers was recruited and followed longitudinally across the early school transition.

Consistent with hypotheses and with findings at Time 1 (i.e., Study 1), higher maternal ratings of EP were predicted by family SES, child temperament characteristics (emotion reactivity and activity-level), as well as less positive, more punitive or critical parenting. This was also the case when parenting variables were replaced by maternal negative emotionality, such that an analogous pattern emerged whereby heightened EP at school age was predicted by lower family SES, greater maternal expression of negative emotionality, as well as elevations in both emotion reactivity and activity-level. Such results reflect the significant and enduring contributions of familial, parental, and temperamental variables in predicting heightened EP in early childhood and at school age, and are consistent with a bioecological systems perspective, which implicates a range of factors, at multiple levels, and in multiple social subsystems (Bronfenbrenner & Morris, 1998; 2006; Kuczynski & De Mol, 2015).

Given the comorbidity of early emerging behaviour problems, the predictive capacity of early-onset IP was explored in the context of EP at school age. Again, results supported hypotheses and indicated that heightened maternal ratings of EP were predicted by higher early-onset IP, in conjunction with lower family SES, more punitive, less positive parenting, and higher temperamental activity-level or emotion reactivity. In addition to consistency in these relationships over time, results also reflected consistency in the predictive capacity of early-onset EP with respect to both maternal and teacher ratings of EP in middle childhood. When tested simultaneously with temperamental, parental, and control variables, early-onset EP emerged as the sole significant predictor of maternal ratings of EP at school age; higher teacher ratings of EP were similarly predicted by early-onset EP, as well as by child age and activity-level, or by lower family SES and more punitive parenting. Together, results add to a growing body of literature that demonstrates the significant and enduring risks associated with early emerging EP on developmental outcomes in later childhood (Choe et al., 2013; Metcalfe, Harvey, & Laws, 2013; Chen et al., 2014), and adolescence (Vitaro, Brendgen, Larose, & Tremblay, 2005; Burt & Roisman, 2010; Bierman et al., 2013).

Although analogous relationships were expected in the context of additional indices of school age adjustment, results demonstrated that significant longitudinal predictors of higher school marks consisted only of family SES and younger child age, while all other variables were rendered non-significant. Similarly, in the context of children's vocabulary performance, higher family SES and less punitive parenting emerged as the sole significant predictors of improved scores on standardized assessment measures. This was also the case for teacher-rated attention problems, whereby family SES emerged as the sole significant predictor, with punitive parenting approaching significance. The pooled nature of this study's design may have accounted, at least partially, for the non-significant associations between vocabulary performance and other predictors such as early emerging IP/EP, temperament, and critical or less positive parenting given that measures varied across individual samples. In addition to method variance, attrition and consequent missing data may have limited the power of these analyses to detect significant predictive effects.

Despite these limitations, however, results revealed consistent and robust effects of family SES as an enduring predictor of school achievement, vocabulary performance, and classroom attention problems. The salience of family SES on children's adjustment outcomes is underscored by the nature of the pooled sample, which included a greater proportion of mid-to-upper SES families ($n = 278$) relative to high-risk, or lower SES participants ($n = 104$). In accord with literature documenting the profound effects of contextual variables on cognitive, achievement, and behavioural adjustment outcomes (Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002; Duncan et al., 2007; Carpiano, Lloyd, & Hertzman, 2009), the present results underscore the strength of these associations as lower SES families were markedly underrepresented in the study's pooled sample.

In contrast to teacher-rated attention problems, maternal ratings of attention problems were predicted by more punitive parenting and early-onset problem behaviour (EP or IP), as well as by the combination of early-onset IP, and more critical, less positive parenting. Analogous relationships were found in the context of activity-level, whereby heightened maternal ratings of attention problems were predicted by higher temperamental activity in conjunction with more critical, less positive parenting, or with lower family SES and more punitive parenting. Adding further support to a bioecological systems perspective, results reflect the additive contributions of a range of multilevel factors on the development of maternal rated attention problems at school age.

In accord with hypotheses and the aforementioned findings, elevated maternal ratings of children's social problems were also predicted by lower family SES and higher temperamental activity-level, in combination with more critical, less positive parenting, or more punitive parenting. Although emotion reactivity emerged as a significant predictor of social problems when tested independently, when entered simultaneously with activity-level, its contribution was rendered non-significant leaving lower family SES and higher temperamental activity as significant longitudinal contributors. In addition to temperament characteristics, results reflected the significant contribution of early emerging problem behaviour (EP or IP) and more punitive parenting to elevated social problems at school age (CBCL), as well as the contribution of early-onset IP, lower family SES and less positive or more critical parenting. Collectively, these findings are reflective of marked overlap between academic and social domains of adjustment with regard to their respective predictors. As such, it appears that temperament, early-onset IP/EP, parenting, and family SES as assessed at preschool age exert lasting effects on a range of developmental outcomes in middle childhood.

Although teacher-rated social problems were not predicted by any of the early childhood variables, teacher ratings of social skills were significantly predicted by family SES, child sex, and punitive parenting in samples 2 and 3. Improved social skills as rated by mothers were similarly predicted by child sex and less punitive parenting, in conjunction with lower temperamental activity-level or emotion reactivity; the combination of positive parenting, and both lower activity-level and emotion reactivity also predicted greater social skills as rated by mothers. Finally, in addition to temperament characteristics, results reflected significant inverse relationships between early emerging problem behaviour and the subsequent acquisition of social skills at school age. Specifically, preschoolers with elevated EP who experienced less positive parenting in early childhood evidenced poorer social skills at school age, as was the case for preschoolers with elevated IP who experienced less positive, more punitive parenting. Similarly predictive of poorer social skills was greater maternal expression of negative emotionality and less positive parenting, in combination with heightened emotion reactivity or early-onset IP.

In addition to direct effects of predictor variables, interactive effects were explored in a subsequent series of analyses. Consistent with hypotheses and with findings at Time 1 (i.e., Study 1), results reflected a significant interaction between early-onset IP and emotion reactivity over and above their individual contributions to maternal-rated EP at school age. Such results suggested that while emotion reactivity had minimal effect at high levels of early-onset IP, for children with low IP, heightened emotion reactivity predicted greater levels of EP at school age than for those less emotionally reactive children. Based on these findings, it appears that the effects of certain temperament traits on behavioural outcomes at school age may be more pronounced and/or apparent for children with lower levels of early-onset IP than for those with higher levels of early-onset IP who seem to experience increased EP regardless of differences in emotion reactivity (McCoy & Raver, 2011; Blair & Raver, 2015).

Similar findings emerged in the context of the early-onset EP and activity-level such that their corresponding interaction predicted heightened maternal ratings of attention problems at school age over and above the contribution of individual predictors. Unlike preschoolers with low EP, those with elevated EP had significantly reduced attention problems at school age when temperamental activity-level was lower rather than higher. In this way, it appears that elevations in early-onset EP were exacerbated by temperamental over-activity and resulted in greater attention problems than would be expected at lower levels of temperamental activity.

Despite the absence of significant moderating effects in interactions between temperament and parenting variables, early-onset IP did interact with positive parenting to predict maternal ratings of attention problems at school age. Whereas the presence of positive parenting had little effect on the development of attention problems for children with low levels of early-onset IP, children with elevated levels of early-onset IP displayed significantly less attention problems at school age when parenting was more positive relative to when it was less positive. Adding to a growing body of literature (e.g., Early et al., 2002; Jackson et al., 2009), these results suggested that for preschoolers with increased IP, the presence of highly positive parenting may have buffered against the emergence of subsequent attention problems at school age. While the protective capacity of sensitive, responsive, and warm parenting has been documented by certain studies in the context of school/social adjustment outcomes (e.g., Early et al., 2002; Kingston et al., 2013; Waller et al., 2015), the research to-date has predominantly focused on the ways in which maladaptive parenting exacerbates risk for maladjustment in temperamentally vulnerable and sociodemographically at-risk children (e.g., Jackson et al., 2009; Choe, Olson, & Sameroff, 2013; Chen et al., 2014). The present results therefore support and extend the extant body of literature by demonstrating the enduring protective effects of positive parenting for children with early emerging IP on developmental outcomes at school age.

In contrast to the protective capacity of positive parenting in early childhood, additional results revealed the detrimental effects of punitive parenting on the emergence of attention problems at school age for children from lower SES families; this was evidenced via the significant interaction between family SES and punitive parenting in the prediction of maternal-reported attention problems. Relative to children from higher SES families who experienced more punitive parenting, those from lower SES families who experienced more punitive parenting displayed significantly greater levels of attention problems at school age. Despite contribution to problematic adjustment in general, highly punitive parenting appeared to be particularly deleterious for children from lower SES families, such that relative to those who experienced less punitive parenting, children from lower SES families who experienced highly punitive parenting exhibited significantly more attention problems at school age.

Finally, mediation analyses served to elucidate direct and indirect pathways to school age adjustment from maternal negative emotionality by way of parenting, and from family SES by way of parenting. Comparisons with findings at Time 1 served to elucidate age similarities and differences in the salient predictors and pathways to EP and related adjustment outcomes across childhood. Consistent with hypotheses and with earlier findings, results provided evidence of significant mediation effects whereby maternal negative emotionality was associated with heightened EP at school age via more punitive parenting and via less positive parenting; this was also the case when direct and indirect effects of the aforementioned variables were explored in the context of maternal ratings of attention problems at school age, and when punitive parenting was replaced by critical parenting in the prediction of both school age EP and attention problems as rated by mothers. While this pattern of findings was also hypothesized in the context of teacher ratings of EP and attention problems, only punitive parenting emerged as a significant mediator in relationships between maternal negative emotionality and Time 2 adjustment outcomes. Notably, this pattern of findings was replicated in the context of vocabulary performance such that the relationship between maternal negative emotionality and children's scores on measures of vocabulary at school age was mediated by more punitive parenting in early childhood.

Further replication of this pattern of findings emerged in the context of social adjustment outcomes, such that the relationship between maternal negative emotionality and heightened social problems was partially mediated by less positive, more critical parenting, and the relationship between maternal negative emotionality and poorer social skills at school age was also partially mediated by less positive, more punitive parenting. Counter to hypotheses, however, results did not extend to teacher ratings of social problems nor social skills, and were significant only in the context of maternal ratings on these measures. Together, the present results provide support for preliminary evidence linking maternal negative emotional expression to child adjustment problems indirectly via suboptimal parenting practices (Choe et al., 2013; Chen et al., 2014). By extension, findings also shed light on the distinct nature and contributions of positive parenting, and critical-punitive parenting suggesting unique mechanisms of influence and underscoring the importance of their collective inclusion in future studies of child adjustment.

Exploration of direct and indirect relationships between temperament and parenting with respect to their contribution to school age EP was consistent with hypotheses and with findings at Time 1. Evidence of partial mediation was demonstrated in relationships between EP and punitive parenting via activity-level and emotion reactivity, and between EP and critical parenting via activity-level and emotion reactivity. Evidence of bidirectional associations between temperament and parenting in the context of school age EP was also consistent with hypotheses and with bidirectional models of development that emphasize reciprocal transactions between the child and his/her social environments (Bronfenbrenner & Morris, 1998; 2006; Sameroff, 2009; 2010). More specifically, in addition to the aforementioned mediating relationships, findings further demonstrated that the association between school age EP and activity-level was partially mediated by punitive parenting, and that the association between school age EP and emotion reactivity was also partially mediated by punitive parenting.

Overall, these results serve to demonstrate the significant longitudinal contributions of temperament, behaviour, parenting, maternal emotionality, and family socioeconomic stress assessed in early childhood to academic and social adjustment outcomes at school age. Through the use of a multi-informant, multi-method paradigm with a large and regionally, socioeconomically, and linguistically diverse sample, this study sheds light on the pathways and mechanisms implicated in the emergence of school and social adjustment problems across a critical developmental period and transition. In addition to providing support for bioecological and transactional models of development (Bronfenbrenner & Morris, 1998; 2006; Sameroff, 2009; 2010) that implicate of a range of influences at multiple levels and in multiple social subsystems, these findings also demonstrate the convergence of academic and social domains of adjustment. The marked overlap demonstrated across domains in the significance of respective predictors lends support to emergent research on school readiness and early school trajectories reflecting the interrelatedness of academic achievement, prosocial skills, and behavioural competence, particularly during the primary grades (e.g., Vitaro et al., 2005; Fantuzzo et al., 2005; Burt & Roisman; Blair & Raver, 2015).

While this study has many strengths and important implications, it is important to note the limitations and associated avenues for future research. As mentioned previously, the pooled nature of this study's design resulted in inconsistent use of assessment instruments, particularly during the initial phases of data collection. Consequently, pooled constructs were created for temperament (activity-level, emotion reactivity), parenting (positive, critical, punitive), and maternal negative emotionality by selecting items that were parallel in content across measures in each of the three samples (see Mills et al., 2012 for additional details). As it is likely that this contributed to inflated measurement error, results may represent an underestimate of the relations that truly exist.

Of further relevance was the reliance on maternal report measures for variables assessed at preschool age; while it is possible that shared method variance may be reflected in certain analyses, this would not be the case for children's school achievement, vocabulary performance, nor for teacher-reported outcome measures. Additional limitations include sample attrition across time points, and assessment of children's social skills in only two of the three subsamples, as the SSRS was not administered to parents/teachers in the Concordia risk sample.

In light of these methodological constraints, future research should replicate findings using multiple informants [e.g., mothers, fathers, (pre)school teachers] and multiple methods of measurement, that may include observational parent-child interactions in naturalistic and/or laboratory-based settings, as well as classroom observations. Consequently, specific dimensions of temperament, parenting, and caregiver emotional expressiveness could be assessed in an objective capacity without the biases inherent to questionnaire measures. Social competencies could also be addressed in this context during child interactions with similar-aged peers. In this way, observational methods could supplement parent, teacher, and child-report measures to enhance methodological validity. The inclusion of standardized cognitive and achievement batteries administered at multiple time points across preschool and middle childhood could also be beneficial in this regard.

The present study has important implications and reflects the advantages afforded by a pooled sample approach. Importantly, findings reflect the continuing influence of parents and familial environment in shaping developmental outcomes across the early school transition. Interactions and mediating relationships further reflect the complexity of the processes and mechanisms implicated in school and social adjustment outcomes. It is likely that by implementing screening measures to parents of preschool children, preventative interventions could be tailored to the needs of caregivers experiencing high levels of stress, mood-related symptoms, and/or parenting struggles to provide psychoeducation, and the opportunity to adopt more efficacious strategies based on the temperament profile of the child.

In addition to reducing the frequency of negative emotional expression and punitive/critical parenting, the present findings further underscore the importance of targeting sensitive, warm, and responsive parenting in this context. Helping caregivers to interact and respond nurturantly to the needs expressed by their child, may serve to buffer against the risks associated with certain less modifiable risk factors, such as family SES. This may also contribute to the acquisition of enhanced emotion and behavioural self-regulatory abilities, which in turn, have profound implications for children's adjustment outcomes as demonstrated in the present study.

Table 22. Demographic Characteristics of the Individual and Integrated Samples

	Sample 1 (N = 104)		Sample 2 (N = 101)		Sample 3 (N = 177)		Integrated (N = 382)	
Characteristics	% or *M*	N or *SD*	% or *M*	N or *SD*	% or *M*	N or *SD*	% or *M*	N or *SD*
Child age (years)	7.93	1.01	9.07	.81	8.13	.29	8.32	.83
Child gender								
Boys	52.9%	55	56.4%	57	42.9%	76	49.2%	188
Girls	47.1%	49	43.6%	44	57.1%	101	50.8%	194
Maternal age (years)	34.66	3.42	41.07	4.77	39.47	5.58	38.58	5.45
Maternal Education[a]								
Below high school	26.0%	27	.0%	0	.6%	1	7.3%	28
Completed high school	38.5%	40	11.9%	12	13.6%	24	19.9%	76
Community college	26.9%	28	23.8%	24	48.0%	85	35.9%	137
Undergraduate degree	7.7%	8	48.5%	49	34.5%	61	30.0%	118
Graduate/Professional	1.0%	1	15.8%	16	3.4%	6	6.0%	23
Family Income[b] ($)								
0 – 10 000	5.8%	6	.0%	0	.6%	1	1.8%	7
10 001 – 20 000	16.3%	17	3.0%	3	7.3%	13	8.6%	33
20 001 – 30 000	18.3%	19	4.0%	4	5.1%	9	8.4%	32
30 001 – 40 000	10.6%	11	9.9%	10	7.9%	14	9.2%	35
40 001 – 60 000	28.8%	30	17.8%	18	28.2%	50	25.7%	98
60 001 – 74 999	11.5%	12	14.9%	15	15.3%	27	14.1%	54
75 000 or more	8.7%	9	47.5%	48	33.3%	59	30.4%	116

Notes. Sample 1: Concordia Project; Sample 2: Preschool Adjustment; Sample 3: Shame in Childhood; Integrated: Pooled Sample. Maternal Education[a] and Family Income[b] assessed in early childhood (Time 1).

Table 23. Assessment Instruments by Sample at School Age (Time 2)

Construct	Measure(s)
Behaviour Problems Externalizing/Attention Problems	**All:** Child Behavior Checklist (CBCL), Teacher-Report Form (TRF)
Social Adjustment Social Problems, Social Skills	**All:** CBCL, TRF **S2, S3:** Social Skills Rating System (SSRS-Total Parent/Teacher)
School Achievement Math, French, English	**All:** Report Card Marks
Cognitive Ability Vocabulary	**S1:** Stanford Binet -IV **S2:** KBIT-2, WISC-IV **S3:** WASI-II
Assessment Instruments by Sample at Preschool Age (Time 1)	
Behaviour Problems Internalizing/Externalizing	**All:** Child Behavior Checklist (CBCL)
Temperament Emotion Reactivity, Activity-Level	**S1:** Emotionality Sociability, Activity Temperament Survey (EAS-Child) **S2, S3:** Child Behavior Questionnaire (CBQ)
Parenting Punitive, Critical, Positive	**S1:** Parenting Scale, Parenting Dimensions Inventory, Parenting Stress Index **S2:** Child-Rearing Practices Report, Responses to Children’s Emotions (RCE) **S3:** Parenting Styles and Dimensions Questionnaire (PSDQ)
Maternal Emotionality Negative	**S1, S3:** EAS-Adult **S2:** Positive and Negative Affect Scales (PANAS)
Socioeconomic Stress Family SES	**All:** Income, Education (Mother/Father), Occupational Prestige

Notes. **S1**: Sample 1 (Concordia Project), **S2**: Sample 2 (Preschool Adjustment), **S3**: Sample 3 (Shame in Childhood).

Table 24. Descriptive Statistics and Reliabilities of the Measures by Sample

	Sample 1			Sample 2			Sample 3			Integrated Sample		
Variables	*M* or %	*SD* or N	α	*M* or %	*SD* or N	α	*M* or %	*SD* or N	α	*M* or %	*SD* or N	α
Externalizing Problems[a]												
Teacher (TRF)	54.66	9.04	.92	50.23	8.32	.91	49.94	7.90	.88	51.40	8.59	.93
Mother (CBCL)	54.23	10.87	.95	51.85	10.24	.91	50.72	9.92	.88	51.99	10.35	.93
Social Problems[a]												
Teacher (TRF)	56.73	7.51	.81	55.10	5.71	.66	53.27	4.55	.78	54.83	6.06	.89
Mother (CBCL)	57.20	9.17	.82	53.78	5.19	.69	54.01	4.53	.68	54.83	6.48	.71
Attention Problems[a]												
Teacher (TRF)	57.49	8.83	.94	54.14	6.34	.94	51.96	3.88	.94	54.44	6.96	.93
Mother (CBCL)	57.91	9.72	.81	54.31	5.47	.78	53.86	4.88	.84	55.14	6.96	.77
Verbal Ability												
Vocabulary[b]	10.50	3.54		11.26 / 12.11	2.35 / 3.93		11.57	3.40		11.23	3.30	
Achievement												
School Marks	2.78	.60	.88	3.00	.53	.70	3.12	.56	.74	2.95	.58	.82
Social Skills												
Teacher (SSRS)	-	-	-	1.46	.32	.92	1.50	.35	.94	1.48	.34	.93
Mother (SSRS)	-	-	-	1.43	.22	.86	1.38	.27	.92	1.40	.25	.90

Notes. For the integrated sample, Cronbach's alpha reliabilities were computed using centered data to control for between-group variance.
[a] Means and standard deviations are for T-scores; sample 1 alphas are for the 4-18 version of the CBCL/TRF, samples 2 and 3 alphas are for the 6-18 version of the CBCL/TRF.
[b] Means and standard deviations are for scaled scores; sample 1 Stanford-Binet-IV; sample 2 KBIT-2/WISC-IV; sample 3 WASI-II.

Table 25. Zero-order Correlations among Time 2 Adjustment Variables in the Integrated Sample

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Child Age										
2. EP TRF	.18**									
3. EP CBCL	.03	.28**								
4. Social Problems TRF	.10	.59**	.18**							
5. Social Problems CBCL	-.01	.20**	.58**	.23**						
6. Attention Problems TRF	.03	.60**	.17**	.62**	.11					
7. Attention Problems CBCL	-.05	.23**	.59**	.22**	.68**	.32**				
8. Vocabulary	.03	.03	-.01	-.07	-.01	-.08	.03			
9. School Marks	-.23**	-.23**	-.11	-.30**	-.13*	-.39**	-.22**	.29**		
10. SSRS-Total M[a]	-.02	-.13	-.49**	-.11	-.42**	-.07	-.41**	-.01	-.00	
11. SSRS-Total T[b]	-.06	-.63**	-.24**	-.48**	-.18*	-.63**	-.22**	.18**	.30**	.19**

Notes. SSRS-Total M[a] = Mother, SSRS-Total T[b] = Teacher in Samples 2 and 3 only; **p* < .05, ** *p* < .01.

Table 26. Zero-order Correlations among Time 1 and Time 2 Variables in the Integrated Sample

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. EP TRF																
2. EP CBCL	.28**															
3. Social Prob T[a]	.59**	.18**														
4. Social Prob M[b]	.20**	.58**	.23**													
5. Attention Prob T[a]	.60**	.17**	.62**	.11												
6. Attention Prob M[b]	.23**	.59**	.22**	.68**	.32**											
7. Vocabulary	.02	.00	-.09	-.01	-.10	.02										
8. Mean Marks	-.23**	-.11	-.30**	-.13*	-.39**	-.22**	.29**									
9. Family SES	-.16**	-.16**	-.04	-.14**	-.17**	-.11*	.19**	.22**								
10. T1 IP	.07	.30**	.08	.21**	.09	.20**	.05	-.01	-.11*							
11. T1 EP	.21**	.57**	.08	.37**	.07	.35**	.00	-.01	-.17**	.49**						
12. Emotion React	.00	.21**	.03	.12*	-.08	.02	.01	-.01	-.02	.28**	.34**					
13. Activity-Level	.25**	.31**	.11	.23**	.09	.26**	.01	.06	-.07	.10	.46**	.10				
14. Punitive	.18**	.27**	.09	.26**	.12	.22**	-.11*	-.08	-.06	.14**	.34**	.13*	.14**			
15. Critical	.01	.19**	.00	.15**	-.01	.16**	-.02	-.03	.00	.20**	.27**	.10	.12*	.37**		
16. Positive	-.07	-.22**	.02	-.18**	-.02	-.17**	.05	.05	.09	-.16	-.25**	-.10	-.02	-.30**	-.17**	
17. M Neg Emotion[c]	.09	.22**	.00	.18**	.01	.15**	.03	.04	-.07	.24**	.25**	.15**	.18**	.34**	.20**	-.18**

Notes. T[a] = Teacher, M[b] = Mother; M Neg Emotion[c] = Maternal Negative Emotionality; **p* < .05, ** *p* < .01.

Table 27. Zero-order Correlations among Social Skills and Variables Assessed at Time 1 in Samples 2 and 3

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. SSRS-Total M[a]										
2. SSRS-Total T[b]	.19**									
3. Family SES	.09	.19**								
4. T1 IP	-.23**	-.12	-.11*							
5. T1 EP	-.37**	-.17*	-.17**	.49**						
6. Emotion Reactivity	-.20**	.08	-.02	.28**	.34**					
7. Activity-Level	-.20**	-.11	-.07	.10	.46**	.10				
8. Punitive Parenting	-.22**	-.17*	-.06	.14**	.34**	.13*	.14**			
9. Critical Parenting	-.12	-.08	.00	.20**	.27**	.10*	.12*	.37**		
10. Positive Parenting	.29**	.10	.09	-.16**	-.25**	-.10	-.02	-.30**	-.17**	
11. M. Negative Emotion[c]	-.21**	-.14	-.07	.24**	.25**	.15**	.18**	.34**	.20**	-.18**

Notes. M[a] = Mother, T[b] = Teacher; M. Negative Emotion[c] = Maternal Negative Emotionality; *p < .05, ** p < .01.

Table 28. Hierarchical Regressions Predicting Time 2 Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**10.42****	Step 1				**0.03**	**10.42****
Family SES	-0.17	0.03	-3.23**			Family SES	-0.17	0.03	-3.23**		
Step 2				**0.02**	**3.47***	Step 2				**0.02**	**3.47***
Family SES	-0.16	0.03	-3.04*			Family SES	-0.16	0.03	-3.04*		
Child Sex[a]	0.14	0.02	2.63*			Child Sex[a]	0.14	0.02	2.63*		
Child Age	-0.01	0.00	-0.22			Child Age	-0.01	0.00	-0.22		
Step 3				**0.16**	**17.80****	Step 3				**0.15**	**15.91****
Family SES	-0.13	0.02	-2.71*			Family SES	-0.13	0.02	-2.71*		
Child Sex[a]	0.07	0.00	1.34			Child Sex[a]	0.07	0.00	1.42		
Child Age	-0.04	0.00	-0.84			Child Age	-0.05	0.00	-1.06		
Activity	0.24	0.05	4.76**			Activity	0.24	0.06	4.86**		
Emotion React[b]	0.15	0.02	3.11*			Emotion React[b]	0.16	0.02	3.25**		
Punitive	0.17	0.03	3.31**			Critical	0.11	0.01	2.12*		
Positive	-0.14	0.02	-2.70*			Positive	-0.17	0.03	-3.46**		
	R = 0.46		$R^2_{Adj} = 0.20$	F = 13.16**			R = 0.44		$R^2_{Adj} = 0.18$	F = 12.02**	

Notes. [a] -1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; *$p < .05$, **$p < .001$.

Table 29. Hierarchical Regression Predicting Time 2 Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**10.21***
Family SES	-0.17	0.03	-3.23**		
Step 2				**0.02**	**3.17***
Family SES	-0.16	0.03	-3.04*		
Child Sex[a]	0.13	0.02	2.63*		
Child Age	-0.02	0.00	-0.22		
Step 3				**0.11**	**14.75****
Family SES	-0.14	0.02	-2.75*		
Child Sex[a]	0.08	0.01	1.60		
Child Age	-0.03	0.00	-0.51		
Activity-Level	0.23	0.05	4.43**		
Emotion Reactivity	0.15	0.02	2.96*		
M. Neg Emotion[b]	0.12	0.01	2.39*		
	$R = 0.40$		$R^2_{Adj} = 0.14$		$F = 10.49$**

Notes. [a]-1 = Male, 1 = Female; M. Neg Emotion[b] = Maternal Negative Emotionality; *$p < .05$, **$p < .001$.

Table 30. Hierarchical Regressions Predicting Time 2 Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**10.42****	Step 1				**0.03**	**9.24***
Family SES	-0.17	0.03	-3.23**			Family SES	-0.16	0.03	-3.04*		
Step 2				**0.02**	**3.47***	Step 2				**0.02**	**4.30***
Family SES	-0.16	0.03	-3.04*			Family SES	-0.15	0.02	-2.87*		
Child Sex[a]	0.14	0.02	2.63*			Child Sex[a]	0.15	0.02	2.93*		
Child Age	-0.01	0.00	-0.22			Child Age	-0.01	0.00	-0.12		
Step 3				**0.14**	**14.59****	Step 3				**0.18**	**20.66****
Family SES	-0.13	0.02	-2.63*			Family SES	-0.10	0.01	-2.14*		
Child Sex[a]	0.09	0.01	1.86			Child Sex[a]	0.06	0.00	1.19		
Child Age	-0.05	0.00	-0.92			Child Age	-0.02	0.00	-0.35		
Emotion React[b]	0.12	0.01	2.41*			Activity	0.25	0.06	5.08**		
Time 1 IP	0.18	0.03	3.36**			Time 1 IP	0.20	0.04	4.12**		
Punitive	0.19	0.03	3.62**			Punitive	0.17	0.03	3.41**		
Positive	-0.11	0.01	-2.16*			Positive	-0.13	0.01	-2.27**		
	R = 0.43		R^2_{Adj} = 0.17		F = 11.23**		R = 0.48		R^2_{Adj} = 0.22		F = 14.95**

Notes. [a]-1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; *$p < .05$, **$p < .001$.

Table 31. Hierarchical Regressions Predicting Time 2 Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**9.03***	Step 1				**0.03**	**9.03***
Family SES	-0.16	0.02	-3.00*			Family SES	-0.16	0.02	-3.00*		
Step 2				**0.02**	**4.15***	Step 2				**0.02**	**4.15***
Family SES	-0.15	0.02	-2.86*			Family SES	-0.15	0.02	-2.86*		
Child Sex[a]	0.15	0.02	2.88*			Child Sex[a]	0.15	0.02	2.88*		
Child Age	-0.01	0.00	-0.20			Child Age	-0.01	0.00	-0.20		
Step 3				**0.10**	**13.30****	Step 3				**0.08**	**10.78****
Family SES	-0.12	0.02	-2.49*			Family SES	-0.13	0.02	-2.50*		
Child Sex[a]	0.13	0.02	2.64*			Child Sex[a]	0.14	0.02	2.75*		
Child Age	-0.02	0.00	-0.39			Child Age	-0.03	0.00	-0.51		
Punitive	0.19	0.03	3.51**			Critical	0.12	0.01	2.30*		
Positive	-0.13	0.01	-2.47*			Positive	-0.16	0.02	-3.03*		
M. Neg Emo[b]	0.11	0.01	2.10*			M. Neg Emo[b]	0.15	0.02	2.83*		
	R = 0.38		R^2_{Adj} = 0.13	F = 9.87**			R = 0.36		R^2_{Adj} = 0.11	F = 8.55**	

Notes. [a] -1 = Male, 1 = Female; M. Neg Emo[b] = Maternal Negative Emotionality; **p* < .05, ***p* < .001.

Table 32. Hierarchical Regressions Predicting Time 2 Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**9.27***	Step 1				**0.02**	**6.74***
Family SES	-0.16	0.02	-3.05*			Family SES	-0.15	0.02	-2.60*		
Step 2				**0.02**	**4.53***	Step 2				**0.02**	**2.89**
Family SES	-0.15	0.02	-2.91*			Family SES	-0.15	0.02	-2.49*		
Child Sex[a]	0.16	0.02	3.01*			Child Sex[a]	0.02	0.02	0.37		
Child Age	-0.00	0.00	-0.06			Child Age	0.14	0.00	2.36*		
Step 3				**0.29**	**159.11****	Step 3				**0.07**	**11.62****
Family SES	-0.06	0.00	-1.36			Family SES	-0.10	0.01	-1.78		
Child Sex[a]	0.08	0.01	1.90			Child Sex[a]	-0.04	0.00	-0.63		
Child Age	-0.01	0.00	-0.27			Child Age	0.16	0.03	2.85*		
Time 1 EP	0.55	0.29	12.61**			Activity	0.20	0.01	3.01*		
						Time 1 EP	0.13	0.03	2.02*		
	R = 0.58		$R^2_{Adj} = 0.33$		F = 46.43**		R = 0.34		$R^2_{Adj} = 0.10$		F = 7.36**

Notes. [a] -1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Table 33. Hierarchical Regressions Predicting Teacher-rated Externalizing Problems (TRF)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.02**	**6.69***	Step 1				**0.02**	**6.75***
Family SES	-0.15	0.02	-2.59*			Family SES	-0.15	0.02	-2.60*		
Step 2				**0.02**	**2926**	Step 2				**0.02**	**2.74**
Family SES	-0.14	0.02	-2.50*			Family SES	-0.15	0.02	-2.49*		
Child Sex[a]	0.02	0.00	0.27			Child Sex[a]	0.02	0.00	0.35		
Child Age	0.14	0.02	2.39*			Child Age	0.14	0.02	2.30*		
Step 3				**0.05**	**7.99****	Step 3				**0.09**	**13.68****
Family SES	-0.11	0.01	-1.97*			Family SES	-0.12	0.01	-2.10*		
Child Sex[a]	-0.02	0.00	-0.35			Child Sex[a]	-0.05	0.00	-0.85		
Child Age	0.15	0.02	2.67*			Child Age	0.16	0.02	2.75*		
Time 1 EP	0.16	0.02	2.57*			Activity	0.24	0.05	4.16**		
Punitive	0.12	0.01	2.00*			Punitive	0.16	0.03	2.84*		
	R = 0.31		$R^2_{Adj} = 0.08$		F = 5.84**		R = 0.36		$R^2_{Adj} = 0.11$		F = 8.16**

Notes. [a] -1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Table 34. Hierarchical Regression Predicting Mean School Marks (Math, French, English)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.05**	**13.01****
Family SES	0.22	0.05	3.61**		
Step 2				**0.02**	**2.92**
Family SES	0.22	0.05	3.58**		
Child Sex[a]	-0.00	0.00	-0.04		
Child Age	-0.15	0.02	-2.41*		
	R = 0.27		$R^2_{Adj} = 0.06$		F = 6.35**

Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Table 35. Hierarchical Regression Predicting Vocabulary Scores

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.04**	**14.37****
Family SES	0.19	0.04	3.79**		
Step 2				**0.01**	**1.11**
Family SES	0.20	0.04	3.88**		
Child Sex[a]	0.06	0.00	1.20		
Child Age	0.04	0.00	0.84		
Step 3				**0.01**	**4.19***
Family SES	0.19	0.04	3.79**		
Child Sex[a]	0.07	0.00	1.35		
Child Age	0.05	0.00	0.90		
Punitive	-0.10	0.01	-2.05*		
	R = 0.23		R^2_{Adj} = 0.04		F = 5.23**

Notes. [a]-1 = Male, 1 = Female; *p < .05, **p < .001.

Table 36. Hierarchical Regression Predicting Teacher-rated Attention Problems (TRF)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**7.47***
Family SES	-0.17	0.03	-2.73*		
Step 2				**0.00**	**0.32**
Family SES	-0.17	0.03	-2.71*		
Child Sex[a]	-0.01	0.00	-0.14		
Child Age	0.05	0.00	0.79		
	R = 0.18		$R^2_{Adj} = 0.02$		F = 2.69*

Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Table 37. Hierarchical Regressions Predicting Attention Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.01**	**3.76***	Step 1				**0.01**	**4.47***
Family SES	-0.10	0.01	-1.94*			Family SES	-0.11	0.01	-2.12*		
Step 2				**0.01**	**0.86**	Step 2				**0.01**	**0.97**
Family SES	-0.10	0.01	-1.87			Family SES	-0.11	0.01	-2.03*		
Child Sex[a]	0.07	0.00	1.30			Child Sex[a]	0.07	0.01	1.38		
Child Age	-0.01	0.00	-0.27			Child Age	-0.01	0.00	-0.24		
Step 3				**0.13**	**25.00****	Step 3				**0.07**	**13.03****
Family SES	-0.05	0.00	-0.96			Family SES	-0.09	0.01	-1.72		
Child Sex[a]	0.03	0.00	0.63			Child Sex[a]	0.04	0.00	0.78		
Child Age	-0.02	0.00	-0.42			Child Age	-0.02	0.00	-0.42		
Time 1 EP	0.31	0.08	5.66**			Time 1 IP	0.16	0.02	2.94*		
Punitive	0.11	0.01	2.16*			Punitive	0.20	0.04	3.77**		
	R = 0.37		R^2_{Adj} = 0.13		F = 11.25**		R = 0.29		R^2_{Adj} = 0.07		F = 6.58**

Notes. [a] -1 = Male, 1 = Female; *p < .05, **p < .001.

Table 38. Hierarchical Regressions Predicting Attention Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.01**	**4.47***	Step 1				**0.02**	**5.80***
Family SES	-0.11	0.01	-2.12*			Family SES	-0.13	0.02	-2.41*		
Step 2				**0.01**	**0.97**	Step 2				**0.00**	**0.74**
Family SES	-0.11	0.01	-2.03*			Family SES	-0.13	0.02	-2.34*		
Child Sex[a]	0.07	0.01	1.38			Child Sex[a]	0.06	0.00	1.16		
Child Age	-0.01	0.00	-0.24			Child Age	-0.02	0.00	-0.42		
Step 3				**0.06**	**7.91****	Step 3				**0.09**	**11.80****
Family SES	-0.08	0.01	-1.62			Family SES	-0.10	0.01	-1.93*		
Child Sex[a]	0.05	0.00	0.90			Child Sex[a]	0.01	0.00	0.21		
Child Age	-0.04	0.00	-0.77			Child Age	-0.04	0.00	-0.76		
Time 1 IP	0.14	0.02	2.55*			Activity-Level	0.23	0.05	4.40**		
Critical	0.11	0.01	2.15*			Critical	0.13	0.02	2.42*		
Positive	-0.13	0.02	-2.42*			Positive	-0.12	0.01	-2.36*		
	R = 0.29		$R^2_{Adj} = 0.07$		F = 5.09**		R = 0.34		$R^2_{Adj} = 0.10$		F = 7.22**

Notes. [a] -1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Table 39. Hierarchical Regression Predicting Attention Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.02**	**5.80***
Family SES	-0.13	0.02	-2.41*		
Step 2				**0.00**	**0.74**
Family SES	-0.13	0.02	-2.34*		
Child Sex[a]	0.06	0.00	1.16		
Child Age	-0.02	0.00	-0.42		
Step 3				**0.10**	**20.10****
Family SES	-0.11	0.01	-2.12*		
Child Sex[a]	0.01	0.00	0.13		
Child Age	-0.02	0.00	-0.38		
Activity-Level	0.22	0.05	4.22**		
Punitive	0.22	0.05	4.25**		
	R = 0.35		$R^2_{Adj} = 0.11$		F = 9.65**

Notes. [a] -1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Table 40. Hierarchical Regressions Predicting Social Problems (CBCL)

Variables	β	sr^2	*t*	ΔR^2	ΔF		β	sr^2	*t*	ΔR^2	ΔF
Step 1				**0.02**	**7.70***	Step 1				**0.03**	**8.76***
Family SES	-0.15	0.02	-2.78*			Family SES	-0.16	0.02	-2.96*		
Step 2				**0.01**	**2.54**	Step 2				**0.01**	**1.81**
Family SES	-0.14	0.02	-2.64*			Family SES	-0.15	0.02	-2.82*		
Child Sex[a]	0.12	0.01	2.25*			Child Sex[a]	0.10	0.01	1.90		
Child Age	-0.01	0.00	-0.14			Child Age	-0.01	0.00	-0.24		
Step 3				**0.04**	**15.28****	Step 3				**0.01**	**4.31***
Family SES	-0.13	0.02	-2.42*			Family SES	-0.15	0.02	-2.83*		
Child Sex[a]	0.07	0.00	1.37			Child Sex[a]	0.10	0.01	1.78		
Child Age	0.00	0.00	-0.06			Child Age	-0.03	0.00	-0.50		
Activity-Level	0.21	0.04	3.91**			Emotion Reactivity	0.11	0.01	2.08*		
	R = 0.28		R^2_{Adj} = 0.07		F = 7.16**		R = 0.22		R^2_{Adj} = 0.04		F = 4.21*

Notes. [a]-1 = Male, 1 = Female; *p < .05, **p < .001.

Table 41. Hierarchical Regressions Predicting Social Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.02**	**7.70***	Step 1				**0.02**	**7.70***
Family SES	-0.15	0.02	-2.78**			Family SES	-0.15	0.02	-2.78*		
Step 2				**0.01**	**2.49**	Step 2				**0.01**	**2.49**
Family SES	-0.14	0.02	-2.64*			Family SES	-0.14	0.02	-2.64*		
Child Sex[a]	0.12	0.01	2.23*			Child Sex[a]	0.12	0.01	2.23*		
Child Age	-0.01	0.00	-0.17			Child Age	-0.01	0.00	-0.17		
Step 3				**0.07**	**9.41****	Step 3				**0.10**	**19.95****
Family SES	-0.12	0.01	-2.27*			Family SES	-0.12	0.02	-2.45*		
Child Sex[a]	0.07	0.00	1.26			Child Sex[a]	0.06	0.00	1.12		
Child Age	-0.03	0.00	-0.54			Child Age	-0.01	0.00	-0.20		
Activity	0.19	0.03	3.65**			Activity	0.18	0.03	3.39**		
Critical	0.11	0.01	2.04*			Punitive	0.25	0.06	4.87**		
Positive	-0.13	0.02	-2.53*								
	R = 0.33		R^2_{Adj} = 0.09		F = 6.98**		R = 0.37		R^2_{Adj} = 0.12		F = 10.81**

Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Table 42. Hierarchical Regressions Predicting Social Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**8.76***	Step 1				**0.02**	**6.10***
Family SES	-0.16	0.02	-2.96*			Family SES	-0.13	0.02	-2.57*		
Step 2				**0.01**	**1.77**	Step 2				**0.02**	**2.71**
Family SES	-0.15	0.02	-2.82*			Family SES	-0.12	0.02	-2.36*		
Child Sex[a]	0.10	0.01	1.87			Child Sex[a]	0.12	0.01	2.33*		
Child Age	-0.01	0.00	-0.28			Child Age	-0.01	0.00	-0.17		
Step 3				**0.05**	**5.86***	Step 3				**0.14**	**28.83****
Family SES	-0.14	0.02	-2.70*			Family SES	-0.07	0.01	-1.46		
Child Sex[a]	0.09	0.01	1.63			Child Sex[a]	0.07	0.01	1.46		
Child Age	-0.05	0.00	-0.96			Child Age	-0.02	0.00	-0.32		
Emotion React[b]	0.09	0.01	1.68^{+}			Time 1 EP	0.30	0.08	5.76**		
Critical	0.12	0.01	2.19*			Punitive	0.14	0.02	2.71*		
Positive	-0.13	0.02	-2.50*								
	R = 0.29		$R^2_{Adj} = 0.07$	F = 5.08**			R = 0.41		$R^2_{Adj} = 0.16$	F = 14.21**	

Notes. [a] -1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; $^{+}p < .01$, $*p < .05$, $**p < .001$.

Table 43. Hierarchical Regressions Predicting Social Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.02**	**7.40***	Step 1				**0.02**	**7.41***
Family SES	-0.14	0.02	-2.72*			Family SES	-0.14	0.02	-2.72*		
Step 2				**0.02**	**3.02***	Step 2				**0.02**	**3.07***
Family SES	-0.13	0.02	-2.58*			Family SES	-0.13	0.02	-2.58*		
Child Sex[a]	0.13	0.02	2.45*			Child Sex[a]	0.13	0.02	2.45*		
Child Age	-0.01	0.00	-0.27			Child Age	-0.01	0.00	-0.27		
Step 3				**0.08**	**16.38****	Step 3				**0.05**	**9.97****
Family SES	-0.11	0.01	-2.24*			Family SES	-0.11	0.01	-2.09*		
Child Sex[a]	0.09	0.01	1.77			Child Sex[a]	0.10	0.01	1.99*		
Child Age	-0.02	0.00	-0.48			Child Age	-0.03	0.00	-0.62		
Time 1 IP	0.15	0.02	3.02*			Time 1 IP	0.16	0.02	3.12*		
Punitive	0.22	0.05	4.44**			Positive	-0.14	0.02	-2.70*		
	R = 0.34		$R^2_{Adj} = 0.11$		F = 9.49**		R = 0.30		$R^2_{Adj} = 0.08$		F = 6.85**

Notes. [a] -1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Table 44. Hierarchical Regression Predicting Social Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.02**	**7.40***
Family SES	-0.14	0.02	-2.72*		
Step 2				**0.02**	**3.02***
Family SES	-0.13	0.02	-2.58*		
Child Sex[a]	0.13	0.02	2.45*		
Child Age	-0.01	0.00	-0.27		
Step 3				**0.04**	**8.55****
Family SES	-0.12	0.01	-2.35*		
Child Sex[a]	0.10	0.01	1.96*		
Child Age	-0.03	0.00	-0.56		
Time 1 IP	0.16	0.02	3.06*		
Critical	0.11	0.01	2.15*		
	R = 0.28		$R^2_{Adj} = 0.07$		F = 6.24**

Notes. [a]-1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Table 45. Hierarchical Regression Predicting Social Skills (SSRS-Total Teacher)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**7.13***
Family SES	0.19	0.03	2.67*		
Step 2				**0.04**	**3.96***
Family SES	0.17	0.03	2.47*		
Child Sex[a]	-0.18	0.03	-2.57*		
Child Age	-0.08	0.01	-1.09		
Step 3				**0.02**	**4.02***
Family SES	0.16	0.03	2.37*		
Child Sex[a]	-0.16	0.03	-2.36*		
Child Age	-0.07	0.00	-0.98		
Punitive	-0.14	0.02	-2.00*		
	R = 0.30		R^2_{Adj} = 0.07		F = 4.88**

Notes. [a] -1 = Male, 1 = Female; *p < .05, **p < .001.

Table 46. Hierarchical Regressions Predicting Social Skills (SSRS-Total Mother)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.01**	**1.87**	Step 1				**0.01**	**1.81**
Family SES	0.09	0.01	1.37			Family SES	0.09	0.01	-2.57*		
Step 2				**0.05**	**6.48***	Step 2				**0.05**	**6.08***
Family SES	0.06	0.00	1.04			Family SES	0.06	0.00	-2.36*		
Child Sex[a]	-0.22	0.05	-3.60**			Child Sex[a]	-0.22	0.05	2.33*		
Child Age	-0.01	0.00	-0.11			Child Age	-0.01	0.00	-0.17		
Step 3				**0.06**	**8.11****	Step 3				**0.06**	**8.96****
Family SES	0.05	0.00	0.86			Family SES	0.06	0.00	-1.46		
Child Sex[a]	-0.18	0.03	-2.88*			Child Sex[a]	-0.19	0.03	1.46		
Child Age	0.00	0.00	0.02			Child Age	0.05	0.00	-0.32		
Activity-Level	-0.14	0.02	-2.23*			Emotion React[b]	-0.16	0.02	5.76**		
Punitive	-0.18	0.03	-3.02*			Punitive	-0.17	0.03	2.71*		
	R = 0.34		R^2_{Adj} = 0.10		F = 6.40**		R = 0.34		R^2_{Adj} = 0.10		F = 6.57**

Notes. [a]-1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; **p* < .05, ***p* < .001.

Table 47. Hierarchical Regressions Predicting Social Skills (SSRS-Total Mother)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.01**	**1.81**	Step 1				**0.01**	**1.86**
Family SES	0.09	0.01	1.34			Family SES	0.08	0.01	1.36		
Step 2				**0.05**	**6.08***	Step 2				**0.04**	**5.94***
Family SES	0.06	0.00	1.03			Family SES	0.07	0.00	1.11		
Child Sex[a]	-0.22	0.05	-3.48*			Child Sex[a]	-0.21	0.04	-3.44*		
Child Age	-0.01	0.00	-0.16			Child Age	0.01	0.00	0.23		
Step 3				**0.11**	**10.18****	Step 3				**0.15**	**23.67****
Family SES	0.05	0.00	0.78			Family SES	-0.00	0.00	-0.03		
Child Sex[a]	-0.15	0.02	-2.57*			Child Sex[a]	-0.15	0.02	-2.58*		
Child Age	0.03	0.00	0.47			Child Age	0.02	0.00	0.33		
Emotion React[b]	-0.13	0.02	-2.13*			Time 1 EP	-0.30	0.08	-5.03**		
Activity	-0.14	0.02	-2.36*			Positive	0.19	0.03	3.27*		
Positive	0.23	0.05	-2.82**								
	R = 0.40		R^2_{Adj} = 0.14		F = 7.69**		R = 0.45		R^2_{Adj} = 0.18		F = 12.71**

Notes. [a] -1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; **p* < .05, ***p* < .001.

Table 48. Hierarchical Regressions Predicting Social Skills (SSRS-Total Mother)

Variables	β	sr^2	t	ΔR^2	ΔF	Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.01**	**2.15**	Step 1				**0.01**	**2.15**
Family SES	0.09	0.01	1.47			Family SES	0.08	0.01	1.32		
Step 2				**0.05**	**6.17***	Step 2				**0.05**	**6.17***
Family SES	0.07	0.01	1.19			Family SES	0.07	0.00	1.05		
Child Sex[a]	-0.21	0.04	-3.49*			Child Sex[a]	-0.22	0.05	-3.49*		
Child Age	0.02	0.00	0.39			Child Age	0.05	0.00	0.77		
Step 3				**0.11**	**11.07****	Step 3				**0.11**	**11.07****
Family SES	0.04	0.00	0.63			Family SES	0.03	0.00	0.51		
Child Sex[a]	-0.15	0.02	-2.53*			Child Sex[a]	-0.17	0.03	-2.83*		
Child Age	0.05	0.00	0.87			Child Age	0.05	0.00	0.89		
Time 1 IP	-0.16	0.02	-2.63*			Time 1 IP	-0.14	0.02	-2.22*		
Punitive	-0.12	0.01	-2.03*			Positive	0.23	0.05	3.76**		
Positive	0.22	0.04	3.55**			M. Neg Emo[b]	-0.12	0.01	-2.01		
	R = 0.40		$R^2_{Adj} = 0.14$		F = 8.25**		R = 0.40		$R^2_{Adj} = 0.14$		F = 8.25**

Notes. [a] -1 = Male, 1 = Female; M. Neg Emo[b] = Maternal Negative Emotionality; *$p < .05$, **$p < .001$.

Table 49. Hierarchical Regression Predicting Social Skills (SSRS-Total Mother)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.01**	**1.70**
Family SES	0.08	0.01	1.30		
Step 2				**0.05**	**6.25***
Family SES	0.06	0.00	0.99		
Child Sex[a]	-0.22	0.05	-3.52*		
Child Age	0.02	0.00	0.39		
Step 3				**0.10**	**9.30****
Family SES	0.05	0.00	0.77		
Child Sex[a]	-0.19	0.04	-3.17*		
Child Age	0.06	0.00	0.99		
Emotion Reactivity	-0.13	0.01	-1.99*		
Positive	0.21	0.04	3.41*		
M. Neg. Emotion[b]	-0.13	0.01	-2.03*		
	R = 0.39		$R^2_{Adj} = 0.13$		F = 7.28**

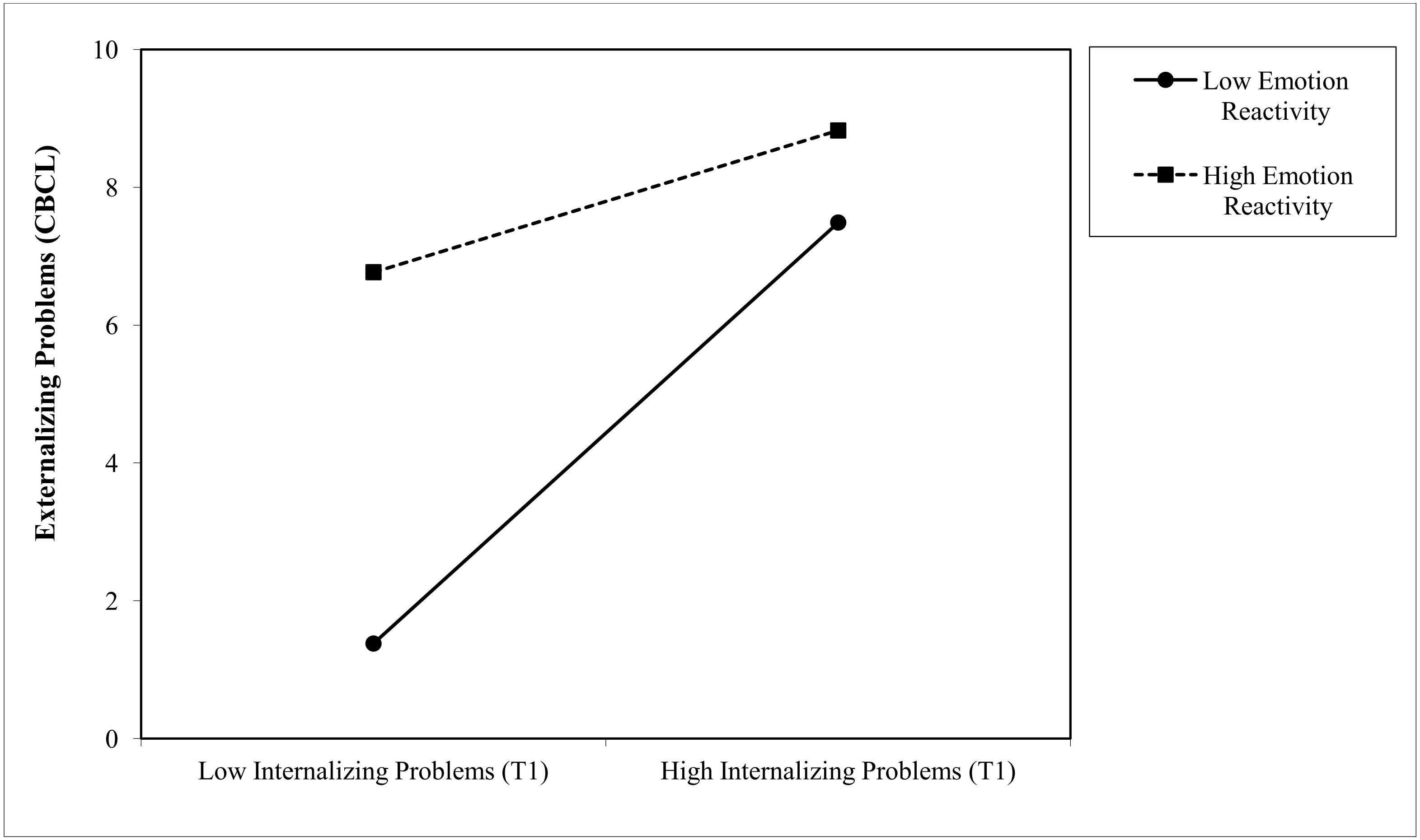
Notes. [a]-1 = Male, 1 = Female; M. Neg Emotion[b] = Maternal Negative Emotionality; *$p < .05$, **$p < .001$.

Table 50. Time 1 Internalizing Problems x Emotion Reactivity Interaction Predicting Time 2 Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**10.45***
Family SES	-0.17	0.03	-3.23*		
Step 2				**0.02**	**3.47***
Family SES	-0.16	0.03	-3.05*		
Child Sex[a]	0.14	0.02	2.63*		
Child Age	-0.01	0.00	-0.23		
Step 3				**0.08**	**16.10****
Family SES	-0.14	0.02	-2.72*		
Child Sex[a]	0.10	0.01	2.06*		
Child Age	-0.04	0.00	-0.69		
Emotion Reactivity	0.15	0.02	2.80*		
Time 1 IP	0.21	0.04	3.92**		
Step 4				**0.01**	**4.01***
Family SES	-0.14	0.02	-2.76*		
Child Sex[a]	0.10	0.01	1.98*		
Child Age	-0.03	0.00	-0.68		
Emotion Reactivity	0.17	0.02	3.14*		
Time 1 IP	0.20	0.04	3.78**		
Emotion React[b] x IP	-0.10	0.01	-2.00*		
	R = 0.37		$R^2_{Adj} = 0.12$		F = 9.29**

Notes. [a]-1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; *$p < .05$, **$p < .001$.

Figure 18. Time 1 Internalizing Problems x Emotion Reactivity Interaction Predicting Time 2 Externalizing Problems (CBCL)



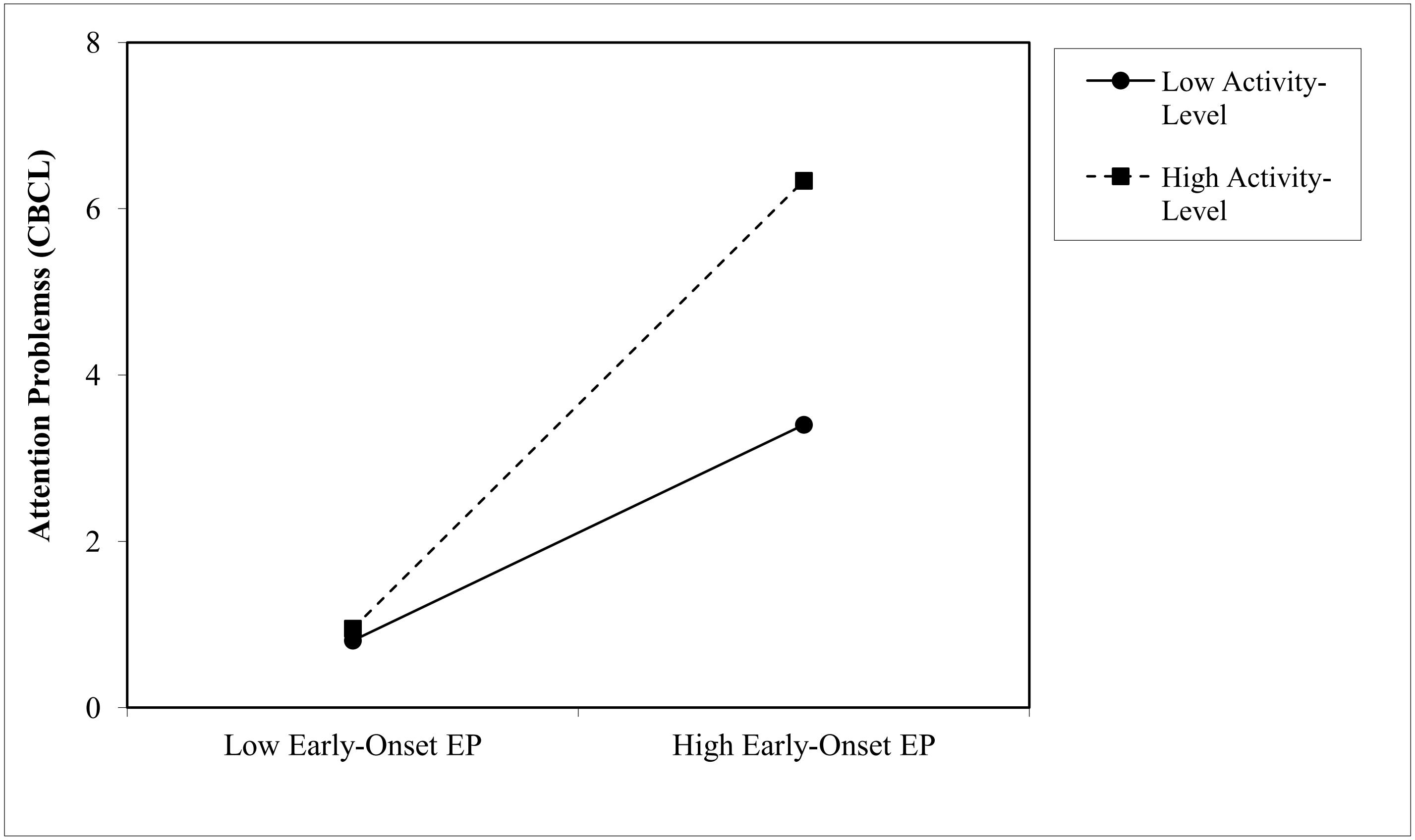
Note. $p < .05$.

Table 51. Time 1 Externalizing Problems x Activity-Level Interaction Predicting Attention Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.02**	**5.34***
Family SES	-0.12	0.02	-2.31*		
Step 2				**0.00**	**0.74**
Family SES	-0.12	0.01	-2.25*		
Child Sex[a]	0.06	0.00	1.11		
Child Age	-0.03	0.00	-0.55		
Step 3				**0.12**	**24.37****
Family SES	-0.07	0.00	-1.31		
Child Sex[a]	0.01	0.00	0.18		
Child Age	-0.03	0.00	-0.57		
Activity-Level	0.11	0.01	1.97*		
Time 1 EP	0.29	0.07	5.14**		
Step 4				**0.01**	**4.83***
Family SES	-0.07	0.00	-1.28		
Child Sex[a]	0.02	0.00	0.40		
Child Age	-0.02	0.00	-0.48		
Activity-Level	0.12	0.01	2.13*		
Time 1 EP	0.30	0.07	5.32**		
Activity-Level x EP	0.11	0.01	2.20*		
	R = 0.39		$R^2_{Adj} = 0.14$		F = 10.32**

Notes. [a]-1 = Male, 1 = Female; *p < .05, **p < .001.

Figure 19. Time 1 Externalizing Problems x Activity-Level Interaction Predicting Attention Problems (CBCL)



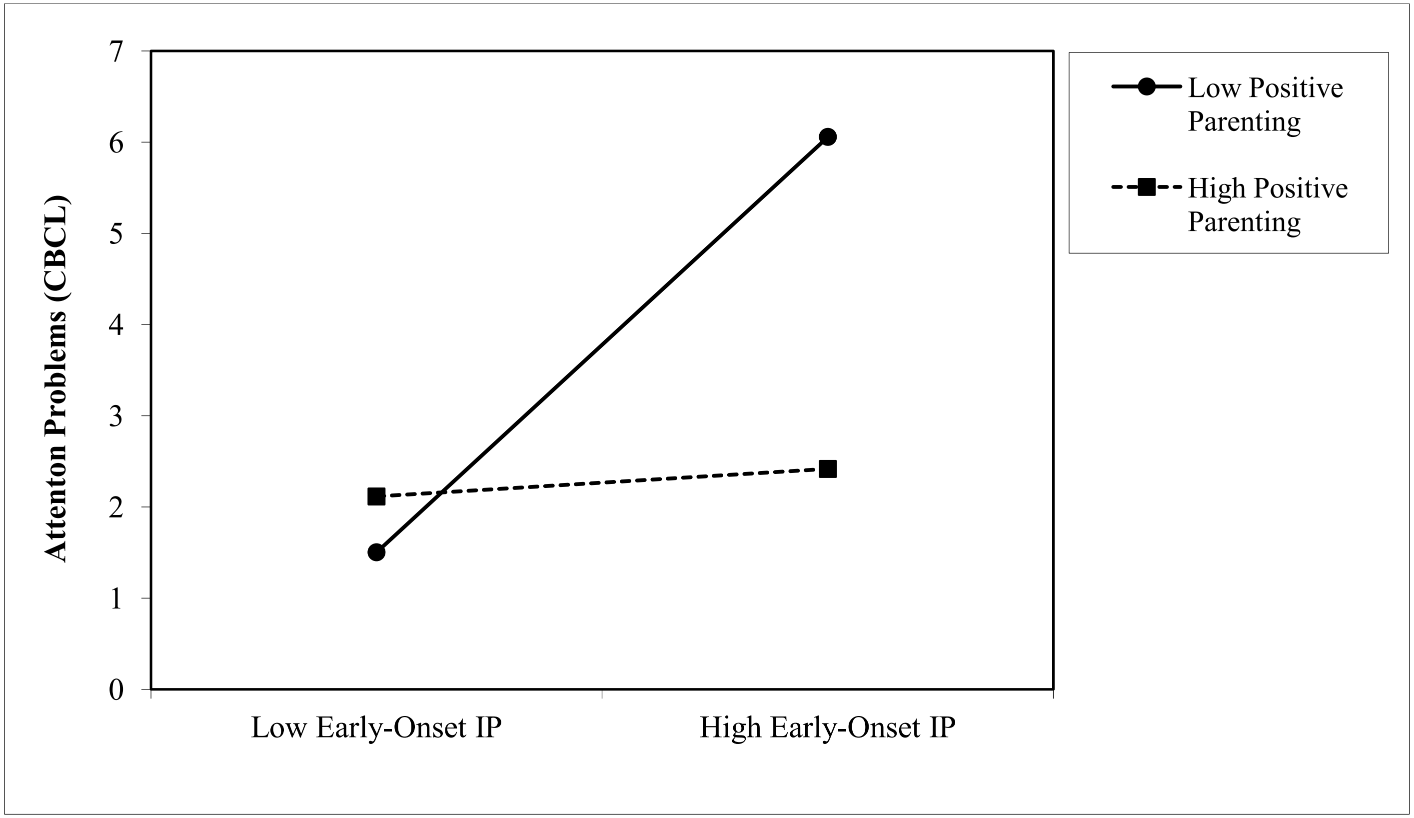
Note. *p* < .05.

Table 52. Time 1 Internalizing Problems x Positive Parenting Interaction Predicting Attention Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.01**	**4.49***
Family SES	-0.11	0.01	-2.12*		
Step 2				**0.01**	**0.96**
Family SES	-0.11	0.01	-2.04*		
Child Sex[a]	0.07	0.01	1.38		
Child Age	-0.01	0.00	-0.25		
Step 3				**0.05**	**9.48****
Family SES	-0.08	0.01	-1.55		
Child Sex[a]	0.05	0.00	0.91		
Child Age	-0.03	0.00	-0.64		
Time 1 IP	0.16	0.02	2.97*		
Positive	-0.14	0.02	-2.70*		
Step 4				**0.02**	**7.89***
Family SES	-0.08	0.01	-1.61		
Child Sex[a]	0.04	0.00	0.86		
Child Age	-0.04	0.00	-0.86		
Time 1 IP	0.18	0.03	3.41*		
Positive	-0.11	0.01	-2.02*		
Positive x IP	-0.15	0.02	-2.81*		
	R = 0.30	R^2_{Adj} = 0.07			F = 5.68**

Notes. [a]-1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Figure 20. Time 1 Internalizing Problems x Positive Parenting Interaction Predicting Attention Problems (CBCL)



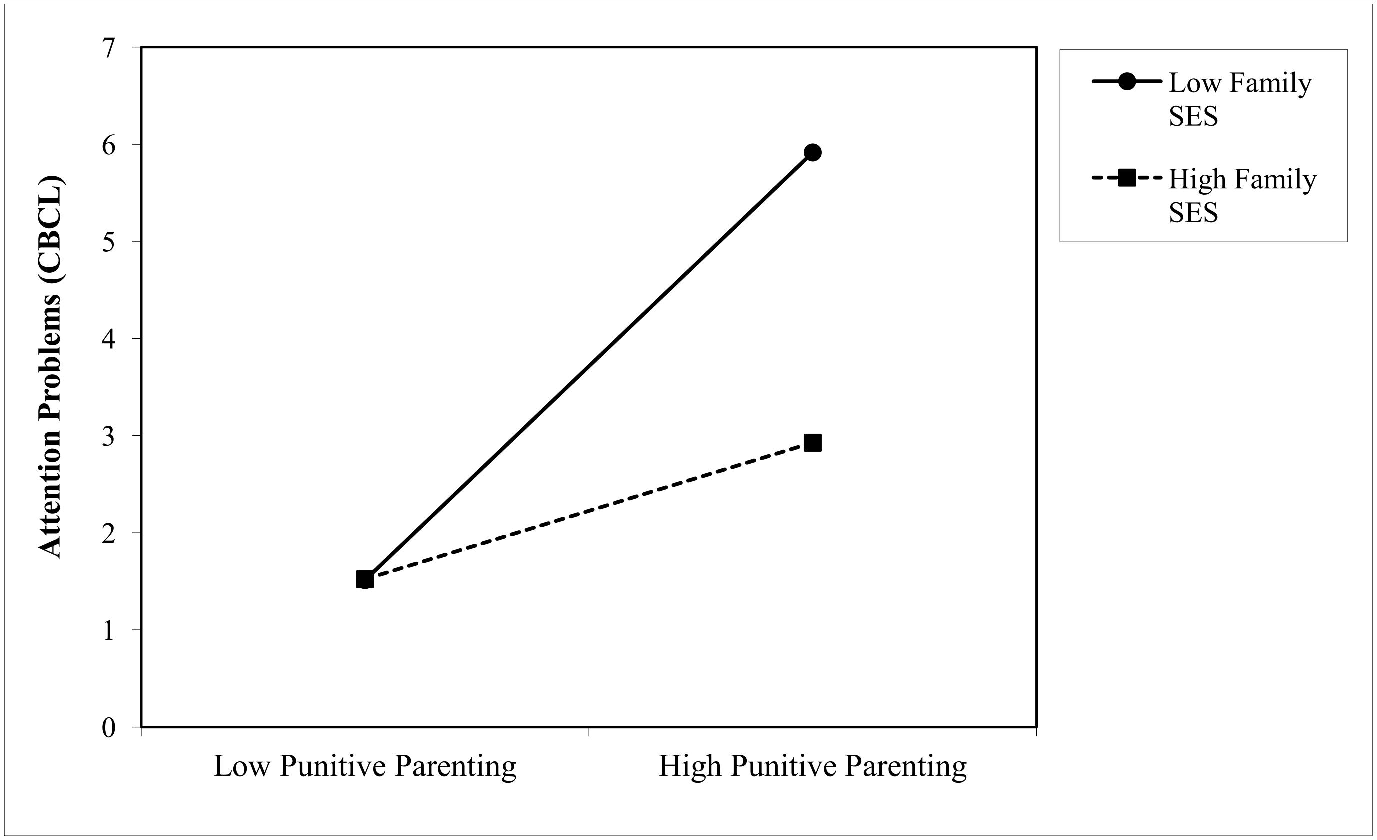
Note. $p < .05$.

Table 53. Family SES x Punitive Parenting Interaction Predicting Attention Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.01**	**4.47***
Family SES	-0.11	0.01	-2.12*		
Step 2				**0.01**	**0.97**
Family SES	-0.11	0.01	-2.03*		
Child Sex[a]	0.07	0.01	1.38		
Child Age	-0.01	0.00	-0.24		
Step 3				**0.05**	**17.02****
Family SES	-0.10	0.01	-1.97*		
Child Sex[a]	0.06	0.00	1.18		
Child Age	-0.02	0.00	-0.32		
Punitive	0.21	0.05	4.13**		
Step 4				**0.01**	**4.08***
Family SES	-0.11	0.01	-2.11*		
Child Sex[a]	0.06	0.00	1.18*		
Child Age	-0.02	0.00	-0.37		
Punitive	0.22	0.05	4.28**		
Punitive x Family SES	-0.11	0.01	-2.02*		
	R = 0.27		$R^2_{Adj} = 0.06$		F = 5.60**

Notes. [a]-1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Figure 21. Family SES x Punitive Parenting Interaction Predicting Attention Problems (CBCL)



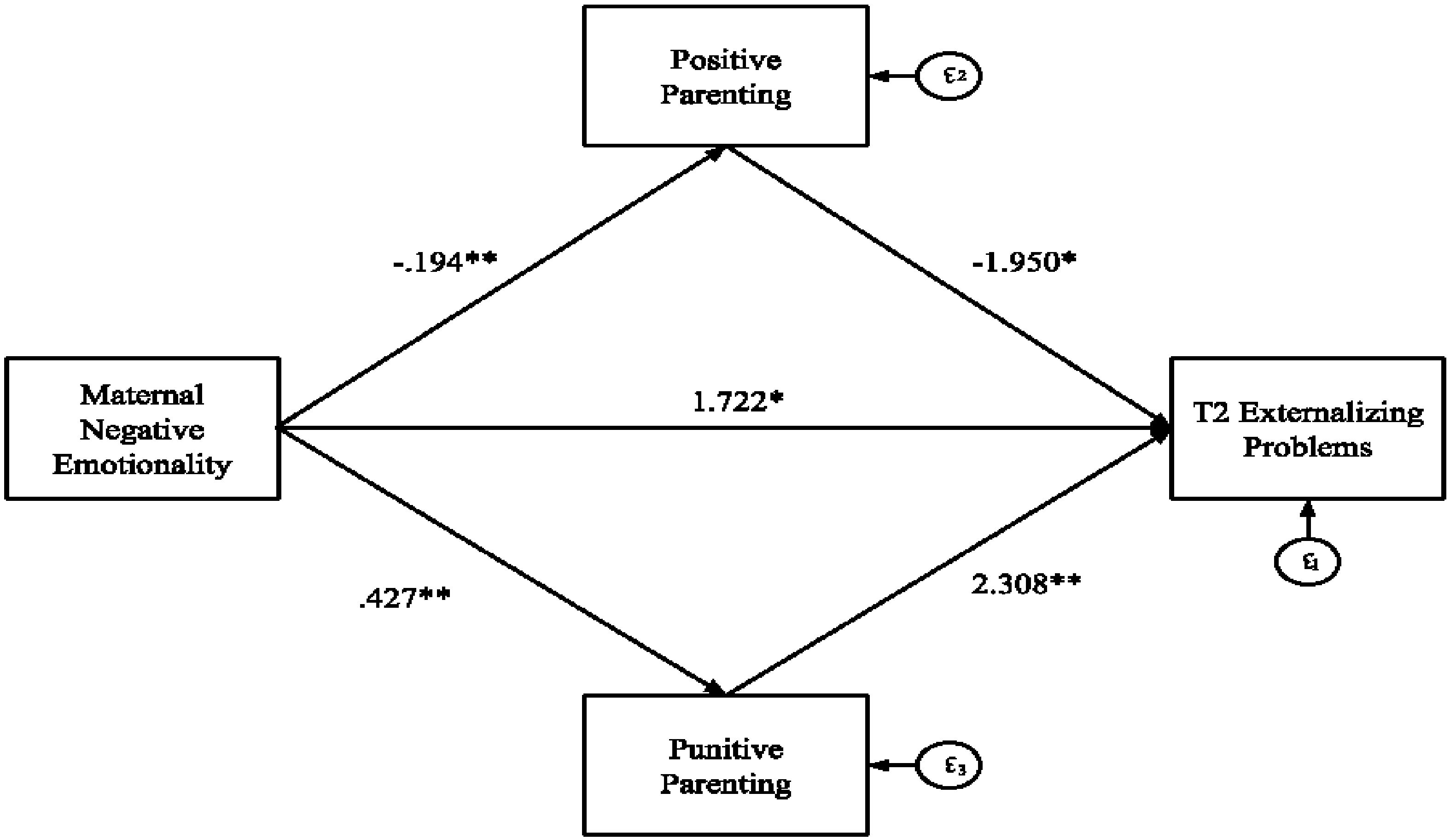
Note. $p < .05$.

Table 54. Indirect Effects of Maternal Negative Emotionality on Time 2 Externalizing Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	.99	.31	3.18	.48	1.75
Positive	.38	.18	2.14	.11	.83
Total	1.36	.34	4.00	.77	2.18
Contrast					
Positive vs. Punitive	-.61	.37	-1.64	-1.42	.07

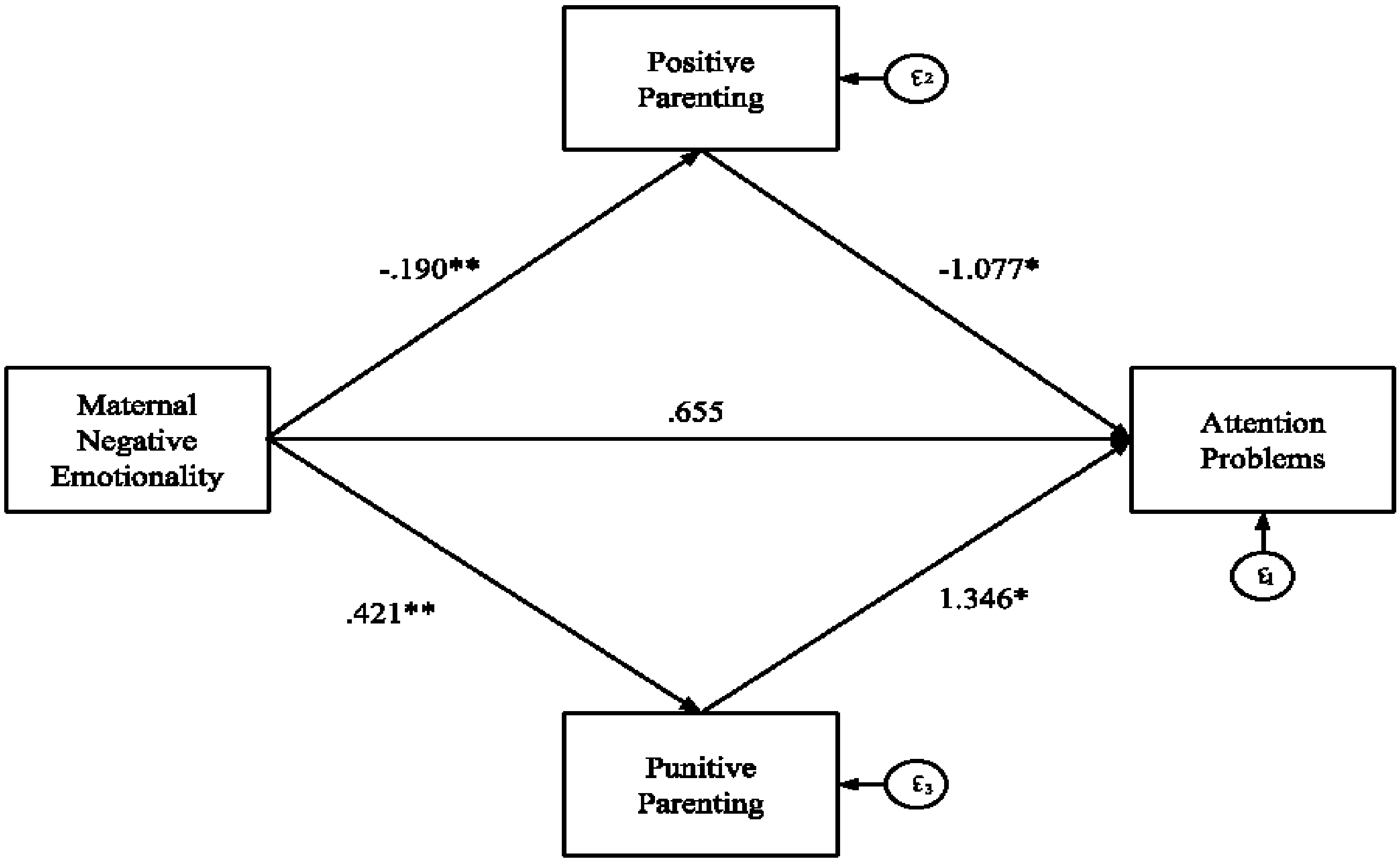
Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 22. Direct and Indirect Effects of Maternal Negative Emotionality on Time 2 Externalizing Problems via Parenting



Notes. **p* < .05, ** *p* < .001; unstandardized path coefficients shown.

Figure 23. Indirect effects of Maternal Negative Emotionality on Attention Problems via Parenting



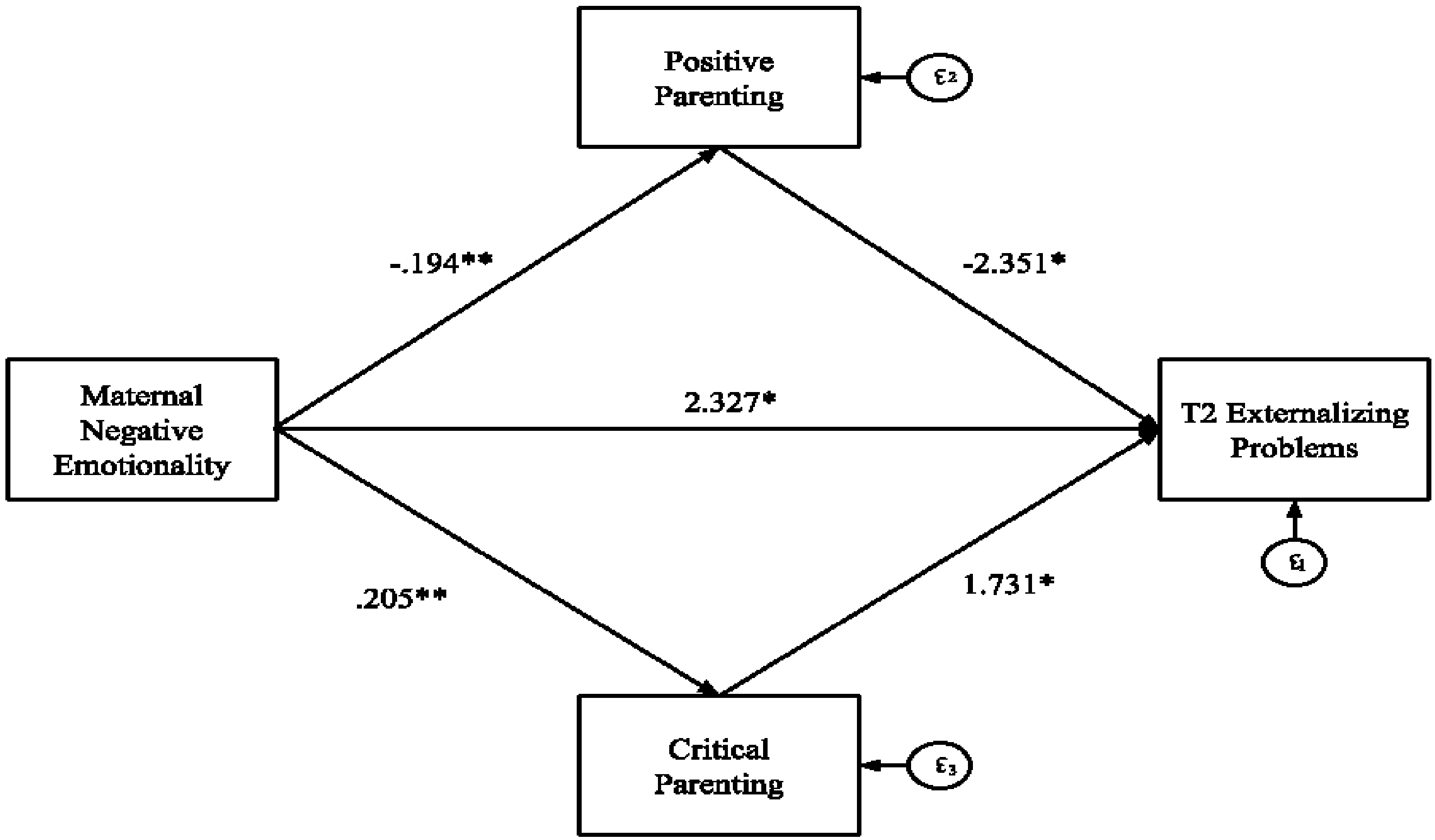
Notes. *p < .05, ** p < .001; unstandardized path coefficients shown.

Table 55. Indirect Effects of Maternal Negative Emotionality on Attention Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	.57	.20	2.78	.21	1.18
Positive	.20	.11	1.82	.00	.57
Total	.77	.22	2.78	.42	1.33
Contrast					
Positive vs. Punitive	-.36	.24	-1.48	-1.10	.19

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 24. Direct and Indirect Effects of Maternal Negative Emotionality on Time 2 Externalizing Problems via Parenting



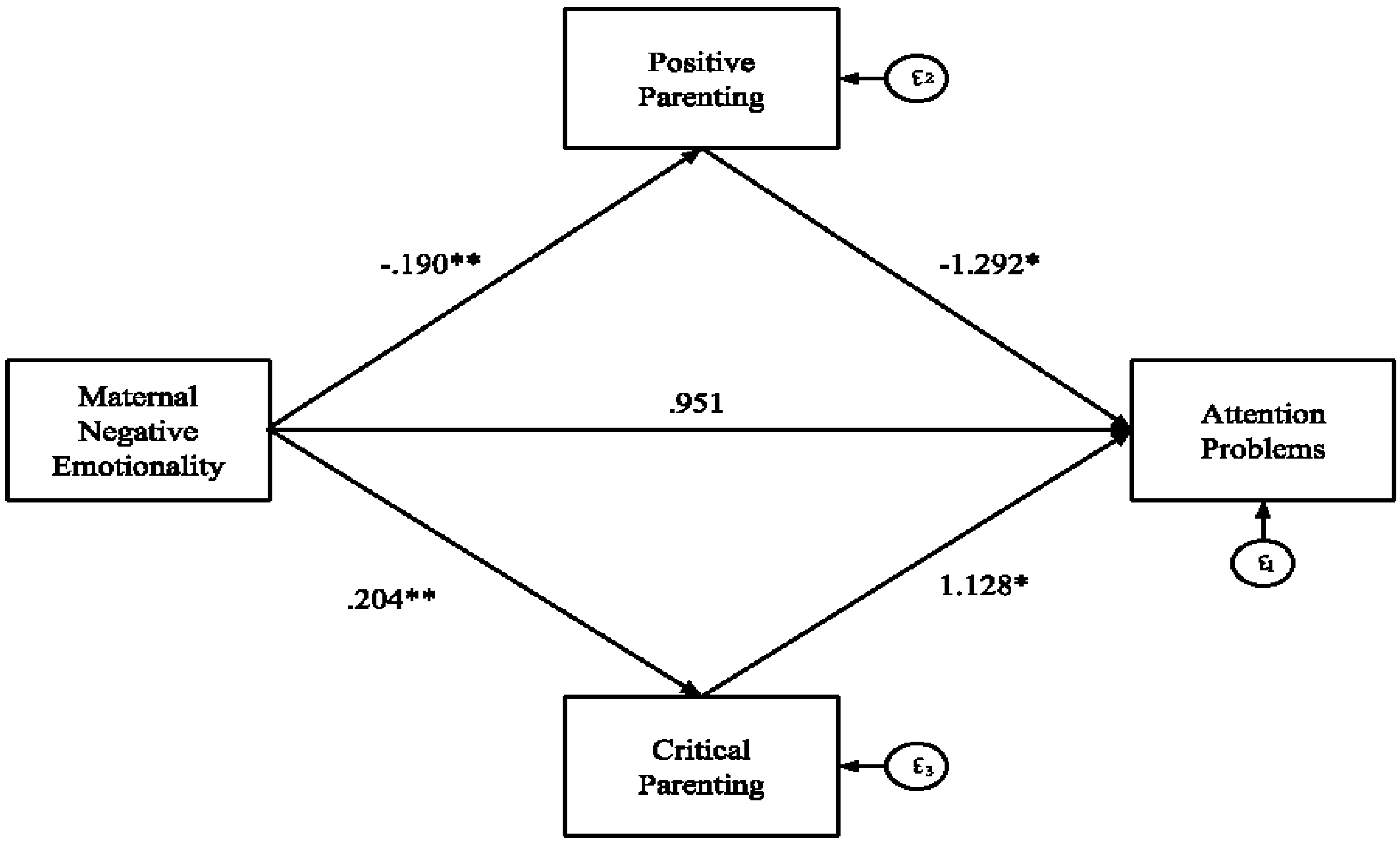
Notes. **p* < .05, ** *p* < .001; unstandardized path coefficients shown.

Table 56. Indirect Effects of Maternal Negative Emotionality on Time 2 Externalizing Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Critical	.35	.18	1.96	.06	.85
Positive	.46	.19	2.40	.18	.93
Total	.81	.34	4.00	.38	1.43
Contrast					
Positive vs. Critical	.10	.27	.38	-.46	.64

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 25. Indirect effects of Maternal Negative Emotionality on Attention Problems via Parenting



Notes. *$p < .05$, ** $p < .001$; unstandardized path coefficients shown.

Table 57. Indirect Effects of Maternal Negative Emotionality on Attention Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Critical	.23	.20	2.78	.04	.63
Positive	.25	.11	1.82	.06	.61
Total	.47	.22	2.78	.21	.92
Contrast					
Positive vs. Critical	.02	.24	-1.48	-.42	.39

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Table 58. Indirect Effect of Maternal Negative Emotionality on Teacher-rated Externalizing Problems via Punitive Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effect					
Punitive	.65	.26	2.48	.21	1.26
Total	.65	.26	2.48	.21	1.26

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of a significant mediation effect.

Table 59. Indirect Effect of Maternal Negative Emotionality on Vocabulary via Punitive Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effect					
Punitive	-.64	.03	-2.29	-.13	-.02
Total	-.64	.03	-2.29	-.13	-.02

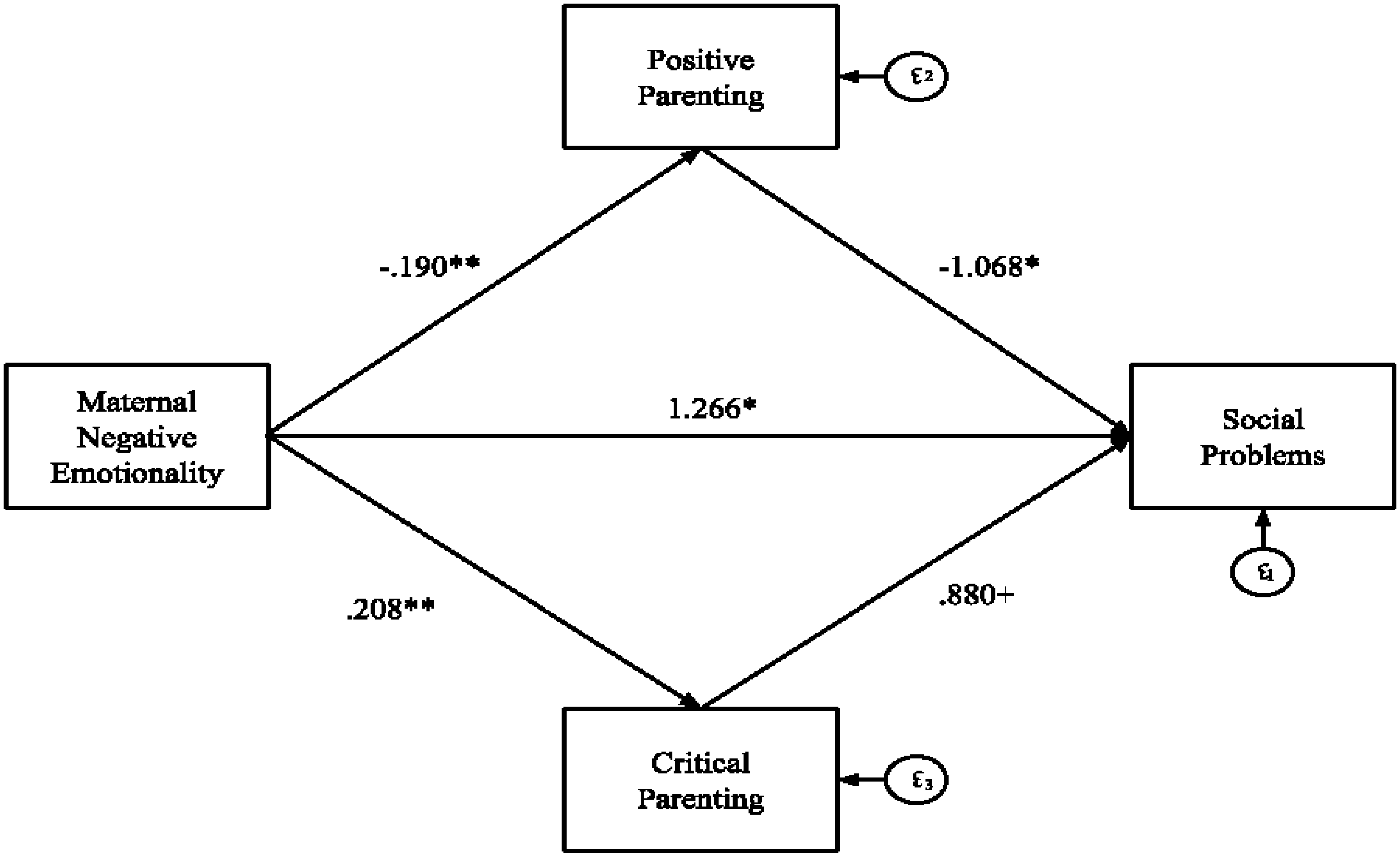
Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of a significant mediation effect.

Table 60. Indirect Effects of Maternal Negative Emotionality on Social Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effect					
Punitive	.67	.20	3.40	.30	1.22
Total	.67	.20	3.40	.30	1.22
Indirect Effect					
Positive	.22	.11	2.07	.05	.47
Total	.22	.11	2.07	.05	.47

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples. *BCa 95% CI does not contain zero and is therefore indicative of a significant mediation effect.

Figure 26. Direct and Indirect Effects of Maternal Negative Emotionality on Social Problems via Parenting



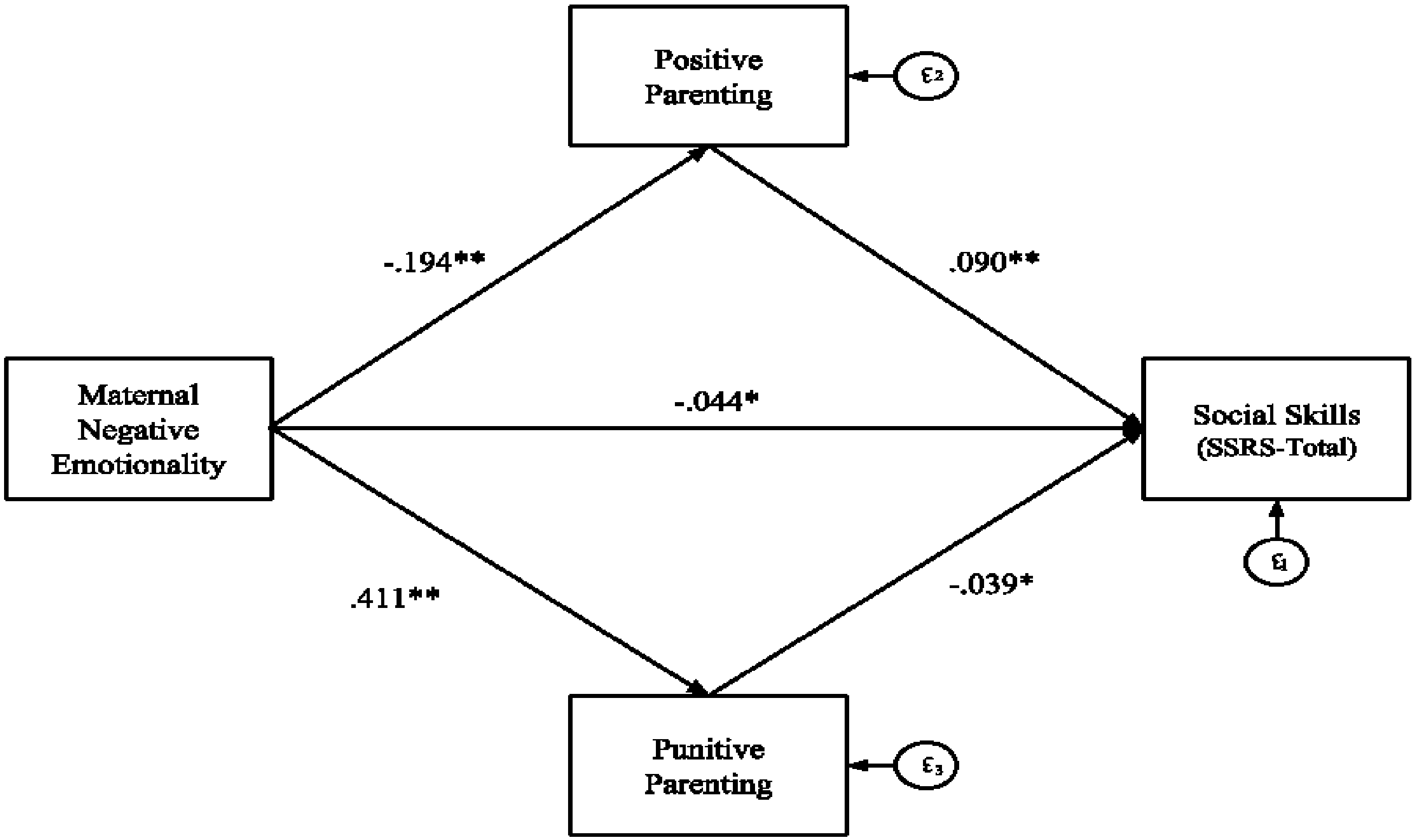
Notes. **p* < .05, ** *p* < .001; unstandardized path coefficients shown.

Table 61. Indirect Effects of Maternal Negative Emotionality on Social Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Critical	.18	.11	1.65	.01	.50
Positive	.20	.10	1.94	.03	.46
Total	.39	.15	2.62	.14	.75
Contrast					
Positive vs. Critical	.02	.16	.13	-.35	.34

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 27. Direct and Indirect Effects of Maternal Negative Emotionality on Social Skills via Parenting



Notes. **p* < .05, ** *p* < .001; unstandardized path coefficients shown.

Table 62. Indirect Effects of Maternal Negative Emotionality on Social Skills via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	-.02	.01	-1.81	-.04	-.00
Positive	-.02	.01	-2.50	-.04	-.01
Total	-.03	.01	-3.14	-.06	-.02
Contrast					
Positive vs. Punitive	-.00	.01	-.13	-.03	.02

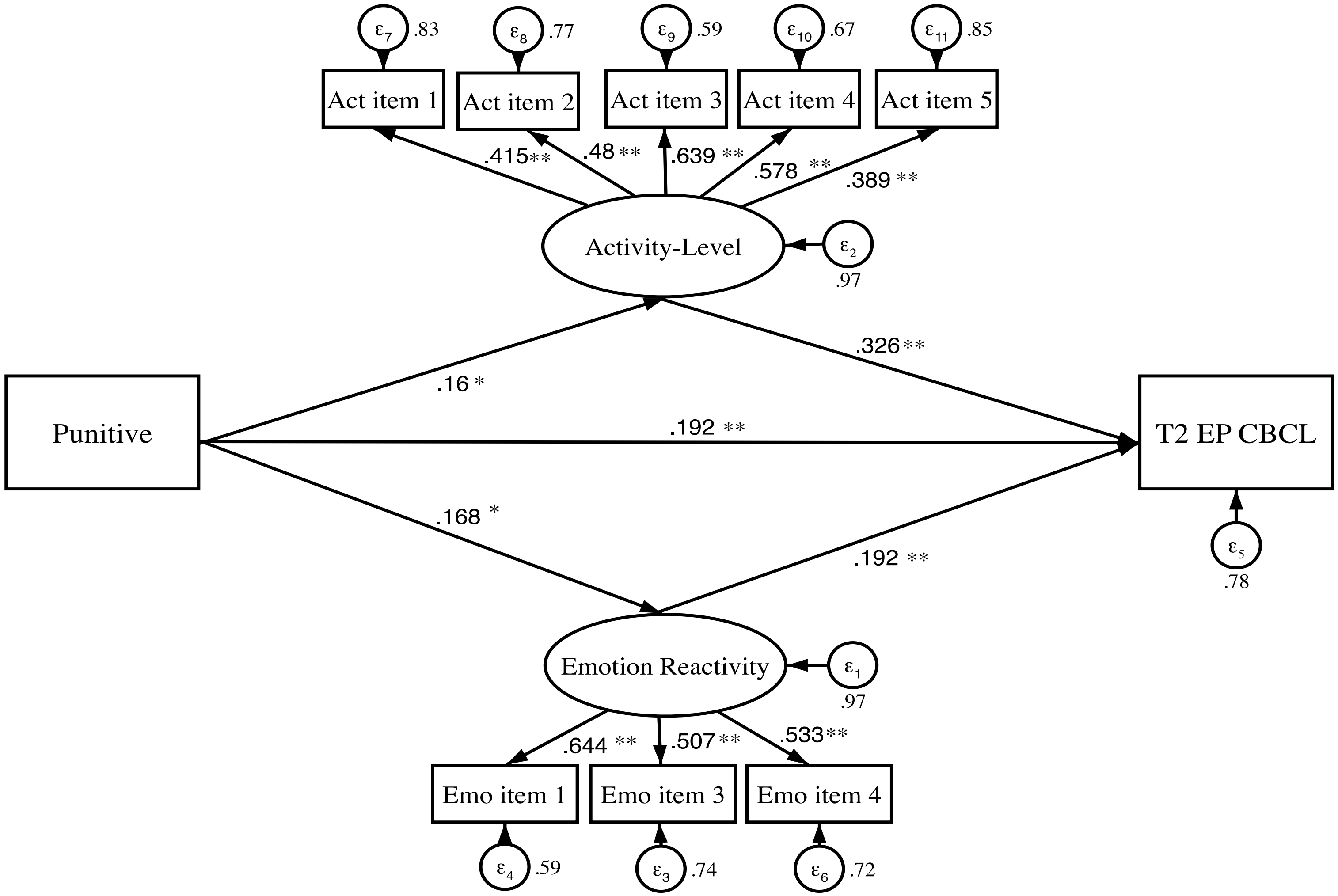
Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples. *BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Table 63. Indirect Effects of Punitive Parenting on Time 2 Externalizing Problems via Temperament

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Emotion Reactivity	.24	.12	1.96	.04	.59
Activity-Level	.41	.18	2.32	.10	.87
Total	.65	.22	2.97	.26	1.19
Contrast					
Emotion Reactivity vs. Activity-Level	-.17	.21	-.79	-.65	.26

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 28. Direct and indirect effects of Punitive Parenting on Time 2 Externalizing Problems via Temperament



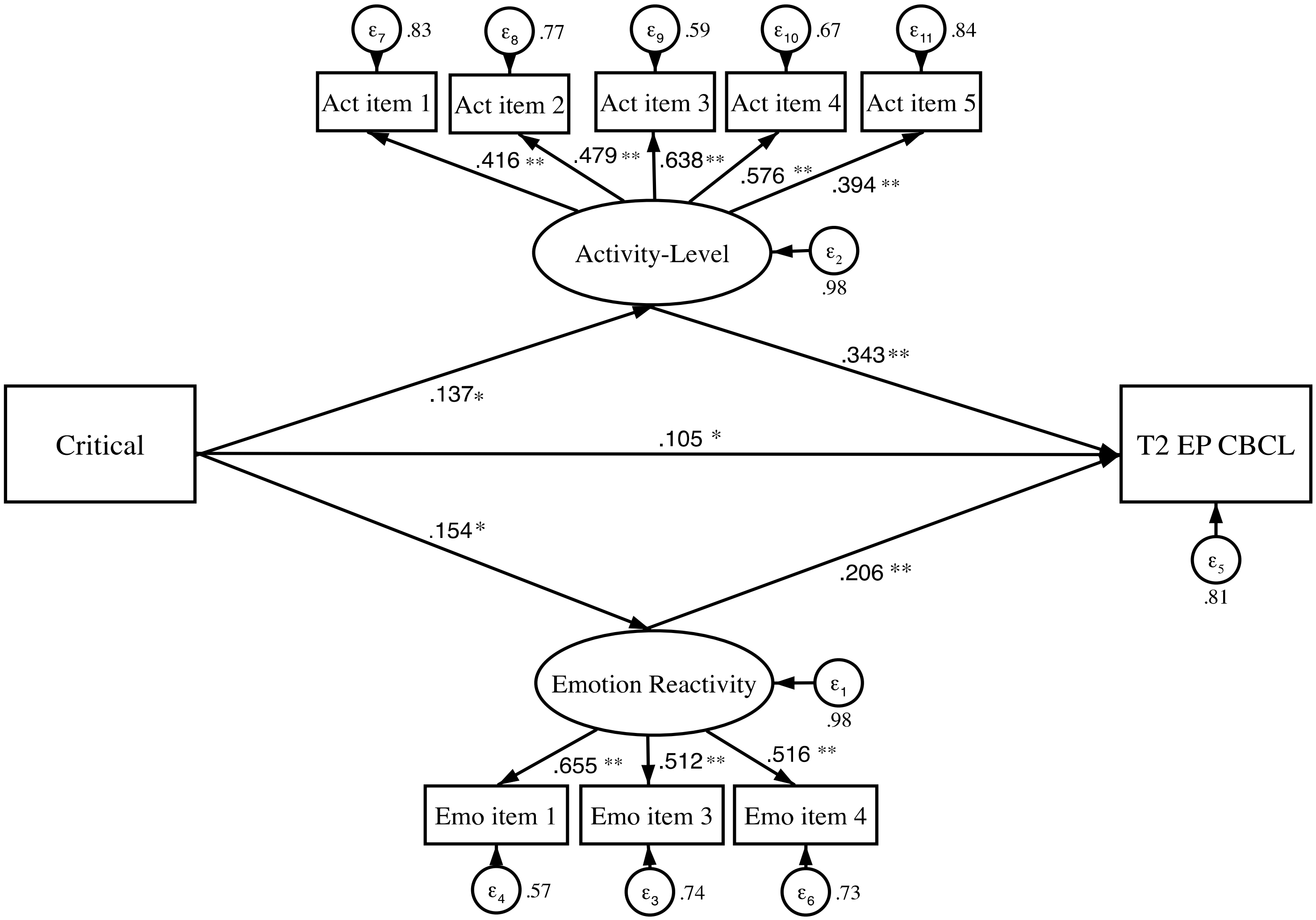
Notes. **p* < .05, ** *p* < .001; standardized path coefficients shown.

Table 64. Indirect Effects of Critical Parenting on Time 2 Externalizing Problems via Temperament

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Emotion Reactivity	.27	.15	1.76	.02	.71
Activity-Level	.49	.23	2.16	.10	1.07
Total	.76	.28	2.71	.25	1.44
Contrast					
Emotion Reactivity vs. Activity-Level	-.22	.27	-.81	-.86	.30

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of significant mediation effects.

Figure 29. Direct and indirect effects of Critical Parenting on Time 2 Externalizing Problems via Temperament



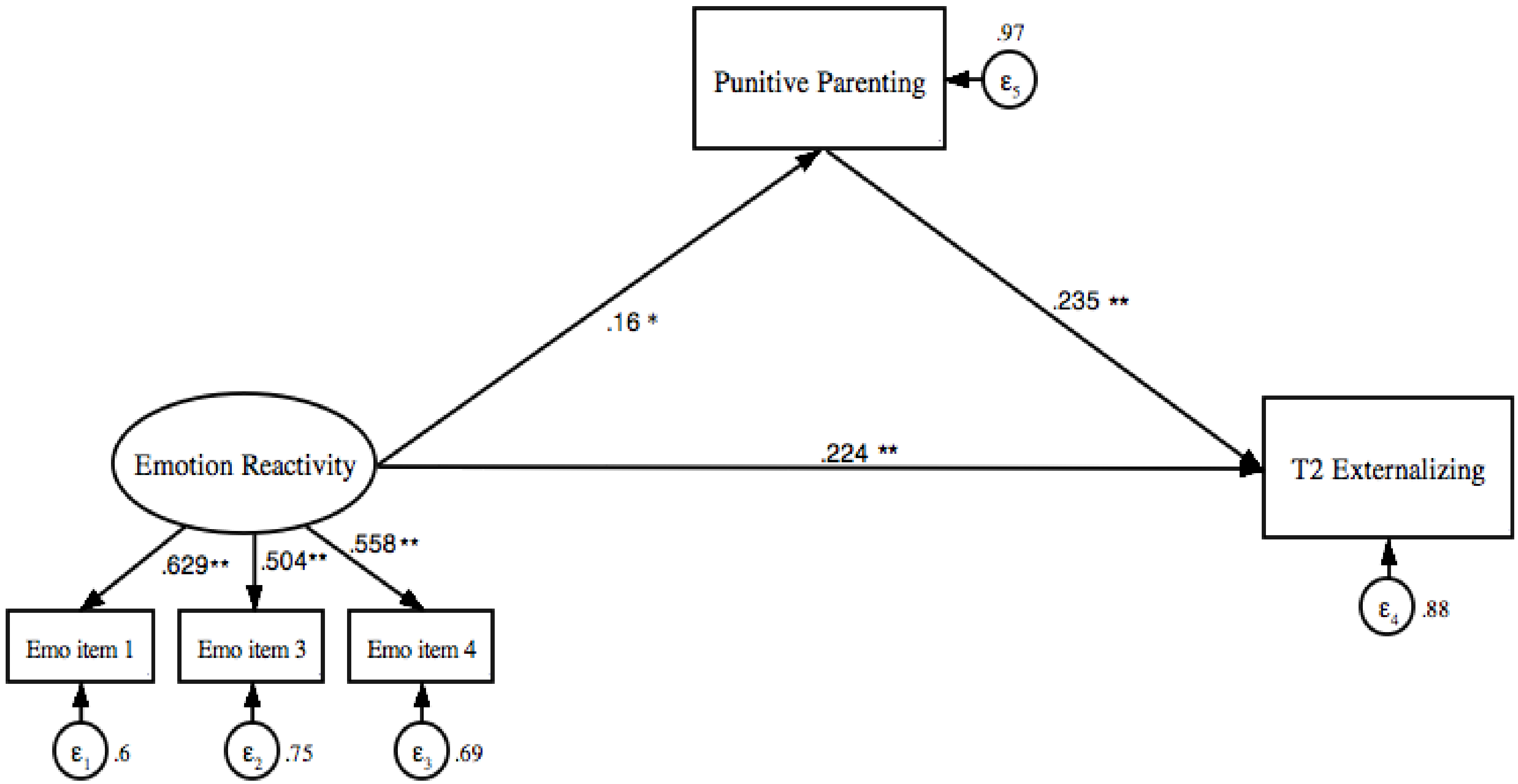
Notes. *$p < .05$, ** $p < .001$; standardized path coefficients shown.

Table 65. Indirect Effects of Temperament on Time 2 Externalizing Problems via Punitive Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effect of Emotion Reactivity					
Punitive	.28	.13	2.21	.06	.59
Total	.28	.13	2.21	.06	.59
Indirect Effect of Activity-Level					
Punitive	.34	.15	2.30	.10	.69
Total	.34	.15	2.30	.10	.69

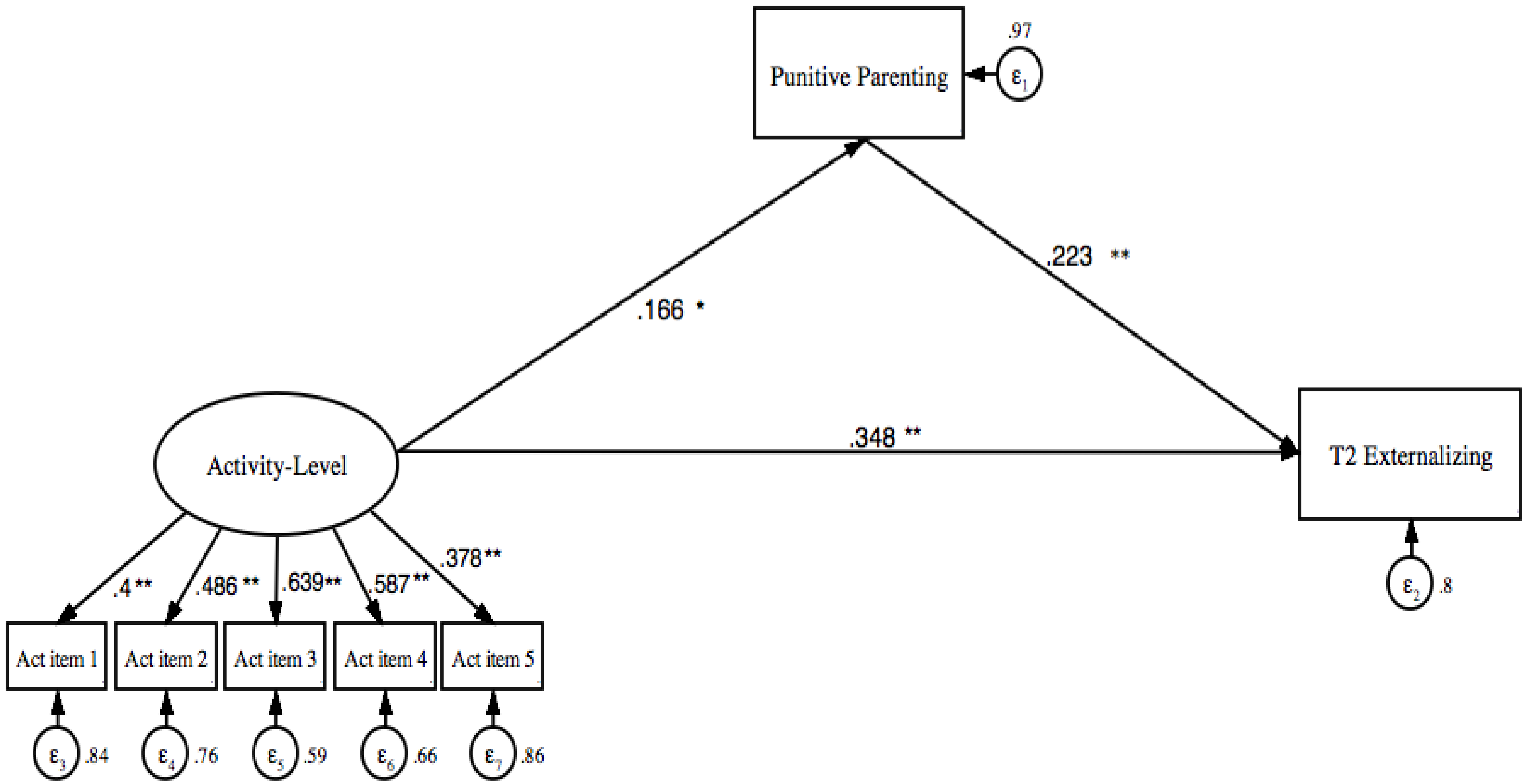
Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of a significant mediation effect.

Figure 30. Direct and indirect effects of Emotion Reactivity on Time 2 Externalizing Problems via Punitive Parenting



Notes. *$p < .05$, ** $p < .001$; standardized path coefficients shown.

Figure 31. Direct and indirect effects of Activity-Level on Time 2 Externalizing Problems via Punitive Parenting



Notes. *$p < .05$, ** $p < .001$; standardized path coefficients shown.

Table 66. Indirect Effects of Temperament on Time 2 Externalizing Problems via Critical Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effect of Emotion Reactivity					
Critical	.15	.09	1.70	.01	.43
Total	.15	.09	1.70	.01	.43
Indirect Effect of Activity-Level					
Critical	.18	.10	1.81	.02	.48
Total	.18	.10	1.81	.02	.48

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI does not contain zero and is therefore indicative of a significant mediation effect.

Chapter 5: General Discussion

The primary goals of the present dissertation were to investigate complex relationships between multilevel factors contributing to the early emergence of EP, and to subsequent adjustment problems following the school transition. Together, results from the two studies shed light on important child, parental, and familial environment factors that influence children's early behaviour during the preschool period, and that contribute to developing academic and social competencies in middle childhood. In accord with a bioecological systems perspective (Bronfenbrenner & Morris, 1998; 2006) and transactional model of development (Sameroff, 2009; 2010; Kuczynski & De Mol, 2015), findings revealed significant and complex relationships between within-child characteristics, and factors within children's social environments that contribute to concurrent and longitudinal adjustment outcomes.

Study 1 focused on concurrent associations between individual child and environment factors associated with the early emergence of EP; however there was considerable overlap demonstrated with findings from Study 2, which explored predictive relationships between these factors and adjustment outcomes at school age. More specifically, results from both studies indicated that heightened EP in early and middle childhood was consistently predicted by early childhood temperament (emotion reactivity, activity-level), less positive, more punitive or critical parenting, and lower family SES. The enduring influence of these variables on children's problem behaviour over time underscores the salience of the preschool period in setting the stage for future developmental outcomes. It is important to note that results in both studies, not only revealed the risks associated with the presence of punitive, critical parenting, but also those associated with a relative absence of positive parenting. In addition to elucidating the differential effects of positive and negative parenting constructs on children's developmental outcomes, findings further revealed the protective effects of positive parenting for children with high IP in buffering against the development of attention problems at school age.

Results from the present studies further demonstrated the stability of EP across childhood, and the strength of early-onset EP in predicting both maternal and teacher ratings of EP in middle childhood. This was evidenced via Study 2 results in which early-onset EP emerged as the sole significant predictor when tested simultaneously with temperamental, parental, and control variables. Together, results add to a growing body of literature reflecting the significant and enduring risks associated with early-emerging EP on developmental outcomes in later childhood (Choe et al., 2013; Metcalfe, Harvey, & Laws, 2013; Chen et al., 2014), and beyond (Vitaro, Brendgen, Larose, & Tremblay, 2005; Burt & Roisman, 2010; Bierman et al., 2013).

While parenting, temperament, and early-onset problem behaviour represented robust predictors of children's concurrent and longitudinal adjustment, the results from the present studies also elucidated the role of family SES in contributing to developmental outcomes over time. Children being raised in environments of lower family SES not only displayed heightened EP at preschool age, but also went on to exhibit lower school marks, poorer vocabulary and social skills, as well as increased EP, attention and social problems at school age. Interactions between family SES and both emotion reactivity and IP indicated that the effects of family socioeconomic stress were particularly deleterious for highly emotionally reactive children and for those with increased IP, who displayed greater levels of early-onset EP relative to children in environments of lower family SES. The wide-ranging effects of family SES on multiple indices of adjustment lend support to the literature documenting the profound implications of contextual variables on cognitive, achievement, and behavioural outcomes (Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002; Duncan et al., 2007; Carpiano, Lloyd, & Hertzman, 2009), and underscore the strength of these associations given the underrepresentation of lower SES families in the current pooled sample.

In addition to significant direct effects, analogous bidirectional and indirect effects were demonstrated across both studies with respect to temperament and parenting, and maternal negative emotionality and parenting, respectively. In Study 2, these relationships were not only significant in the context of EP but further extended to social and attention-related outcomes, thereby reflecting the salience of the aforementioned predictive associations across domains of adjustment. Collectively, results reflected marked overlap between behavioural, academic, and social domains of adjustment with regard to their respective predictors, and served to reveal the lasting effects of early-onset problem behaviour, parenting, and family SES on a range of developmental outcomes in middle childhood.

Together, findings demonstrate the strength of these relationships over time and across domains of adjustment. In this way, results support and extend the current literature by identifying salient direct and indirect predictors in early childhood that contribute not only to the emergence of EP at preschool age, but also to a range of social, behavioural, and academic problems in middle childhood. In accord with a bioecological systems approach (Bronfenbrenner & Morris, 1998; 2006) and transactional model of development (Sameroff, 2009; 2010; Kuczynski & De Mol, 2015), the bidirectional nature of indirect relationships between parenting and temperament, suggests that children's early characteristics may influence parenting, and parenting may influence children's early characteristics to ultimately predict adaptive and/or maladaptive outcomes in later childhood.

Such results also lend support to studies demonstrating bidirectional relationships between characteristics of the child and the environments in which he/she is embedded. As recently demonstrated by Lorber, Del Vecchio, and Slep (2014), an unsupportive family environment was both predictive of and predicted by young children's externalizing behaviour problems. The dynamic interplay between the child and those within his/her immediate social environments appears to have profound and lasting implications for multiple indices of adjustment (Kuczynski & De Mol, 2015; Stack et al., accepted).

Limitations and Future Directions

Despite the significance of these findings, it is important to consider the general limitations of the current research. First, the integrated sample, comprised of three independent, Canadian studies had a fair amount of missing data at Time 2 of Study 2, which precluded the use of structural equation modeling (SEM) and more advanced statistical modeling techniques. In addition, one of the measures, the Social Skills Rating System (SSRS), was administered in only two of the three samples, and therefore results pertaining to social skills outcomes are reflective of only a subsample of children. With the exclusion of the SSRS, differences in assessment measures across samples were addressed by selecting individual items that were parallel in content, and creating pooled factors based on internal reliability and factor analysis. Consequently, it is likely that measurement error may be higher than would have been the case had identical instruments been used across samples; findings may thus represent an underestimate of the relations that exist.

A related limitation is the sole reliance on maternal report measures at Time 1 in Studies 1 and 2, which may have increased the degree of correspondence between these variables, and between those outcomes at Time 2 reported by mothers. Although it is highly unlikely that a single source of information would account entirely for the pattern of relations found, at least at Time 1, it would be important for future research to replicate these findings using multiple raters and different methods of measurement. To circumvent the problem of measurement error, and to afford important extensions, future studies could include paternal ratings as well as observational methodology to assess temperament and parenting dimensions at multiple points in time, as well as maternal/paternal emotionality, child classroom behaviour and/or peer interactions. This would also allow for assessment of transactions between children and their environments in ways that were not possible in the present studies without observational data and/or a cross-lagged design with data at multiple time points. Consequently, this methodology should be incorporated in future research in accordance with specified tenents of the transactional model of development (Sameroff 2009; 2010).

Another limitation comprises the cross-sectional design of Study 1, the findings of which should be replicated in the context of a longitudinal design. While causality of Time 1 findings should be interpreted with caution, consistency in moderating and mediating relationships across time points underscores the salience of child temperament, behaviour, parenting, maternal emotionality, and family SES in contributing to developmental outcomes. While the present studies explored children's behavioural, academic, and social outcomes across the transition to elementary school, an important direction for future research would be to track children's trajectories over a longer period and across a number of developmental transitions, and ideally, from infancy through adolescence and beyond.

The use of a multi-informant, multidimensional protocol with maternal, paternal, teacher, and self-report instruments, as well as observational methodology in laboratory and/or naturalistic settings would provide valuable information about trajectories of school and social adjustment from birth/infancy, through middle childhood, and adolescence. As in the present dissertation, this could be supplemented by standardized performance-based measures of cognition, achievement, and/or executive functioning, as well as report card marks and social skills across relevant settings. The inclusion of physiological measures related to reactivity and regulation could also be incorporated in future research pursuits to delineate psychobiological mechanisms underlying temperamental differences, such as cardiac vagal tone, salivary cortisol, and hypothalamic-pituitary-adrenal (HPA) reactivity/regulation. As suggested by developmental research on temperament, emotion reactivity is associated with difficulties regulating negative emotions, and with the processes involved in monitoring, evaluating, and modifying affective reactions (Campos et al., 1983, Zahn-Waxler, Klimes-Dougan, & Slattery, 2000). In this way, emotion reactivity has been conceptualized as a biological propensity towards heightened physiological reactivity and a reduced capacity to regulate negative arousal, and the associated affective experiences. Studies implementing physiological and observational measures of emotion reactivity and related temperament constructs have revealed that mildly stressful situations for most children elicit significantly greater levels of intense and dysregulated negative affect in children who are highly emotionally reactive (Kennedy, Rubin, Hastings, & Maisel, 2004; Feng, Shaw, Kovacs, Lane, O'Rourke, & Alarcon, 2008). The use of physiological indicators of temperament may be beneficial in identifying young children at-risk for adjustment problems, particularly when caregiver/parental reports are unavailable or of questionable validity, and/or in the absence of observational measures. Physiological measures of temperament would also be of substantial (clinical) utility when implemented independently or as part of a multidimensional protocol to complement observational, interview, and/or questionnaire measures.

Taken together, results of the present series of two studies support bioecological systems (Bronfenbrenner & Morris, 1998; 2006) and transactional models of development (Sameroff, 2009; 2010; Kuczynski & De Mol, 2015) that underscore the complexity of within-child and environmental influences that contribute to interrelated spheres of behavioural, social, and school adjustment outcomes across childhood. Results provide empirical support for a broad perspective of school readiness and adjustment, incorporating early behavioural and socio-emotional capacities, and also reflect the critical role of parents/caregivers in perpetuating and/or inhibiting children's acquisition of fundamental competencies during this period, with lasting implications on development.

Applied Implications

Despite the limitations, the present research has important applied implications as well as implications for research and policy. The two studies that comprise this dissertation demonstrate the importance of integrative data analysis and the advantages of combining complementary samples to investigate complex developmental models and questions. In addition to increasing power and efficacy of results, the inclusion of an at-risk subsample provided the unique opportunity to explore the generalizability of findings across a range of sociodemographic environments and varying levels of parental education, income, and occupational prestige. The robust effects of family SES were demonstrated consistently across both studies of the present dissertation and underscore the need for future research targeting early childhood development and adjustment in socio-demographically at-risk environments.

In addition to the effects of family socioeconomic environment, the present findings underscore the significance of focusing on modifiable risk and protective factors (e.g., parenting practices, maternal negative emotionality) to enhance adjustment outcomes of all children, and particularly those within at-risk subgroups. The results of both studies elucidate the risk associated with punitive, critical, and less positive parenting, as well as the protective effects afforded by highly positive parenting. Evidence of bidirectionality and mediating relationships between parenting and temperament in the context of emergent EP, suggests that early prevention/intervention programs targeting parenting practices (i.e., reducing maladaptive parenting and increasing parental warmth) may be particularly beneficial in altering children's early developmental trajectories.

Results further suggest that such preventative interventions may hold substantial prognostic utility for children in disadvantaged environments, and/or offspring of parents with high levels of stress, anxiety, and/or depressive symptoms, who may be prone to using less effective parenting practices. This may also be the case for parents whose children display dispositional tendencies towards high emotion reactivity and/or activity-level, as well as early emerging problem behaviours. Preliminary evidence from pioneering early-intervention studies for at-risk child populations, including the Perry Preschool Project and the Chicago Parent-Child Centers, have focused on emotion regulation as a mechanism associated with improvements in early learning and achievement (Heckman, Pinto, & Savelyev, 2012). Their findings have indicated that improvement in young children's self-regulation of emotion was associated with enhanced academic achievement and cognitive abilities for disadvantaged populations at-risk for school failure (Reynolds & Temple, 2008; Heckman et al., 2012).

In addition to these intervention programs, the present results suggest that preventative interventions with parents and teachers may be particularly beneficial for children with more challenging temperament characteristics. By identifying young children who are emotionally reactive and/or overly active prior to preschool entry, it is conceivable that family and daycare/preschool environments could be modified to enhance the development of self-regulatory abilities, and thereby optimize developmental outcomes. As suggested by results demonstrating the robust and lasting effects of temperament, behaviour, parenting, and maternal emotionality, it is likely that by modifying respective environments in ways that facilitate the early acquisition of fundamental competencies, children may have improved outcomes in elementary school and beyond. This may be accomplished by tailoring preventative interventions to the needs of parents and offspring with differing caregiving and/or temperament profiles; by observing parent-child interactions and/or administering questionnaires assessing positive/negative parenting, emotional expressiveness, and temperamental activity-level and emotion reactivity, programs could be developed to target different subgroups based on need.

A component of these programs may include analysis of videotaped parent-child interactions to facilitate parents' understanding of the impact of their own behaviours and emotions on their child, as well as the needs of their child in the context of individual temperament characteristics; this may provide an individualized demonstration of bidirectional relationships between child temperament and parenting practices and/or emotional expressiveness that better illustrates this concept for parents/caregivers. As the current results also indicated that greater maternal negative emotionality led to more punitive-critical and less positive parenting, which in turn, led to more problematic adjustment outcomes, interventions could also be tailored to address psychologically vulnerable parents/caregivers. By learning to increase positive emotional expressiveness in dyadic parent-child interactions as well as adaptive parenting practices, caregivers may come to recognize the benefits and protective effects of parental warmth and sensitivity.

Targeted preventative interventions for parents of young children and/or primary prevention programs could also be implemented in daycare/preschool settings to provide caregivers with psychoeducation about the significance of warm, responsive, and efficacious parenting during the early childhood years. In addition to minimizing maladaptive or punitive parenting and teaching effective methods of inductive discipline, results suggest that equal emphasis on the provision of positive parenting and emotional expressiveness may be beneficial for both children and caregivers. Extrapolating from these results, similar programs could be disseminated to early childhood educators, teachers, and daycare staff to facilitate positive relationships within the preschool setting. Evidence demonstrating the salience of the teacher-child relationship in promoting resiliency and optimizing developmental outcomes has been well documented (e.g., Driscoll & Pianta, 2010; Denham et al., 2014; Fisher, Reynolds, & Sheehan, 2015). Implementing psychoeducation for teachers and school personnel as part of general training programs may be beneficial for all children, and particularly for those whose family environments may be characterized by high levels of stress and/or minimal parental warmth/responsiveness.

Rooted in temperament theory, social-emotional learning interventions such as Collaborative for Academic, Social, and Emotional Learning (CASEL; Diekstra, 2008; Weare & Nind, 2011; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011) or *INSIGHTS into Children's Temperament* (O'Connor, Cappella, McCormick, & McClowry, 2014; McCormick, O'Connor, Cappella, & McClowry, 2015) integrate theory, research, and clinical strategies into parent, teacher, and classroom programs with the aim of enhancing the fit between children's temperament and their immediate environments (e.g., home, school). Preliminary evidence has supported the efficacy of both programs in decreasing disruptive behaviour and increasing classroom engagement and both math and reading achievement in children with emotionally reactive and overly-active temperament profiles (O'Connor, Rodriguez, Cappella, Morris, & McClowry, 2012; Denham, Bassett, Zinsser, & Wyatt, 2014; McCormick et al., 2015). Moreover, increases in parenting efficacy appeared to be the primary mechanism through which *INSIGHTS* fostered clinically significant declines in children's disruptive behaviour post-intervention. Although further research is required to demonstrate the effectiveness of this program, such evidence suggests that overly-active and emotionally reactive children at-risk for poor adjustment outcomes, may benefit from similar preventative interventions, particularly when implemented consistently across multiple social environments (O'Connor et al., 2014; McCormick et al., 2015).

Behavioural family intervention programs that target parenting practices have also been well established; examples include Parent Management Training (Patterson, 2005), the Incredible Years (Webster-Stratton & Hancock, 1998), and the Positive Parenting Program Triple P (Sanders, 2012). Drawing on social learning models of parent-child interactions, the Triple P program aims to change child behaviour by modifying family environments. A burgeoning body of evidence and meta-analytic approaches have supported the effectiveness of Triple P programs in facilitating and maintaining positive change in child problem behaviour, parenting skills, and parental well-being and sense of competence (Nowak & Heinrichs, 2008; Heinrichs, Kliem, & Hahlweg, 2014). With emphasis on comprehensive dissemination and a tiered multi-level intervention model (Sanders, 2012), the program consists of five intervention levels of varying degrees of intensity. Findings demonstrating the effectiveness of Triple P for preschoolers and parents in combination with results from the present dissertation support universal preventive efforts via widespread implementation of such programs (Nowak & Heinrichs, 2008; Sanders, 2012; Denham et al., 2014; Heinrichs et al., 2014). Given the amount of change that takes place during early childhood and the number of upcoming developmental transitions, such programs provide a critical foundation from which parents and children may learn to supportively negotiate novel experiences and challenges that arise over time.

Conclusions

The findings from this series of two studies underscore the myriad of factors and the complexity of their relationships that shape children's early adjustment and continuing development. In addition to evidence of direct associations, the results from the present research demonstrated the significance of indirect and interactive relationships in predicting developmental outcomes at both time points, as well as bidirectional associations between temperament and parenting in the context of EP at preschool age.

The complexity and comprehensiveness of analyses used in both studies of the present dissertation was feasible due to the nature of the pooled sample. By pooling three independent Canadian studies, the large sample size and resultant high level of statistical power allowed for the use of structural equation modeling, and complex analyses exploring direct, indirect, and interactive relationships across multiple outcomes of interest. Among the first to utilize this approach to explore a comprehensive model of factors associated with the early emergence of EP and subsequent indices of adjustment, this constitutes a major strength of the studies comprising the present dissertation (Mills et al., 2012). In addition to increased statistical power and greater sample heterogeneity, this approach allows for a greater understanding of the generalizability of results to community and socioeconomically and/or behaviourally at-risk subsamples. This is particularly important given the biased representation of mid-to-upper class, Caucasian families in the literature to date, and the use of smaller sample sizes that limit the complexity of analyses.

In addition to the large, diverse, pooled sample of young children and their mothers, additional strengths included a multi-informant, multidimensional protocol that facilitated a comprehensive focus on child, parental, and familial characteristics, as well as multiple indices of adjustment. While the first study of the present dissertation relied heavily on maternal-report measures, the second study included maternal and teacher-report measures, performance-based tests of vocabulary, and children's final report card marks. The use of multiple measures and informants to evaluate a range of adjustment indices comprised additional strengths given the need for further research on the ways in which young child populations navigate pivotal transitions including the early adjustment to the formal schooling environment. The current findings shed light on the robust and lasting effects of multilevel factors assessed in early childhood on developmental outcomes at later stages of development. Together, findings support a bioecological systems perspective and transactional model of development that implicate a chain of influences from socioeconomic factors to the psychological resources of parents, parenting quality, and children's behavioural and dispositional characteristics to developmental outcomes across the childhood period.

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Appendix A

Concordia Project: Within-sample Mean Comparisons at Times 1 and 2

Within-sample Mean Comparisons: Sample 1 relative to entire Concordia Project Sample at Times 1 and 2.

Time 1 (1995-1998)**: Sample 1 (n = 126) Vs. Concordia Project Preschool Sample (N = 469)**					
Variables	**[a]Population Mean**	**[b]Population SD**	**Sample 1 Mean**	**[c]SE**	**[d]Z-score**
Mom Aggression	0.37	1.06	0.30	0.09	-0.74
Mom Withdrawal	0.33	0.96	0.32	0.09	-0.16
Maternal Education	11.78	2.34	11.60	0.21	-0.85
Family Income	38439.30	29527.56	41211.87	2630.52	1.05
Occupational Prestige	38.09	11.42	37.81	1.02	-0.27
Mom Age at 1st Child	24.57	3.61	24.83	0.32	0.81
Time 2 (1999-2002): **Sample 1 (n = 117) Vs. Concordia Project School Age Sample (N = 623)**					
Variables	**Population Mean**	**Population SD**	**Sample 1 Mean**	**SE**	**Z-score**
Mom Aggression	0.28	1.01	0.29	0.09	0.14
Mom Withdrawal	0.29	0.91	0.34	0.08	0.63
Maternal Education	12.33	2.60	11.83	0.23	-2.16*
Family Income	45226.59	29709.21	45241.12	2646.71	0.01
Occupational Prestige	40.67	12.37	37.66	1.10	-2.74*
Mom Age at 1st Child	25.17	4.09	24.85	0.36	-0.89

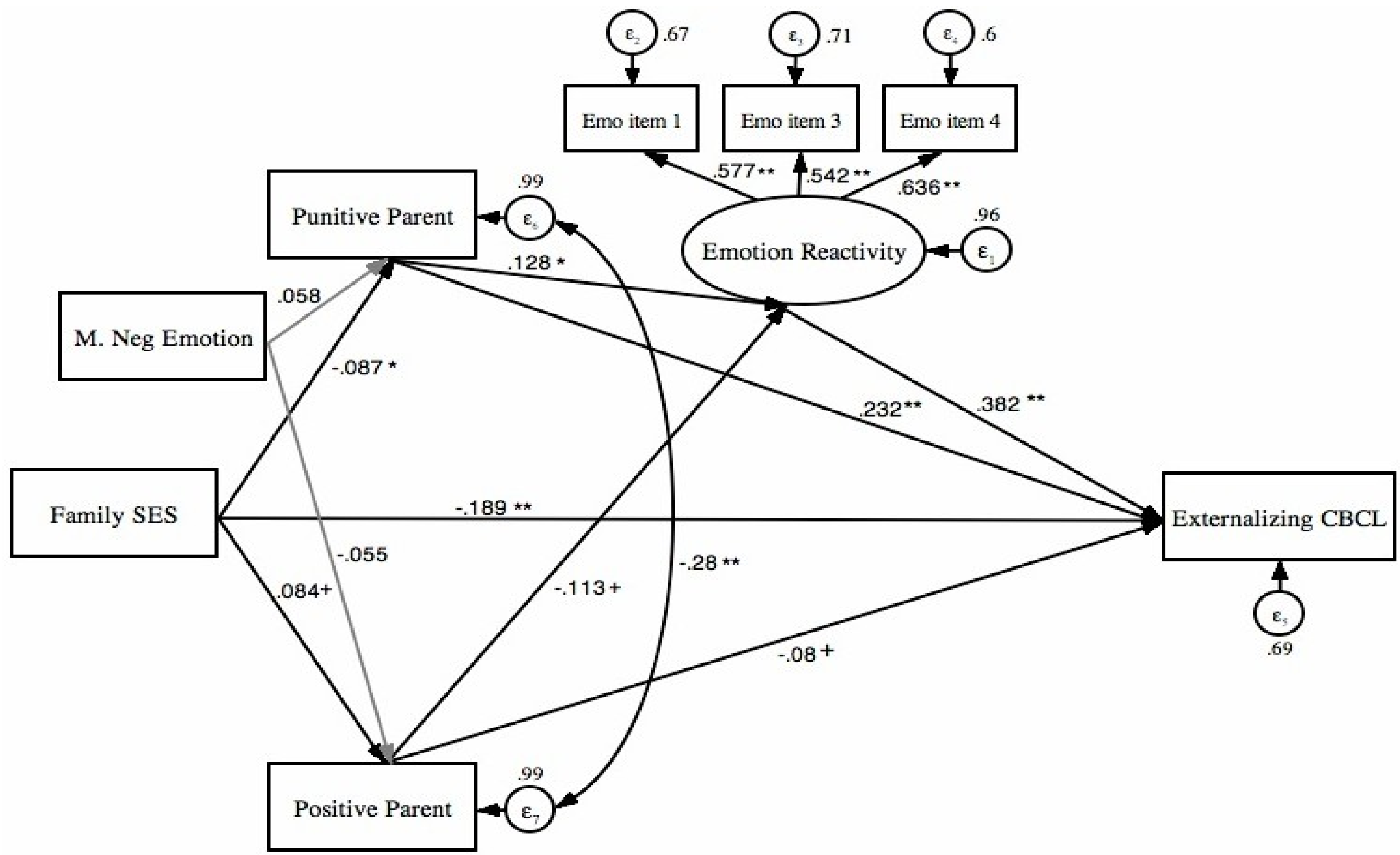
Notes. [a]Population Mean = Mean of Concordia Project Sample; [b]Population SD = Standard Deviation of Concordia Project Sample;
[c]SE = Standard Error; [d]Z-score = Difference between the two sample means.
*Time 2 sample differences in Maternal Education and Highest Occupational Prestige; $p < .05$.

Relative to mothers in the Concordia Project Sample (N = 623), the subsample of mothers in Sample 1 had 0.5 years less education and lower Occupational Prestige by 3 points.

Appendix B

Emotion Reactivity SEM Model with Maternal Negative Emotionality

Emotion Reactivity SEM Model with Maternal Negative Emotionality

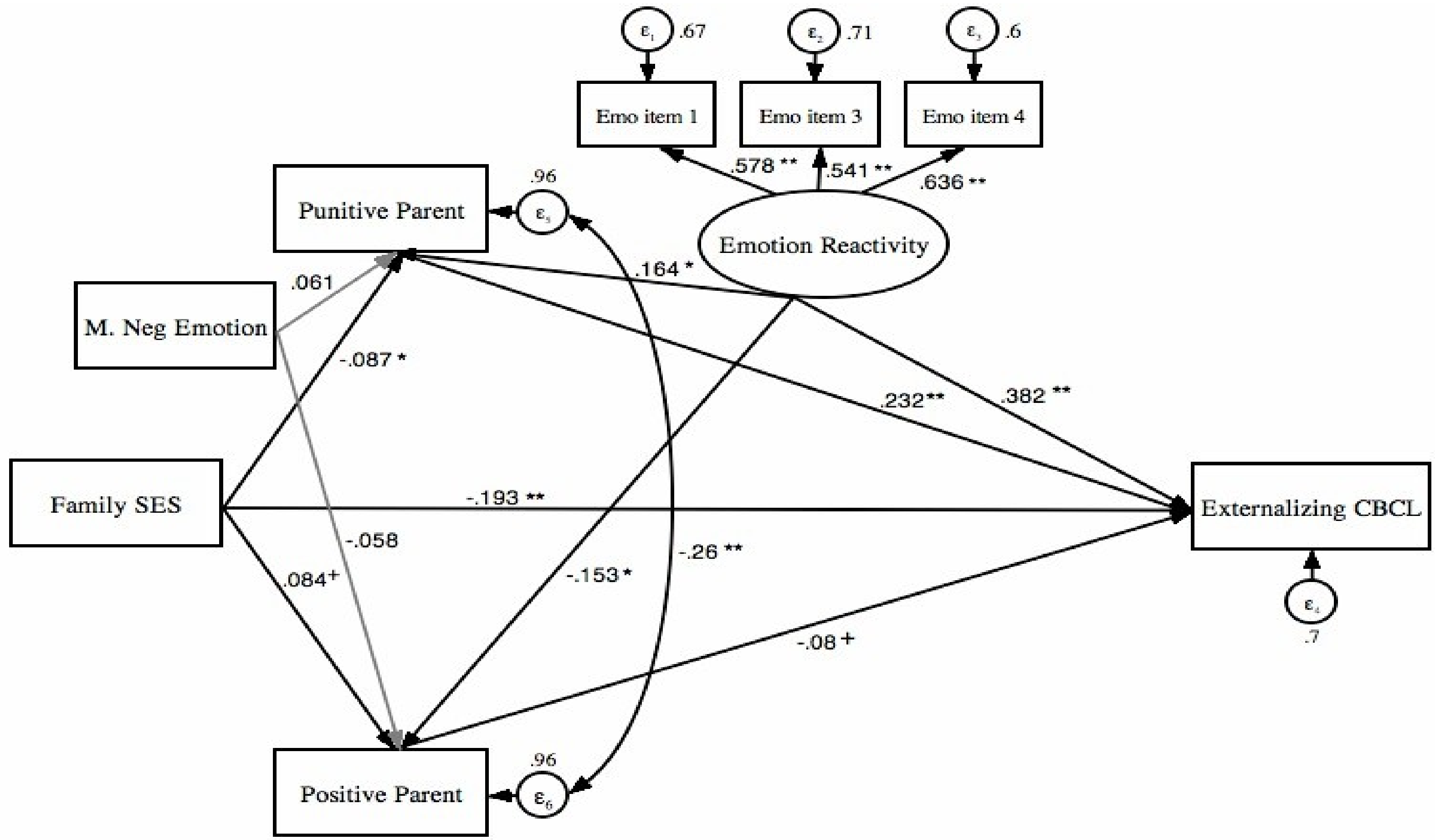


Notes. Non-significant paths in grey; M. Neg Emotion = Maternal Negative Emotionality; $^{+}p < .1$, $*p < .05$, $**p < .001$;
χ^2 (13) = 14.59, p = .33, CFI = .995, TLI = .990, RMSEA = .016, SRMR = .021.

Appendix C

Inverse Emotion Reactivity SEM Model with Maternal Negative Emotionality

Inverse Emotion Reactivity SEM Model with Maternal Negative Emotionality

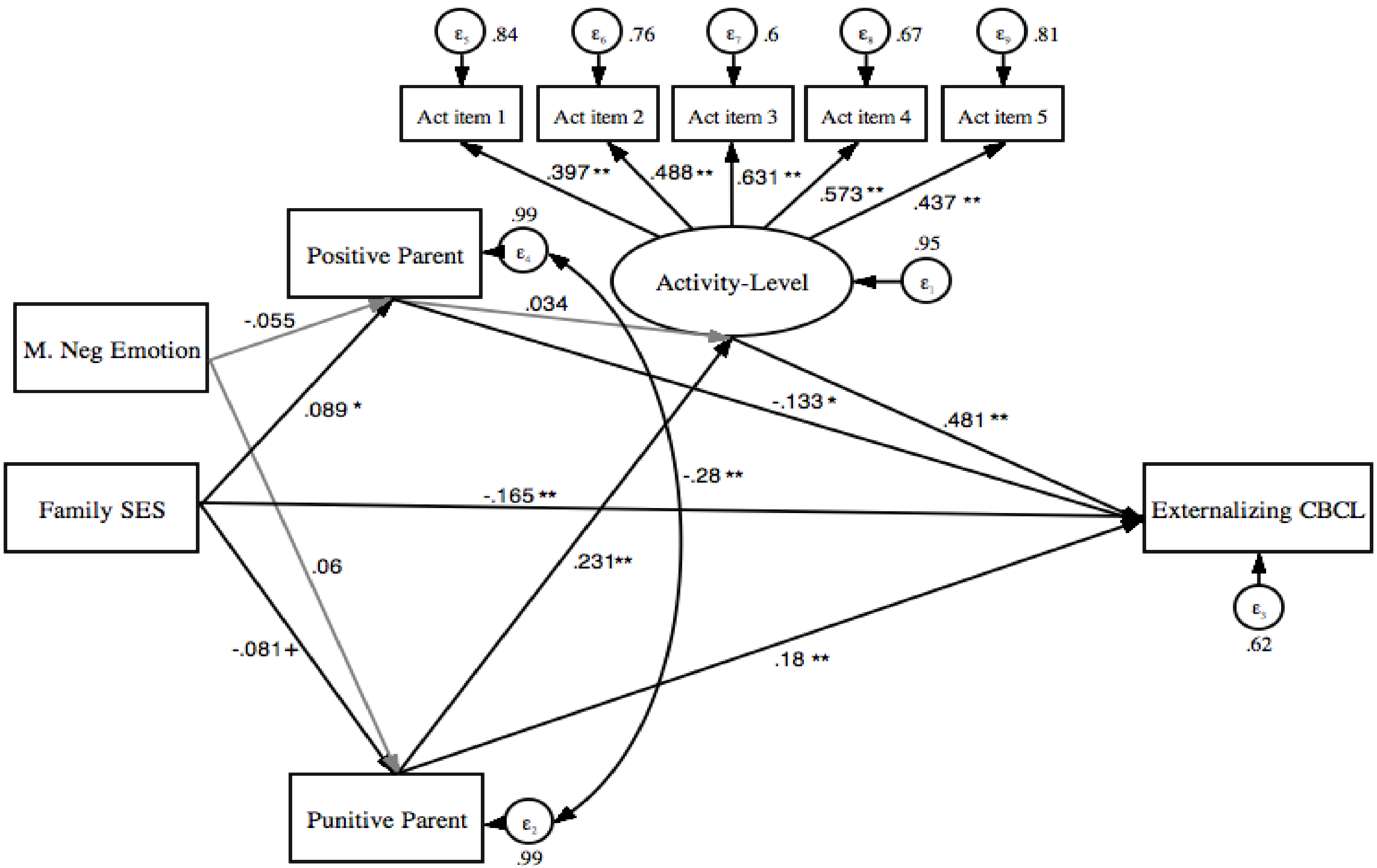


Notes. Non-significant paths in grey; M. Neg Emotion = Maternal Negative Emotionality; $^{+}p < .1$, $*p < .05$, $**p < .001$;
χ^2 (13) = 14.00, p = .37, CFI = .997, TLI = .994, RMSEA = .013, SRMR = .019.

Appendix D

Activity-Level SEM Model with Maternal Negative Emotionality

Activity-Level SEM Model with Maternal Negative Emotionality

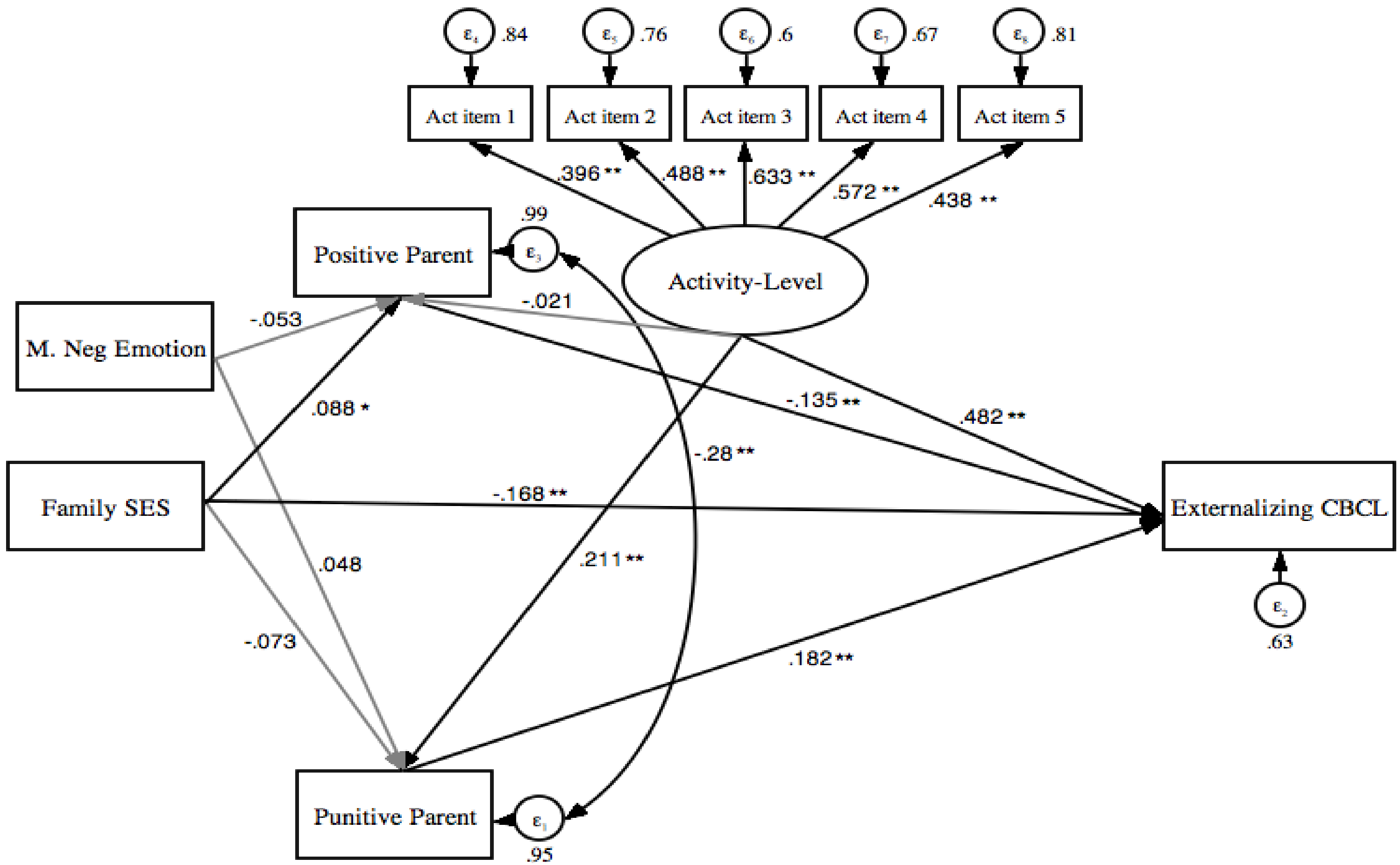


Notes. Non-significant paths in grey; M. Neg Emotion = Maternal Negative Emotionality; $+p < .1$, $*p < .05$, $**p < .001$; χ^2 (28) = 34.61, $p = .18$, CFI = .985, TLI = .977, RMSEA = .023, SRMR = .031

Appendix E

Inverse Activity-Level SEM Model with Maternal Negative Emotionality

Inverse Activity-Level SEM Model with Maternal Negative Emotionality

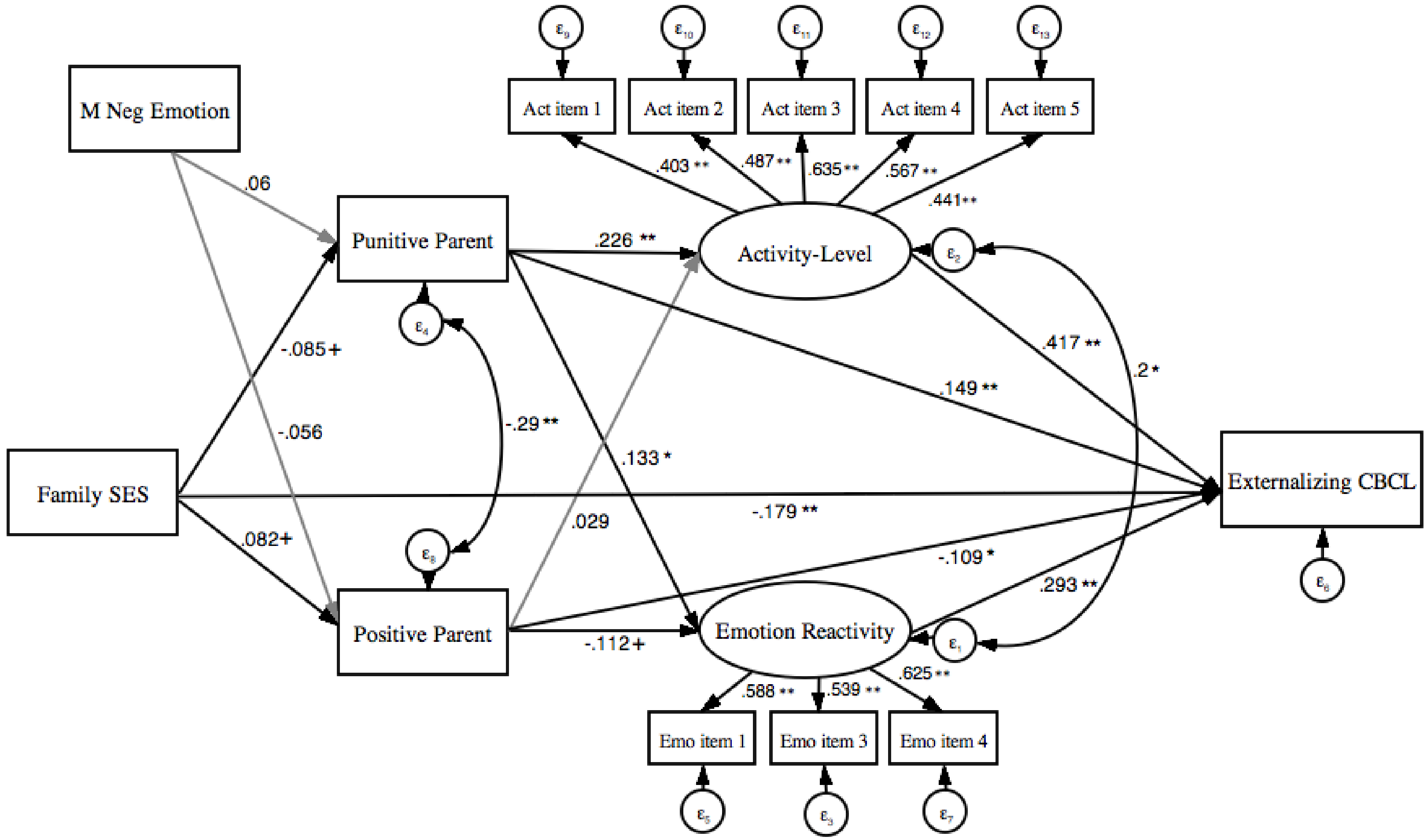


Notes. Non-significant paths in grey; M. Neg Emotion = Maternal Negative Emotionality; $^{+}p < .1$; $^{*}p < .05$, $^{**}p < .001$;
χ^2 (28) = 35.78, p = .15, CFI = .983, TLI = .973, RMSEA = .025, SRMR = .033.

Appendix F

Integrative SEM Model with Maternal Negative Emotionality

Integrative SEM Model with Maternal Negative Emotionality

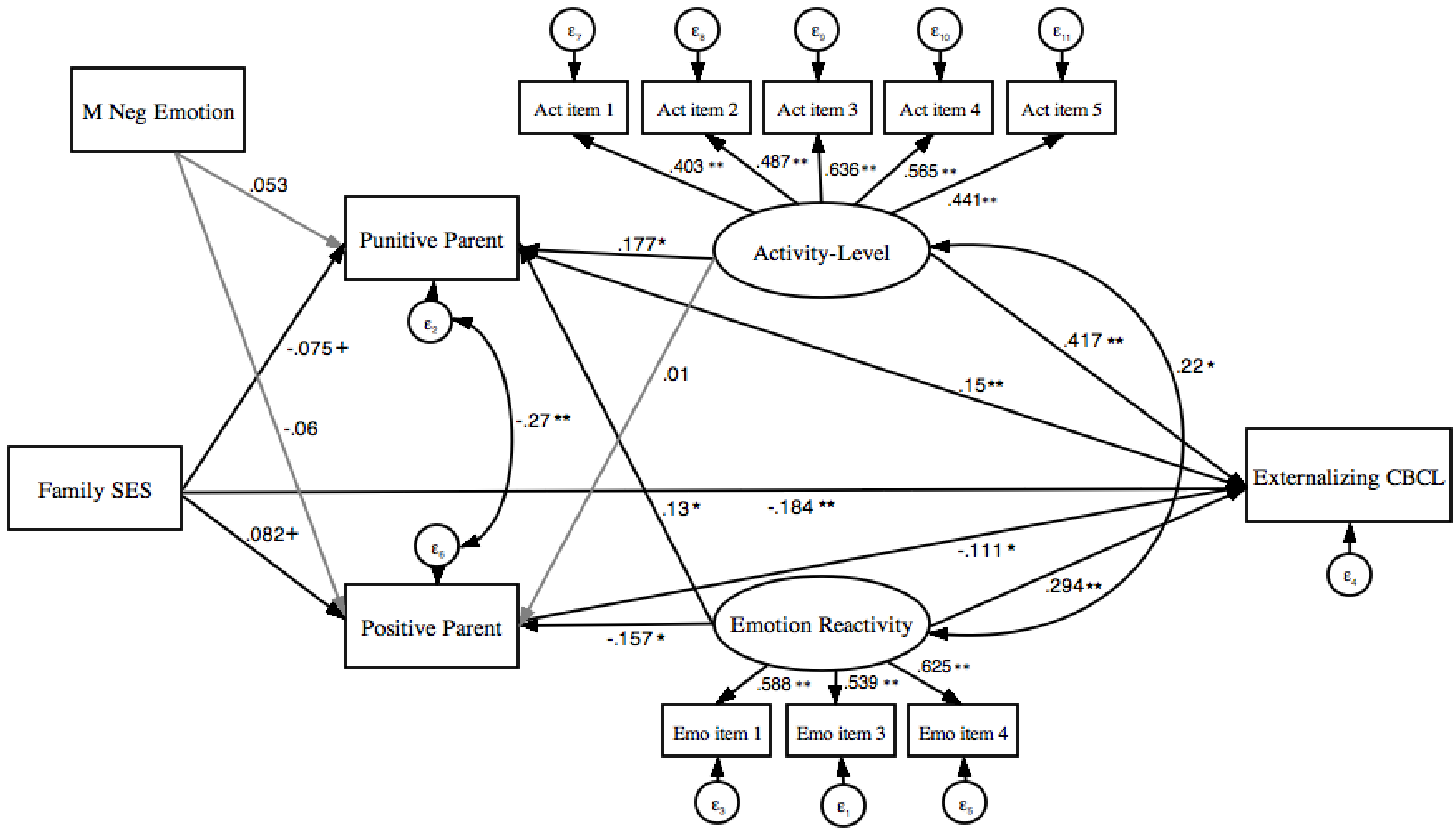


Notes. Non-significant paths in grey; M Neg Emotion = Maternal Negative Emotionality; $^{+}p < .1$, $^{*}p < .05$, $^{**}p < .001$;
χ^2 (54) = 71.91, p = .05, CFI = .973, TLI = .961, RMSEA = .027, SRMR = .037.

Appendix G

Inverse Integrative SEM Model with Maternal Negative Emotionality

Inverse Integrative SEM Model with Maternal Negative Emotionality



Notes. Non-significant paths in grey; M Neg Emotion = Maternal Negative Emotionality; $^{+}p < .1$, $^{*}p < .05$; $^{**}p < .001$;
χ^2 (54) = 72.50, p = .05, CFI = .972, TLI = .960, RMSEA = .027, SRMR = .038.

Appendix H

Hierarchical Regressions Predicting Mean School Marks

Hierarchical Regression Predicting Mean School Marks (Math, French, English)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.05**	**12.47****
Family SES	0.22	0.05	3.53**		
Step 2				**0.02**	**3.03***
Family SES	0.22	0.05	3.53**		
Child Sex[a]	0.00	0.00	0.04		
Child Age	-0.15	0.02	-2.46*		
Step 3				**0.00**	**0.32**
Family SES	0.22	0.05	3.53**		
Child Sex[a]	0.00	0.00	0.02		
Child Age	-0.15	0.02	-2.41*		
M. Neg Emotion[b]	0.04	0.00	0.56		
	R = 0.27		$R^2_{Adj} = 0.06$	F = 4.75*	

Notes. [a]-1 = Male, 1 = Female; M. Neg Emotion[b] = Maternal Negative Emotionality; *$p < .05$, **$p < .001$.

Hierarchical Regressions Predicting Mean School Marks (Math, French, English)

Variables	β	sr^2	t	ΔR^2	ΔF		β	sr^2	t	ΔR^2	ΔF
Step 1				**0.05**	**13.30****	Step 1				**0.05**	**13.30****
Family SES	0.23	0.05	3.65**			Family SES	0.23	0.05	-0.74		
Step 2				**0.02**	**2.53**	Step 2				**0.02**	**2.53**
Family SES	0.22	0.05	3.62**			Family SES	0.22	0.05	-0.70		
Child Sex[a]	0.01	0.00	0.08			Child Sex[a]	0.01	0.00	0.58		
Child Age	-0.14	0.02	-2.25*			Child Age	-0.14	0.02	0.18		
Step 3				**0.01**	**0.84**	Step 3				**0.00**	**0.07**
Family SES	0.22	0.05	3.61**			Family SES	0.22	0.05	-0.74		
Child Sex[a]	0.01	0.00	0.15			Child Sex[a]	0.01	0.00	0.59		
Child Age	-0.14	0.02	-2.25*			Child Age	-0.14	0.02	0.24		
Punitive	-0.08	0.01	-1.29			Critical	-0.02	0.00	0.06		
Positive	-0.02	0.00	-0.29			Positive	0.00	0.00	0.45		
	$R = 0.28$		$R^2_{Adj} = 0.06$		$F = 4.04$*		$R = 0.27$		$R^2_{Adj} = 0.05$		$F = 3.70$*

Notes. [a]-1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Hierarchical Regressions Predicting Mean School Marks (English, Math, French)

Variables	β	sr^2	t	ΔR^2	ΔF		β	sr^2	t	ΔR^2	ΔF
Step 1				**0.04**	**10.29***	Step 1				**0.05**	**12.48****
Family SES	0.20	0.04	3.21*			Family SES	0.22	0.05	3.53**		
Step 2				**0.02**	**2.70**	Step 2				**0.02**	**2.83**
Family SES	0.20	0.04	3.12*			Family SES	0.22	0.05	3.54**		
Child Sex[a]	-0.02	0.00	-0.33			Child Sex[a]	-0.00	0.00	-0.04		
Child Age	-0.14	0.02	-2.28*			Child Age	-0.15	0.02	-2.37*		
Step 3				**0.00**	**0.51**	Step 3				**0.00**	**0.08**
Family SES	0.20	0.04	3.18*			Family SES	0.22	0.05	3.55**		
Child Sex[a]	-0.04	0.00	-0.55			Child Sex[a]	-0.01	0.00	-0.07		
Child Age	-0.14	0.02	-2.25*			Child Age	-0.15	0.02	-2.37*		
Emotion React[b]	0.02	0.00	0.32			Time 1 IP	-0.01	0.00	-0.07		
Activity-Level	0.06	0.00	0.93			Time 1 EP	0.03	0.00	0.38		
	R = 0.26		R^2_{Adj} = 0.05		F = 3.36*		R = 0.26		R^2_{Adj} = 0.05		F = 3.67*

Notes. [a]-1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; *$p < .05$, **$p < .001$.

Appendix I

Hierarchical Regression Predicting Teacher-rated Attention Problems

Hierarchical Regression Predicting Teacher-rated Attention Problems (TRF)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**8.18***
Family SES	-0.18	0.03	-2.86*		
Step 2				**0.00**	**0.16**
Family SES	-0.18	0.03	-2.86*		
Child Sex	-0.03	0.00	-0.42		
Child Age	0.02	0.00	0.39		
Step 3				**0.01**	**3.41^{+}**
Family SES	-0.17	0.03	-2.77*		
Child Sex[a]	-0.04	0.00	-0.63		
Child Age	0.03	0.00	0.44		
Punitive	0.11	0.01	1.85^{+}		
	R = 0.21		R^2_{Adj} = 0.03		F = 2.98*

Notes. [a] -1 = Male, 1 = Female; $^{+}p < .10$, $*p < .05$, $**p < .001$.

Appendix J

Non-significant Hierarchical Regressions Predicting Teacher-rated Social Problems

Non-significant Hierarchical Regression Predicting Teacher-rated Social Problems (TRF)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.00**	**0.41**
Family SES	-0.04	0.00	-0.64		
Step 2				**0.00**	**0.55**
Family SES	-0.04	0.00	-0.57		
Child Sex	0.05	0.00	0.87		
Child Age	0.03	0.00	0.53		
Step 3				**0.00**	**0.00**
Family SES	-0.04	0.00	-0.57		
Child Sex[a]	0.05	0.00	0.87		
Child Age	0.03	0.00	0.53		
M. Negative Emotion[b]	-0.00	0.00	-0.03		
	R = 0.07		R^2_{Adj} = .01		F = 0.37

Notes. [a]-1 = Male, 1 = Female; M. Negative Emotion[b] = Maternal Negative Emotionality; *p < .05, **p < .001.

Non-significant Hierarchical Regressions Predicting Teacher-rated Social Problems (TRF)

Variables	β	sr^2	t	ΔR^2	ΔF		β	sr^2	t	ΔR^2	ΔF
Step 1				**0.00**	**0.55**	Step 1				**0.00**	**0.55**
Family SES	-0.04	0.00	-0.74			Family SES	-0.04	0.00	-0.74		
Step 2				**0.00**	**0.19**	Step 2				**0.00**	**0.19**
Family SES	-0.04	0.00	-0.70			Family SES	-0.04	0.00	-0.70		
Child Sex[a]	0.04	0.00	0.58			Child Sex[a]	0.04	0.00	0.58		
Child Age	0.01	0.00	0.18			Child Age	0.01	0.00	0.18		
Step 3				**0.01**	**1.37**	Step 3				**0.00**	**0.10**
Family SES	-0.04	0.00	-0.70			Family SES	-0.05	0.00	-0.74		
Child Sex[a]	0.03	0.00	0.42			Child Sex[a]	0.04	0.00	0.59		
Child Age	0.02	0.00	0.33			Child Age	0.01	0.00	0.24		
Punitive	0.06	0.01	0.89			Critical	0.00	0.00	0.06		
Positive	0.10	0.00	1.60			Positive	0.03	0.00	0.45		
	$R = 0.12$		$R^2_{Adj} = 0.01$		$F = 0.73$		$R = 0.06$		$R^2_{Adj} = 0.01$		$F = 0.22$

Notes. [a]-1 = Male, 1 = Female; *$p < .05$, **$p < .001$.

Non-significant Hierarchical Regressions Predicting Teacher-rated Social Problems (TRF)

Variables	β	sr^2	t	ΔR^2	ΔF		β	sr^2	t	ΔR^2	ΔF
Step 1				**0.00**	**1.12**	Step 1				**0.00**	**0.47**
Family SES	-0.07	0.00	-1.06			Family SES	-0.04	0.00	-0.69		
Step 2				**0.00**	**0.45**	Step 2				**0.00**	**0.45**
Family SES	-0.06	0.00	-0.98			Family SES	-0.04	0.00	-0.63		
Child Sex[a]	0.06	0.00	0.90			Child Sex[a]	0.05	0.00	0.75		
Child Age	0.02	0.00	0.26			Child Age	0.03	0.00	0.53		
Step 3				**0.01**	**1.58**	Step 3				**0.01**	**0.95**
Family SES	-0.04	0.00	-0.70			Family SES	-0.02	0.00	-0.39		
Child Sex[a]	0.03	0.00	0.53			Child Sex[a]	0.03	0.00	0.51		
Child Age	0.02	0.00	0.35			Child Age	0.04	0.00	0.59		
Emotion React[b]	0.03	0.00	0.44			Time 1 IP	0.04	0.00	0.58		
Activity-Level	0.11	0.01	1.71			Time 1 EP	0.06	0.00	0.84		
	R = 0.14		R^2_{Adj} = 0.00	F = 1.04			R = 0.11		R^2_{Adj} = 0.01		F = 0.65

Notes. [a]-1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; *$p < .05$, **$p < .001$.

Appendix K

Hierarchical Regressions with Emotion Reactivity Predicting Social Problems

Hierarchical Regressions with Emotion Reactivity Predicting Social Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF		β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**8.76***	Step 1				**0.03**	**8.76***
Family SES	-0.16	0.02	-2.96*			Family SES	-0.16	0.02	-2.96*		
Step 2				**0.01**	**3.47**	Step 2				**0.01**	**1.77**
Family SES	-0.15	0.02	-2.82*			Family SES	-0.15	0.02	-2.82*		
Child Sex[a]	0.10	0.01	1.90			Child Sex[a]	0.10	0.01	1.87		
Child Age	-0.01	0.00	-0.24			Child Age	-0.02	0.00	-0.28		
Step 3				**0.05**	**9.00****	Step 3				**0.07**	**13.96****
Family SES	-0.14	0.02	-2.60*			Family SES	-0.14	0.02	-2.81*		
Child Sex[a]	0.05	0.00	1.01			Child Sex[a]	0.08	0.01	1.47		
Child Age	-0.02	0.00	-0.38			Child Age	-0.03	0.00	-0.56		
Activity-Level	0.20	0.04	3.68**			Emotion React[b]	0.08	0.01	1.52		
Emotion React[b]	0.09	0.01	1.77			Punitive	0.25	0.06	4.82**		
	R = 0.29		$R^2_{Adj} = 0.07$		F = 6.20**		R = 0.33		$R^2_{Adj} = 0.10$		F = 8.24**

Notes. [a]-1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; $*p < .05$, $**p < .001$.

Appendix L

Non-significant Activity-Level x Parenting Interactions Predicting Externalizing Problems

Activity-Level x Punitive Parenting Interaction Predicting Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**9.24***
Family SES	-0.16	0.03	-3.04*		
Step 2				**0.02**	**4.30***
Family SES	-0.15	0.02	-2.87*		
Child Sex[a]	0.15	0.02	2.93*		
Child Age	-0.01	0.00	-0.12		
Step 3				**0.13**	**27.28****
Family SES	-0.13	0.02	-2.70*		
Child Sex[a]	0.08	0.01	1.65		
Child Age	-0.00	0.00	-0.09		
Activity-Level	0.26	0.06	5.10**		
Punitive	0.23	0.05	4.67**		
Step 4				**0.01**	**2.00**
Family SES	-0.13	0.02	-2.68*		
Child Sex[a]	0.09	0.01	1.71		
Child Age	-0.01	0.00	-0.13		
Activity-Level	0.25	0.06	5.07**		
Punitive	0.22	0.05	4.43**		
Punitive x Activity	0.07	0.01	1.42		
	R = 0.34		$R^2_{Adj} = 0.17$		F = 12.91**

Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Activity-Level x Critical Parenting Interaction Predicting Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**9.24***
Family SES	-0.16	0.03	-3.04*		
Step 2				**0.02**	**4.30***
Family SES	-0.15	0.02	-2.87*		
Child Sex[a]	0.15	0.02	2.93*		
Child Age	-0.01	0.00	-0.12		
Step 3				**0.10**	**19.95****
Family SES	-0.14	0.02	-2.74*		
Child Sex[a]	0.09	0.01	1.81		
Child Age	-0.01	0.00	-0.27		
Activity-Level	0.27	0.07	5.23**		
Critical	0.14	0.02	2.89*		
Step 4				**0.00**	**0.03**
Family SES	-0.14	0.02	-2.71*		
Child Sex[a]	0.09	0.01	1.81		
Child Age	-0.01	0.00	-0.28		
Activity-Level	0.27	0.07	5.23**		
Critical	0.14	0.02	2.85*		
Critical x Activity	0.01	0.00	0.18		
	R = 0.38		$R^2_{Adj} = 0.13$		F = 9.95**

Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Activity-Level x Positive Parenting Interaction Predicting Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**9.27***
Family SES	-0.16	0.03	-3.05*		
Step 2				**0.02**	**4.30***
Family SES	-0.15	0.02	-2.87*		
Child Sex[a]	0.15	0.02	2.93*		
Child Age	-0.01	0.00	-0.13		
Step 3				**0.11**	**23.84****
Family SES	-0.12	0.01	-2.37*		
Child Sex[a]	0.09	0.01	1.72		
Child Age	-0.02	0.00	-0.38		
Activity-Level	0.28	0.08	5.67**		
Positive	-0.19	0.04	-3.93**		
Step 4				**0.00**	**0.08**
Family SES	-0.12	0.01	-2.38*		
Child Sex[a]	0.09	0.01	1.72		
Child Age	-0.02	0.00	-0.36		
Activity-Level	0.28	0.08	5.64**		
Positive	-0.19	0.04	-3.94**		
Positive x Activity	0.01	0.00	0.29		
	R = 0.40		$R^2_{Adj} = 0.15$		F = 11.33**

Notes. [a] -1 = Male, 1 = Female; **p* < .05, ***p* < .001.

Appendix M

Non-significant Emotion Reactivity x Parenting Interactions Predicting Externalizing Problems

Emotion Reactivity x Punitive Parenting Interaction Predicting Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**10.42***
Family SES	-0.17	0.03	-3.23*		
Step 2				**0.02**	**3.47***
Family SES	-0.16	0.03	-3.04*		
Child Sex[a]	0.14	0.02	2.63*		
Child Age	-0.01	0.00	-0.22		
Step 3				**0.10**	**19.56****
Family SES	-0.16	0.02	-3.12*		
Child Sex[a]	0.11	0.01	2.23*		
Child Age	-0.04	0.00	-0.75		
Emotion Reactivity	0.18	0.03	3.50*		
Punitive	0.24	0.05	4.70**		
Step 4				**0.00**	**0.03**
Family SES	-0.16	0.02	-2.11*		
Child Sex[a]	0.11	0.01	2.21*		
Child Age	-0.04	0.00	-0.76		
Emotion Reactivity	0.18	0.03	3.44*		
Punitive	0.24	0.05	3.68**		
Punitive x Emotion React[b]	0.01	0.00	0.18		
	R = 0.38		$R^2_{Adj} = 0.13$		F = 9.73**

Notes. [a]-1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; *$p < .05$, **$p < .001$.

Emotion Reactivity x Critical Parenting Interaction Predicting Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**10.42***
Family SES	-0.17	0.03	-3.23*		
Step 2				**0.02**	**3.47***
Family SES	-0.16	0.03	-3.04*		
Child Sex[a]	0.14	0.02	2.63*		
Child Age	-0.01	0.00	-0.22		
Step 3				**0.07**	**13.09****
Family SES	-0.16	0.03	-3.19*		
Child Sex[a]	0.12	0.01	2.38*		
Child Age	-0.05	0.00	-1.00		
Emotion Reactivity	0.19	0.04	3.74**		
Critical	0.16	0.02	3.11*		
Step 4				**0.00**	**0.11**
Family SES	-0.17	0.03	-3.20*		
Child Sex[a]	0.12	0.01	2.37*		
Child Age	-0.05	0.00	-0.99		
Emotion Reactivity	0.10	0.04	3.75**		
Critical	0.16	0.03	3.13*		
Critical x Emotion React[b]	-0.02	0.00	-0.33		
	R = 0.34	$R^2_{Adj} = 0.10$			F = 7.48**

Notes. [a]-1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; *$p < .05$, **$p < .001$.

Emotion Reactivity x Positive Parenting Interaction Predicting Externalizing Problems (CBCL)

Variables	β	sr^2	t	ΔR^2	ΔF
Step 1				**0.03**	**10.45***
Family SES	-0.17	0.03	-3.23*		
Step 2				**0.02**	**3.47***
Family SES	-0.16	0.03	-3.05*		
Child Sex[a]	0.14	0.02	2.63*		
Child Age	-0.01	0.00	-0.23		
Step 3				**0.08**	**15.12****
Family SES	-0.15	0.02	-2.89*		
Child Sex[a]	0.12	0.01	2.38*		
Child Age	-0.05	0.00	-1.06		
Emotion Reactivity	0.19	0.04	3.77**		
Positive	-0.19	0.03	-3.68**		
Step 4				**0.00**	**0.09**
Family SES	-0.15	0.02	-2.89*		
Child Sex[a]	0.12	0.01	2.36*		
Child Age	-0.05	0.00	-1.05		
Emotion Reactivity	0.19	0.04	3.73**		
Positive	-0.19	0.03	-3.65**		
Positive x Emotion React[b]	-0.02	0.00	-0.30		
	$R = 0.35$		$R^2_{Adj} = 0.11$		$F = 8.20$**

Notes. [a]-1 = Male, 1 = Female; Emotion React[b] = Emotion Reactivity; *$p < .05$, **$p < .001$.

Appendix N

Non-significant Indirect Effect of Maternal Negative Emotionality on Teacher-rated Externalizing Problems via Positive Parenting

Non-significant Indirect Effect of Maternal Negative Emotionality on Teacher-rated Externalizing Problems (TRF) via Positive Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effect					
Positive	.11	.13	.85	-.11	.50
Total	.11	.13	.85	-.11	.50

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of a significant mediation effect.

Appendix O

Non-significant Indirect Effects of Family SES on School Age Adjustment Outcomes

Non-significant Indirect Effects of Family SES on Externalizing Problems (CBCL) via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	-.10	.17	-.63	-.46	.18
Positive	-.17	.12	-1.41	-.48	.00
Total	-.27	.22	-1.22	-.75	.10
Contrast					
Punitive vs. Positive	.07	.18	.36	-.28	.43

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects.

Non-significant Indirect Effects of Family SES on Teacher-rated Externalizing Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	-.07	.12	-.60	-.34	.13
Positive	-.00	.05	-.06	-.18	.11
Total	-.07	.12	-.58	-.37	.16
Contrast					
Punitive vs. Positive	-.07	.13	-.51	-.39	.16

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects.

Non-significant Indirect Effects of Family SES on Attention Problems (CBCL) via Parenting

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	*Z*	Lower	Upper
Indirect Effects					
Punitive	-.05	.09	-.54	-.29	.11
Positive	-.09	.07	-1.33	-.34	.01
Total	-.14	.12	-1.14	-.43	.09
Contrast					
Punitive vs. Positive	.04	.10	.43	-.20	.27

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects.

Non-significant Indirect Effects of Family SES on Teacher-rated Attention Problems via Parenting

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	*Z*	Lower	Upper
Indirect Effects					
Punitive	-.06	.07	-.88	-.33	.03
Positive	.03	.05	.52	-.13	.21
Total	-.04	.08	-.43	-.32	.13
Contrast					
Punitive vs. Positive	-.09	.10	-.92	-.42	.09

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects.

Non-significant Indirect Effects of Family SES on Social Problems (CBCL) via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	-.08	.10	-.73	-.32	.10
Positive	-.08	.06	-1.29	-.26	.01
Total	-.15	.13	-1.20	-.41	.08
Contrast					
Punitive vs. Positive	.00	.11	.04	-.26	.21

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects

Non-significant Indirect Effects of Family SES on Teacher-rated Social Problems via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	-.04	.05	-.80	-.24	.03
Positive	.04	.05	.76	-.07	.24
Total	-.00	.07	-.05	-.19	.17
Contrast					
Punitive vs. Positive	-.08	.09	-.99	-.37	.06

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects

Non-significant Indirect Effects of Family SES on Mother-rated Social Skills via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	.00	.00	.86	-.00	.01
Positive	.01	.01	1.19	-.00	.02
Total	.01	.01	1.33	-.00	.03
Contrast					
Positive vs. Punitive	-.00	.01	-.63	-.02	.01

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects

Non-significant Indirect Effects of Family SES on Teacher-rated Social Skills via Parenting

		Product of Coefficients		Bootstrapping BCa 95% CI	
	Point Estimate	*SE*	*Z*	Lower	Upper
Indirect Effects					
Punitive	.00	.01	.85	-.00	.02
Positive	.00	.00	.43	-.00	.02
Total	.01	.01	.91	-.00	.02
Contrast					
Positive vs. Punitive	.00	.01	.66	-.01	.02

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects

Appendix P

Non-significant Indirect Effects of Parenting on Teacher-rated Externalizing Problems via Temperament

Non-significant Indirect Effects of Punitive Parenting on Teacher-rated Externalizing Problems via Temperament

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	*Z*	Lower	Upper
Indirect Effects					
Emotion Reactivity	-.01	.04	-.25	-.16	.06
Activity-Level	.23	.15	1.58	-.02	.59
Total	.22	.15	1.48	-.04	.61
Contrast					
Emotion React vs. Activity	-.24	.15	-1.59	-.62	.03

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is not therefore indicative of significant mediation effects.

Non-significant Indirect Effects of Critical Parenting on Teacher-rated Externalizing Problems via Temperament

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	*Z*	Lower	Upper
Indirect Effects					
Emotion Reactivity	-.00	.05	-.08	-.18	.10
Activity-Level	.31	.19	1.64	-.03	.80
Total	.31	.20	1.57	-.05	.81
Contrast					
Emotion React vs. Activity	-.32	.20	-1.60	-.82	.05

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is not therefore indicative of significant mediation effects.

Appendix Q

Non-significant Indirect Effects of Emotion Reactivity on Externalizing Problems via Parenting

Non-significant Indirect Effects of Emotion Reactivity on Externalizing Problems via Parenting

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	*Z*	Lower	Upper
Indirect Effects					
Punitive	.24	.11	2.09	.05	.52
Positive	.12	.08	1.50	-.01	.36
Total	.35	.14	2.45	.09	.71
Contrast					
Punitive vs. Positive	.12	.13	.90	-.13	.41

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects.

Non-significant Indirect Effects of Emotion Reactivity on Externalizing Problems via Parenting

	Point Estimate	Product of Coefficients		Bootstrapping BCa 95% CI	
		SE	*Z*	Lower	Upper
Indirect Effects					
Critical	.12	.08	1.59	.01	.38
Positive	.15	.09	1.62	-.00	.43
Total	.28	.13	2.20	.05	.60
Contrast					
Critical vs. Positive	-.03	.12	-.25	-.31	.23

Notes. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects.

Appendix R

Non-significant Indirect Effects of Activity-Level on Externalizing Problems via Parenting

Non-significant Indirect Effects of Activity-Level on Externalizing Problems via Parenting

	Point Estimate	Product of Coefficients *SE*	*Z*	Bootstrapping BCa 95% CI Lower	Upper
Indirect Effects					
Punitive	.27	.13	2.14	.08	.60
Positive	.02	.08	.27	-.14	.20
Total	.29	.17	1.76	-.01	.64
Contrast					
Punitive vs. Positive	.25	.13	1.85	.01	.56

Note. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effects.

Non-significant Indirect Effects of Activity-Level on Externalizing Problems via Parenting

	Point Estimate	Product of Coefficients *SE*	*Z*	Bootstrapping BCa 95% CI Lower	Upper
Indirect Effects					
Critical	.14	.09	1.61	.01	.42
Positive	.03	.10	.27	-.18	.23
Total	.17	.14	1.19	-.08	.49
Contrast					
Critical vs. Positive	.11	.13	.88	-.13	.40

Note. BCa, bias-corrected and accelerated 95% confidence interval (CI) based on 5,000 bootstrap samples.
*BCa 95% CI contains zero and is therefore not indicative of significant mediation effect.