



School of Psychology

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The dynamics of self- and co-regulation in children with emerging emotional and behavioural difficulties

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Roles and responsibilities

The data for all empirical chapters in this thesis were sourced from an ongoing study in the Neurodevelopment Assessment Unit (NDAU) at Cardiff University. The NDAU aims to collect broad assessment data on primary school-aged children referred by their teachers or other professionals involved in the child's support system at school for emotional, cognitive, and behavioural problems. This section will describe my contribution to this study since commencing my PhD in October 2017. Data collection for the ongoing NDAU study began in 2017, and data collection for this thesis took place between March 2018 and January 2020. I was involved in administering a large battery of assessments of cognitive, emotional and social functioning with referred children (including the observational tasks detailed in Chapters 2, 3 and 4 of this thesis) and additional assessments with parents.

I introduced the 'Stranger Approach' mother-child interaction task into the NDAU battery of assessments and collaborated with other members of the NDAU research team to introduce the 'Impossibly Perfect (Blue) Circles' task. I created coding schemes for the 'Impossibly Perfect (Blue) Circles' task used in Chapter 2, and the 'Stranger Approach' task used in Chapters 3 and 4. I also supervised and trained three MSc students and two undergraduate placement students in observational coding for the tasks used in this thesis. I coded 58% of observations for the 'Impossibly Perfect (Blue) Circles' task (Chapter 2) and 64% of mother-child interactions for the 'Stranger Approach' task (Chapters 3 and 4). Further, I coded 20% of maternal speech samples for the Five Minute Speech Sample (FMSS) task (Chapter 4).

In addition to data collection and observational coding for this thesis and for the NDAU, I have been involved in supervising MSc student research projects and training placement students in scoring tasks used in the NDAU. I have also been involved in the dissemination of the findings of this thesis in internal meetings and at a national conference as well as promoting the NDAU at public engagement events.

Table of contents

| | |
|--|----|
| List of Tables | 1 |
| List of Figures | 3 |
| Thesis Summary | 4 |
| | |
| CHAPTER 1: General Introduction | 6 |
| 1.1 Problem statement | 7 |
| 1.2 Emotional and behavioural difficulties as early signs of neurodevelopmental disorders | 8 |
| 1.3 Theoretical perspectives on the parent-child relationship | 10 |
| 1.3.1 Attachment theory | 11 |
| 1.3.2 Dynamic Systems (DS) theory | 12 |
| 1.4 The dynamics of coregulation | 15 |
| 1.5 Methodological approaches to examining the parent-child relationship | 16 |
| 1.5.1 Unidirectional perspectives | 17 |
| 1.5.2 Bidirectionality in the parent-child relationship: A historical and theoretical overview | 18 |
| 1.5.3 Coregulation defined and operationalised | 20 |
| 1.5.4 “What’s in a name?”: Construct versus process | 22 |
| 1.5.5 Conceptualising parent-child coregulation | 23 |
| 1.6 Methodological considerations | 26 |
| 1.6.1 Emotion expression in the context of emotional stress | 26 |
| 1.6.2 Observing the coregulatory process during parent-child interaction | 27 |
| 1.6.3 Statistical methods | 29 |
| 1.7 Emotion coregulation in parent-child relationships: State of the field | 30 |
| 1.7.1 Coregulation and socialisation | 31 |
| 1.7.2 Parent-child coregulation and children’s adjustment problems | 33 |
| 1.7.3 Fostering children’s socioemotional functioning through coregulation | 35 |
| 1.8 Factors influencing coregulation | 38 |
| 1.8.1 The overlap between self-regulation and motivation | 38 |
| 1.8.2 Parental psychopathology | 39 |

| | | |
|---|--|-----|
| 1.8.3 | Parenting cognitions | 40 |
| 1.9 | Concluding remarks, study sample and thesis aims | 41 |
| 1.9.1 | Overview of sample | 42 |
| 1.9.2 | Thesis aims | 46 |
| CHAPTER 2: The role of timing in children’s regulation of emotional stress | | 48 |
| 2.1 | Abstract | 49 |
| 2.2 | Introduction | 50 |
| 2.3 | Methodology | 64 |
| 2.3.1 | Ethical statement | 64 |
| 2.3.2 | Participants | 64 |
| 2.3.3 | Procedure | 65 |
| 2.3.4 | Measures | 66 |
| 2.3.5 | Data analysis | 72 |
| 2.4 | Results | 74 |
| 2.5 | Discussion | 80 |
| CHAPTER 3: Timing, socialisation, and children’s social adaptiveness: The role of mother-child coregulation | | 86 |
| 3.1 | Abstract | 87 |
| 3.2 | Introduction | 88 |
| 3.3 | Methodology | 101 |
| 3.3.1 | Ethical statement | 101 |
| 3.3.2 | Participants | 101 |
| 3.3.3 | Procedure | 102 |
| 3.3.4 | Measures | 102 |
| 3.3.5 | Data analysis | 107 |
| 3.4 | Results | 109 |
| 3.5 | Discussion | 117 |
| CHAPTER 4: The child in the mother’s mind: Reconceptualising maternal sensitivity | | 125 |
| 4.1 | Abstract | 126 |

| | |
|---|-----|
| 4.2 Introduction | 127 |
| 4.3 Methodology | 139 |
| 4.3.1 Ethical statement | 139 |
| 4.3.2 Participants | 139 |
| 4.3.3 Procedure | 140 |
| 4.3.4 Measures | 140 |
| 4.3.5 Data analysis | 147 |
| 4.4 Results | 149 |
| 4.5 Discussion | 156 |
| CHAPTER 5: General Discussion | 164 |
| 5.1 Introduction and brief summary of the three empirical studies | 165 |
| 5.2 Summary of the findings | 166 |
| 5.3 Discussion of the findings | 167 |
| 5.3.1 Can micro-analytical methods capture the dynamics of emotion and the regulation of emotion? | 167 |
| 5.3.2 Are there temporal contingencies between children’s emotional experiences and their regulatory responses to emotion-eliciting situations? | 169 |
| 5.3.3 Are temporal patterns of interdependency between child emotion and maternal socialisation practices indicative of supportive and unsupportive coregulation? | 172 |
| 5.3.4 Is there a link between broad metatheoretical constructs of attachment and dynamic coregulatory processes? | 176 |
| 5.4 Strengths and implications of the thesis | 178 |
| 5.4.1 Micro-analytical methods | 178 |
| 5.4.2 The link between children’s emotion regulation abilities and their motivational tendencies | 179 |
| 5.4.3 Bidirectionality and broadening conceptualisations of sensitive parenting | 179 |
| 5.4.4 Maternal psychopathology | 180 |
| 5.5 Implications for clinical practice and intervention | 180 |
| 5.6 Limitations and future directions | 181 |
| 5.6.1 Alternative moderators and mediators of coregulation | 181 |
| 5.6.2 The trajectory of intrapersonal and interpersonal emotion dynamics | 183 |

| | |
|--|-----|
| 5.6.3 The influence of context | 184 |
| 5.7 Final conclusions | 185 |
| References | 186 |
| | |
| Appendices | 238 |
| Appendix 1: Bivariate correlations for Chapter 2 | 239 |
| Appendix 2: Bivariate correlations for Chapter 3 | 240 |
| Appendix 3: Bivariate correlations for Chapter 4 | 241 |
| Appendix 4: Schematic of NDAU referral process | 242 |
| Appendix 5: NDAU assessment battery | 243 |
| Appendix 6: Protocol for Lab-TAB “Impossibly Perfect (Blue) Circles task | 245 |
| Appendix 7: “Stranger” questions to child in Lab-TAB “Stranger Approach” task and example scenarios | 246 |
| Appendix 8: Five Minute Speech Sample Administration | 247 |

List of Tables

| | | |
|-----------|--|-----|
| Table 1.1 | Dyadic constructs related to coregulation. | 22 |
| Table 1.2 | Overview of experimental tasks used in thesis. | 27 |
| Table 1.3 | Demographic information for study samples in Chapter 2 and Chapters 3 and 4. | 45 |
| Table 2.1 | Description of “Impossibly Perfect (Blue) Circles task. | 66 |
| Table 2.2 | “Impossibly Perfect (Blue) Circles” coding scheme. | 68 |
| Table 2.3 | Prevalence of emotional and behavioural difficulties in the sample. | 71 |
| Table 2.4 | Means and standard deviations for child and parent factors. | 75 |
| Table 2.5 | Descriptive statistics for child emotion displays and regulatory behaviour. | 75 |
| Table 2.6 | Hazard rate estimates for child negative emotion by risk factor. | 77 |
| Table 2.7 | Hazard rate estimates for child regulation of negative emotion. | 78 |
| Table 3.1 | Description of adapted Lab-TAB “Stranger Approach” episode. | 103 |
| Table 3.2 | Coding scheme for adapted Lab-TAB “Stranger Approach” episode. | 103 |
| Table 3.3 | Prevalence of emotional and behavioural difficulties in the sample. | 107 |
| Table 3.4 | Means and standard deviations for risk child and parent risk factors. | 109 |
| Table 3.5 | Descriptive statistics for child emotion displays. | 110 |
| Table 3.6 | Descriptive statistics for mother coregulatory strategy. | 110 |
| Table 3.7 | Hazard rate estimates for child negative emotion. | 111 |
| Table 3.8 | Hazard rate estimates for coregulation of child negative emotion. | 112 |

| | | |
|------------|---|-----|
| Table 3.9 | Hazard rate estimates for child positive emotion. | 115 |
| Table 3.10 | Hazard rate estimates for coregulation of child positive emotion. | 116 |
| Table 4.1 | Description of adapted Lab-TAB “Stranger Approach” episode. | 141 |
| Table 4.2 | Coding scheme for adapted Lab-TAB “Stranger Approach” episode. | 142 |
| Table 4.3 | Prevalence of emotional and behavioural difficulties in the sample. | 145 |
| Table 4.4 | Means and standard deviations for risk child and parent risk factors. | 150 |
| Table 4.5 | Descriptive statistics for child emotion displays. | 150 |
| Table 4.6 | Descriptive statistics for mother coregulatory strategies. | 150 |
| Table 4.7 | Hazard rate estimates for maternal supportive coregulatory strategies following child emotion displays. | 153 |
| Table 4.8 | Hazard rate estimates for maternal supportive coregulatory strategies. | 154 |
| Table 4.9 | Hazard rate estimates for maternal unsupportive coregulatory strategies. | 155 |
| Table 4.10 | Hazard rate estimates for child positive and negative emotion displays following maternal supportive coregulatory strategies. | 156 |

List of Figures

| | | |
|------------|---|-----|
| Figure 1.1 | Schematic of Self-organisation. | 13 |
| Figure 1.2 | Schematic of Attractors. | 13 |
| Figure 1.3 | Schematic of Feedback loops. | 14 |
| Figure 1.4 | Derivation of samples used in Chapters 2, 3 and 4 of this thesis. | 44 |
| Figure 2.1 | Procedural details for NDAU assessment sessions. | 65 |
| Figure 2.2 | Example item from the NIH Toolbox Flanker task. | 70 |
| Figure 2.3 | Likelihood of anger/frustration during activation/no activation of behavioural avoidance. Higher hazards indicate increased risk of negative emotion. | 78 |
| Figure 2.4 | Likelihood of anger/frustration during activation/no activation of self-resignation. Higher hazards indicate increased risk of negative emotion. | 79 |
| Figure 3.1 | Likelihood of negative emotion during activation of supportive coregulation/no activation of supportive coregulation. Higher hazards indicate increased risk of negative emotion. | 113 |
| Figure 3.2 | Likelihood of negative emotion during activation of unsupportive coregulation/no activation of unsupportive coregulation. Higher hazards indicate increased risk of negative emotion. | 114 |
| Figure 4.1 | Plot of time to displays of supportive coregulatory strategies. Higher values indicate longer latencies. | 152 |

Thesis summary

Developmental research has sought to explore the parent-child relationship as a key context in which we can elucidate sources of risk for and resilience against children's psychological difficulties. To date, most research on emotional processes (e.g., emotion regulation) in parent-child relationships has relied on methodologies and analytical strategies that obscure their dynamic (i.e., nonlinear) nature. Advances in analytical methods have enabled more nuanced examinations of the dynamics of parent-child emotion and behaviour, capturing both aspects of child self-regulation and coregulation in interactive contexts. In its exploration of dynamic patterns of emotional responding in a sample of mother-child dyads with children experiencing emotional and behavioural difficulties, this thesis had four main aims: The first aim was to illustrate whether micro-analytical methods can successfully capture the dynamics of emotion and the regulation of emotion. This was met in all three empirical studies with the application of a molecular approach to observed emotional expressions and regulatory behaviour. The second aim was to uncover patterns of emotional responding (i.e., the influence of children's avoidance-based, cognitive-behavioural, and approach-based regulatory strategies on displays of anger/frustration). This was met in the empirical study detailed in Chapter 2, where temporal contingencies between children's displays of negative emotion and regulatory responses were found. In particular, children's cognitive-behavioural strategies (i.e., self-resignation/helplessness) increased recurrence of negative emotion; and patterns of emotional responding in children at higher levels of emotional and behavioural difficulties were suggestive of a reliance on avoidance-based strategies.

The third aim was to index the dynamics of socialisation practices in terms of temporal patterns of contingency between mother and child emotion and behaviour, thus ascertaining whether it is the statistical interdependency with child emotion that makes these practices adaptive. The findings from the empirical study detailed in Chapter 3 revealed interesting patterns: Mothers' unsupportive coregulatory behaviours appeared to hinder recurrence of child positive emotion (i.e., social adaptiveness), particularly in high internalising children. While mothers' second-by-second use of autonomy support resolved children's negative emotion displays, the opposite pattern was found in dyads with children at higher levels of internalising difficulties, where mothers' second-by-second use of positive directives (i.e.,

instructional behaviours) instead exacerbated negative emotion. While this appeared to point to low levels of receptiveness to socialisation efforts in dyads with such children, the effect of children's motivational tendencies on emotion displays signified the need for the examination of mothers' interpretations of their child's signals. The empirical study in Chapter 4 investigated the role of attachment-based constructs, namely, narrative coherence (i.e., parental mental representations of the child and parent-child relationship). It particularly found associations between the coherence of mothers' mental representations and increased engagement in supportive coregulatory behaviour, as well as higher levels of contingent responsiveness with children's displays of positive emotion. This chapter thus achieved the final aim of the thesis in its attempt to bridge the gap between traditional parent-child relationship qualities and dynamic social processes. Taken together, this indicates that a focus on dynamic self- and co-regulatory patterns in high-risk populations provides new avenues for refining theoretical models and informing clinical practice.

Presentation of thesis

With Dynamic Systems theory at its core, the primary goal of this thesis is to explore self-regulatory and coregulatory patterns of emotional responding in children experiencing emotional and behavioural difficulties and are considered to be on the pathway to neurodevelopment problems. Comprised of three interrelated studies, the thesis is presented as follows: Chapter 1 provides a literature review of, a) emotion processes and children's social and emotional adjustment, b) major theories which provide a framework from which various conceptualisations of the parent-child relationship have been made; c) a review of empirical work and methodological approaches to the study of parent-child relationships, and d) an introduction to micro-level interactive processes. Chapters 2 to 4 detail the three empirical studies, and Chapter 5 provides a general discussion that integrates the findings from these three studies, including implications for theory and practice and an overview of future directions.

Chapter 1

General introduction

“development does not "know" where it is going from the start....there is no end-state other than the end of life itself....development is the outcome of the self-organizing processes of continuously active living systems” (Thelen & Smith, 1994)

1.1 Problem statement

A child's emotional environment can be key in fostering early social and emotional development, with primary caregivers such as mothers considered to play an important role. Children are particularly dependent on caregivers to develop the ability to self-regulate through coregulation (Cole, 2014). Accordingly, developmental research has sought to explore the parent-child relationship as a key context in which we can elucidate sources of risk and resilience. For example, in predicting early child psychological difficulties, research suggests that parent-child interactions that are mutually negative or unsupportive contribute to a spectrum of child psychopathologies (Hollenstein et al., 2004). To date, most developmental research on emotional processes in parent-child relationships has relied on methodologies and analytical strategies that obscure their dynamic (i.e., nonlinear) nature. Recently, new analytical methods have been developed which enable more nuanced examinations of the dynamics of parent-child emotion and behaviour. These recent advances have spearheaded a growing body of literature that has successfully captured both child self-regulation and coregulation in interactive contexts. While traditional methods have been shown to be reliably predictive of child outcomes, their lack of complexity and specificity leaves them oftentimes unable to disentangle global concepts from micro-level processes. It is the argument of this thesis that there is significant utility for clinical practice and intervention efforts, in identifying unique patterns specific to dynamic processes.

Aims of the literature review

As previously mentioned, research on coregulatory processes is rapidly increasing, demonstrating the uptake of dynamic perspectives on child emotional processes and the parent-child relationship. Researchers are increasingly focusing on the structural and organisational features of self-regulation and social interaction- particularly the timing and contingent relations between the emotions and behaviours of social partners. In order to situate the three empirical studies in the wider literature, the below literature review aims to explore how conceptualisations of qualities of the parent-child relationship have informed methodological approaches, and how a focus on dynamic interactional processes, specifically

coregulation, can advance understanding of the parent-child relationship in children's social and emotional functioning.

1.2 Emotional and behavioural difficulties as early signs of neurodevelopmental disorders

Children's self-regulation has been conceptualised in various ways across different theories. For example, while developmental theories of temperament focus on constructs such as effortful control (Rothbart & Bates, 2006; Sulik et al., 2010; Rothbart & Posner, 1985), attentional control, and cognitive inhibition (Nigg, 2000), neurocognitive theories focus on children's executive functioning. Yet, the distinction between the constructs has not always been clear as both inhibition and attentional control are also considered aspects of executive functioning (Nigg, 2017, Bridgett et al., 2013). Thus, while children's temperamental tendencies reflect innate (biologically determined) abilities to flexibly shift attention and activate internal resources (Banich, 2009; Nigg, 2000; Posner & Rothbart, 2007), children with less efficient effortful control may have fewer resources to effectively organise their actions and control impulses geared towards inappropriate goals. This is then said to hinder engagement in effortful emotional and behavioural responses to the environment (Calkins & Keane, 2009; Carver et al., 2008; Compas et al., 2004; Nigg, 2006; Rothbart & Bates, 2006). Different instruments have been used to measure effortful control in early childhood, including parental report (e.g., the Children's Behaviour Questionnaire (CBQ; Rothbart et al., 2001) and laboratory tasks (e.g., Effortful Control Battery) (ECB; Kochanska et al., 2000). In many studies measuring effortful control using ECB tasks, a general aggregate score is often used, and there is variation in the way in which studies have used the ECB in terms of operational definitions of effortful control (Olson et al., 2005; Aksan & Kochanska, 2004). Questionnaire measures of children's effortful control such as the CBQ have been shown to be ecologically valid, providing trait-like insight into the child's daily functioning over a larger time span. However, informant reports can be biased and limited in their ability to capture core processes (Nigg, 2001). Thus, they might be more global measures of self-regulation ability.

Early childhood sees children's emotion regulation abilities (i.e., the ability to regulate and modify emotions; Gross, 2008) transition from basic regulation strategies used in infancy to a

broad repertoire of regulatory behaviours employed to effectively manage emotions in accordance with more complex social demands (Kopp, 1989; Zeman et al., 2006). By age 6, children acquire the essential skills (i.e., focused attention, empathy and emotion regulation) to facilitate competency in social situations (Feldman & Masalha, 2010). Accordingly, research asserts that children's emotion regulation capacities emerge from their everyday interactions and have been implicated in the development of adjustment problems such as internalising and externalising difficulties. Toddlerhood sees a rise in displays of noncompliance, aggression and temper tantrums (Wakschlag et al., 2007): 84% of preschoolers are considered to exhibit regular temper tantrums (Wakschlag et al., 2012). While these behaviours are considered normative (e.g., "the terrible twos"), they are also thought to be early signs of emerging emotional and behavioural difficulties. For example, research has shown that highly dysregulated, long-lasting irritability and inefficient emotion regulation during the preschool period increases risk of disruptive disorders and depressive/anxiety symptoms later in childhood (Wakschlag et al., 2012; Kessel et al., 2016; Carlson et al., 2016). Once these difficulties become firmly established in early childhood, they become resistant to change (Egger & Angold, 2006; Eron, 1990; Gardner & Shaw, 2008; Squires & Nickel, 2003). This is most significant for the school years, where children face new demands (i.e., focusing attention for longer durations, inhibiting impulsive behaviour to complete tasks). Thus, peer rejection, peer conflict, low academic performance and delinquency are commonly seen in children experiencing emotional and behavioural difficulties (Gardner & Shaw, 2008).

Externalising difficulties, often referred to as behavioural/disruptive disorders, comprise of difficulties such as aggression, impulsivity and hyperactivity. They are also often associated with neurodevelopmental disorders such as attention deficit hyperactivity disorder (ADHD) and oppositional defiant disorder (ODD) (Gardner & Shaw, 2008). Conversely, internalising difficulties comprise of emotional problems such as anxiety and depression. Internalising difficulties in children are often underreported or overlooked in school contexts while externalising problems tend to be overreported (Kristensen, 2001; Heiervang et al., 2008). Understanding the individual and contextual factors involved in the etiology and maintenance of these difficulties is crucial for early intervention. Traditionally, there has been little agreement on where parenting is situated in the direction of effects with children's emotional tendencies when examining emotional and behavioural difficulties; specifically, it is not fully

known whether parents impact children's adjustment or children influence the parenting they receive. Research has thus suggested that both parent and child effects play key roles in the formation and maintenance of child adjustment (Pettit & Arsiwalla, 2008). Though researchers generally agree that the development and persistence of children's emotional and behavioural difficulties cannot be reduced to unidirectional effects and are rather the product of the interplay between child characteristics such as effortful control and parenting processes (i.e., socialisation efforts and attachment behaviours) (Gardner & Shaw, 2008; Landy, 2009; Pettit & Arsiwalla, 2008), research is yet to fully elucidate the role of coregulatory processes.

These findings emphasise why research efforts must be geared towards increasing understanding of the within-child and dyadic processes contributing to children's adaptive social, emotional and behavioural development, particularly for children on the pathway to neurodevelopmental problems. The paucity of research examining dynamic interaction patterns at the dyadic level is even more pronounced in at-risk children (Deater-Deckard & Petrill, 2004). Research has shown negative parenting practices and interactions to be linked with internalising and externalising difficulties, however, we are still to ascertain the nature of positive interactive processes and the extent to which they could serve as sources of protection or resilience against child adjustment problems during this developmental period (Deater-Deckard et al., 2004; Lunkenheimer et al., 2011).

1.3 Theoretical perspectives on the parent-child relationship

A number of frameworks in the child development literature point to the importance of considering parent-child relationships in their entirety, as opposed to the often-prevalent approach of assessing patterns of emotional responding in children and parents separately. These theoretical assertions have made significant contributions to our understanding of the role of the parent-child relationship in children's social and emotional development (Deater-Deckard & O'Connor, 2000), and have crucially formed the basis for new conceptualisations of relationships as comprising bidirectional, interpersonal processes. While a full examination of these theoretical frameworks is beyond the scope of this literature review, two conceptual models are particularly key to understanding why new conceptualisations of the parent-child

relationship are necessary. These are attachment theory (Bowlby, 1978) and Dynamic Systems (DS) theory (Smith & Thelen, 2003; Thelen & Ulrich, 1991; Smith & Thelen, 1993).

1.3.1 Attachment theory

A large body of early research posits that the quality of child-caregiver relationships is key for children's social and emotional development, having important implications for later life (Maccoby, 1980; Jaffe et al., 2001, Golombok et al., 1995). Attachment theory in particular, points to the availability and responsiveness of children's attachment figures (primary caregivers) as key indicators of the quality of early attachment bonds. These attachment behaviours are said to form the basis of "internal working models" which guide perceptions of security and emotional availability in later close relationships. Bowlby (1969) pointed to a number of behaviours central to the activation of the attachment system. In the presence of an internal or external threat, the infant's proximity-seeking behaviour functions to maintain closeness with the caregiver. The caregiver (attachment figure) is also said to become a "safe haven" to shelter the infant from perceived threats, and a "secure base" from which the infant can explore their environment. This signifies the emotional security provided by early parent-child relationships. Thus, in terms of children's emotional development, security-provision and distress-alleviation are important functions of attachment relationships that foster skills related to the modulation of emotional and physiological reactivity to emotionally arousing stimuli (Brennan & Shaver, 1995; Feeney, 1995; Field & Reite, 1984); specifically, nurturing the ability to respond appropriately to situations and accomplish goals (Thompson, 1994).

From 18-24 months of age, a shift occurs wherein the child's primary goals are no longer primarily centred on having their needs met (i.e., seeking comfort from caregivers, protesting when separated from their caregivers) (Sroufe & Waters, 2017); the maturation of their cognitive and attention skills leads to increased awareness of mutual influence with their caregivers. They become aware of the goals of their attachment figures, which leads to increasing opportunities for reciprocal interactions. This represents a period where predictable caregiving becomes key in maintaining healthy attachment relationships. Accordingly, attachment behaviours such as protection, comforting, emotional availability, nurturance and warmth could be said to be the building blocks of parent-child relationships

that gradually become co-created, consistent, sensitive and responsive (Kochanska, 1997). Hence, it is the argument of this thesis that as these attachment behaviours facilitate mutual actions from both parent and child (i.e., the parent's responsiveness increases the child's willingness to be responsive), we must adopt a bidirectional perspective.

1.3.2 Dynamic Systems (DS) theory

The parent-child dyad can be thought of as a mutually regulating system. Recently, developmental researchers have argued that a Dynamic Systems approach can help increase understanding of children's social and emotional development by capturing the underlying processes at work when there are momentary shifts in the system (Hollenstein, 2011). Such transactional models provide a more accurate picture of dyadic interactions by assessing patterns reflecting each member's ongoing contribution to the relationship, with the child seen as active agent.

DS theory is a metatheoretical framework comprising of a number of abstract principles that have been applied to various disciplines (e.g., physics, mathematics, and developmental psychology). One key argument of DS theory is that emotions continuously evolve over time, and thus their development proceeds step by step (Van Geert, 2003). They can be characterised by their self-organisation at multiple time scales; thus, the mechanisms of developmental change can be seen in real-time (i.e., second-by-second), short time periods (i.e., days or weeks) and longer time periods (i.e., years) (De Ruiter, 2019). Micromomentary changes in emotion (e.g., increasing build-up of frustration when having to wait for a toy), are argued to gradually become long-lasting moods which, when repeated, form the basis of enduring personality traits. These personality structures can in turn determine our emotional states, gradually forming a self-organising system over the course of development with its own internal feedback mechanism (Lewis, 2000).

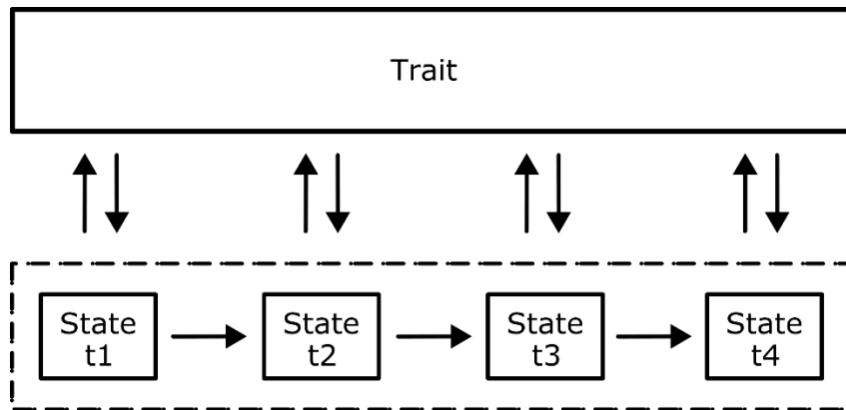


Figure 1.1 Schematic of Self-organisation. Higher-level structures such as personality traits emerge from interactions between subcomponents of the system over time. These states (interrelations between subcomponents) are also constrained by the higher order trait. Reprinted from “Self-organisation” by M.A.E. Van der Gaag, 2018, *Iterativity and interdependency*, 83, 18. Copyright [2018] by the CC BY 4.0.

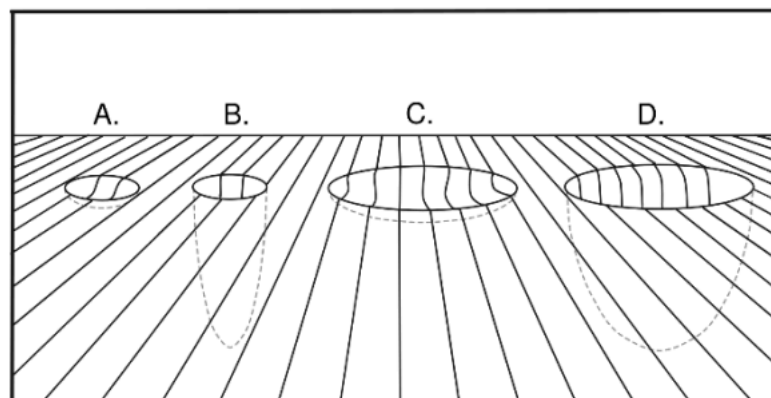


Figure 1.2 Schematic of Attractors. The attractor landscape consists of attractor basins with varying widths (representing the pervasiveness of a state) and depths (signifying the strength of a state). Deep basins reflect deeply entrenched states that are hard to get out of (such as B and D). The wide basins are pervasive states that are easily activated as they involve numerous aspects of an individual’s life (e.g., C and D). Narrow and shallow basins (e.g., A) reflect states that are rarely frequented and are easy to get out of. Reprinted from “Attractor basins” by M.A.E. Van der Gaag, 2018, *Iterativity and interdependency*, 83, 19. Copyright [2018] by the CC BY 4.0.

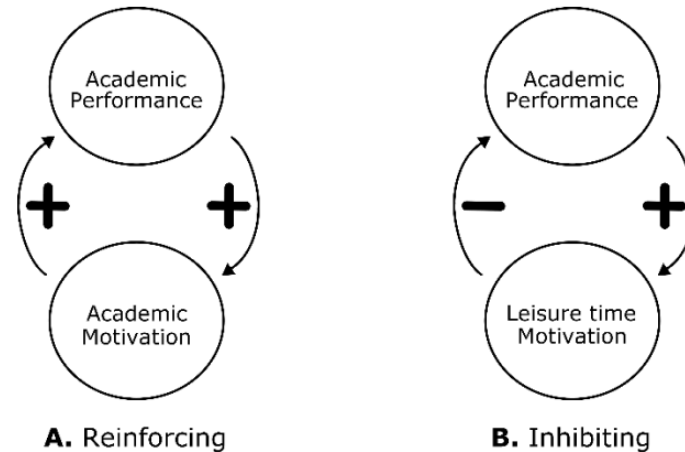


Figure 1.3 Schematic of Feedback loops. Feedback loops: a reinforcing (or positive) feedback loop (A) and an inhibiting (or negative) feedback loop (B). These represent bidirectional relationships between subcomponents of a system which facilitate the rapid growth of states or stabilisation. Reprinted from “Feedback loops” by M.A.E. Van der Gaag, 2018, *Iterativity and interdependency*, 83, 17. Copyright [2018] by the CC BY 4.0.

While DS theory comprises a broad number of concepts, the DS concepts relevant to this thesis include interdependency, self-organisation, attractors, and feedback loops. Underlying the interdependency between the system and the environmental context is the notion that such contexts are continuously and bidirectionally linked to the system and its changes over time. For example, regarding child social adaptiveness, if the context is defined as parental attitudes towards the child’s displays of positive emotion in social interactions, both changes in the child and parental attitudes must be defined over time, as well as how they mutually influence each other over time. Self-organisation (Figure 1.1) is said to denote the continuous interactions between the subcomponents of a system, the manner in which they “move together” and eventually produce relatively stable patterns (Von Bertalanffy, 1968). Accordingly, the interactions between these subcomponents are considered as lower-level processes and the stable patterns they produce are high-level processes that emerge from these interactions. In terms of child social and emotional functioning, the constellation of emotions, actions, and thoughts could be said to self-organise into children’s concrete experiences (i.e., states) or patterns of emotional responding (e.g., coping styles) (De Ruiter et al, 2017). These higher-order characteristics also reflect another key DS concept, attractors. Attractors (Figure 1.2) are defined as patterns of emotion or behaviour that pull the emotion

system into absorbing states or interaction patterns. Internal or external triggers can result in behaviour moving toward these attractors through the self-organisation of the system and as these attractors occur repeatedly over developmental time, they eventually stabilise into increasingly predictable traits (Thelen & Smith, 1994). Therefore, symptoms of depression, aggression and anxiety can be seen as attractors that have emerged over the course of weeks, months or years and stabilised into predictable traits.

Recursive interactions between the subcomponents of a system are not always uniform, thus, while some components reinforce others in the same or opposing direction, others may have an inhibiting effect (Figure 1.3). These interactions are also collectively defined as feedback loops. Interactions between reinforcing components can lead to rapid growth of traits-providing there is no interference from other subcomponents, whereas interactions between inhibiting components lead to the long-term stability of these traits. This points to the nonlinear (i.e., dynamic) nature of these processes.

1.4 The dynamics of coregulation

Dynamic Systems theory posits that the emotions of one person are inherently linked with the emotions of others in a moment-to-moment fashion. The temporal dynamics of emotion help us understand how emotions play out over time and influence interactional outcomes. This approach considers the interdependence between two people as key to the dynamic structure of emotion during interactions. Thus, adaptive interactive processes may be characterised by the harmonious organization of social partners' emotions (Butler, 2015).

Interdependence of actions and emotions can be conceptualized as, (1) Matching (where both social partners are in the same emotional/behavioural state at the same time) and (2) Contingency (where a change in one partner's emotional state precedes or follows a change in the other's state). Previous research has shown that interdependency between partners' positive emotions is associated with adaptive management of emotion, cognitive abilities, and empathy, whereas interdependency between partners' negative emotions has been associated with behavioural problems (Patterson, 1982) and poor management of emotion (Cole et al., 2003). Dynamic in nature, interdependency on a temporal level enables a focus

on mutuality in the “ebb and flow” of emotional states, quantifying fluctuations as the direction of change at any point within a social interaction.

A DS approach may be particularly useful for studying at risk populations as multiple studies have demonstrated that mother-child emotional contingency decreases in high-risk populations; reporting disruptions to a number of interpersonal processes in withdrawn infants, siblings of children with autism (Yirmiya et al., 2006), and young children suffering posttraumatic distress. Thus, examination of the dyad as a system along with temporal patterns unique to a particular dyad, may be the most informative way to measure interdependency. A DS approach to the parent-child relationship then encourages a process-oriented view of social interactions, moving beyond the question of “what is happening?” to “how is it happening?”. Accordingly, researchers have already begun to investigate the structure of parent-child interactions, demonstrating dyadic processes to be significant contributors to child development (Harrist & Waugh, 2002; Lunkenheimer et al., 2011).

Emotion dynamics have been a major focus of research efforts to elucidate the role of dyadic processes in children’s development, leading to a number of operationalisations that more directly incorporate timing. Butler’s (2011) depiction of temporal interpersonal emotion systems (TIES) to conceptualise emotion dynamics in the context of social interactions suggested that the emotions of close social partners become tightly coordinated over time, so much so that they become mutually involved in one another’s emotional states. In keeping with DS perspectives, TIES frames emotion as an interpersonal system comprising a number of subcomponents that interact to produce emotional states such as the internal experience, behavioural responses, and physiological responses. These temporal interpersonal systems come into play whenever emotions occur in the context of interactions with social partners or relational others. The subcomponents of each partner’s emotion system also interact with one another. Consequently, this interactive process reflects the interdependent nature of relationships in real-time. This perspective of emotion dynamics has methodological implications; specifically, it leads to questions on how we can empirically investigate how partners influence each other’s emotions and behaviour over time.

1.5 Methodological approaches to examining the parent-child relationship

1.5.1 Unidirectional perspectives

The introduction and development of the behavioural approach to clinical issues in the 1960s highlighted the importance of direct observation of children in their natural settings (Dishion & Granic, 2004). Decades of research in the child development literature has utilised direct observation as a tool to assess and examine adaptive and maladaptive behaviours in children (Aspland & Gardner, 2003; Pellegrini, 2003; Rolfe & Emmett, 2010). Observation uncovers a wide range of target behaviours and their environmental contexts. Although useful, self- and proxy-report has been argued to be susceptible to biased individual perceptions, evidenced by inconsistent reporting among family members (Lotzin et al., 2015). Observations are considered to be more objective tools of assessment, providing researchers with the opportunity to see the complexities in social interaction.

Parenting practices have traditionally been highlighted as key contributors to the course and outcome of child development. Thus, early developmental research used traditional tools measuring broad constructs that map onto different qualities of parent-child relationship, such as maternal sensitivity and responsiveness. Both constructs are grounded in attachment theory. Bowlby (1969) earlier suggested that the caregiver's responsiveness to child distress is one of the principal antecedents of secure attachment in children. Maternal responsiveness has been associated with a range of developmental outcomes, such as social competence and emotion management (Ainsworth et al., 1974; Bornstein et al., 2008; Bus & van Ijzendoorn, 1992). In Ainsworth's (1974) conceptualisation of sensitivity, the parent notices their child's signals, interprets these signals correctly, and responds to these signals in a timely and sensitive manner. These components of parental behaviour highlight global aspects of caregiving. Yet, the conceptual overlap between the constructs used in some global assessments of sensitivity calls into question the methodological soundness of these approaches. Global assessments of sensitivity such as the Emotional Availability Scales (Biringen, 2008), include positive emotion or parental warmth (i.e., smiling, positive tone of voice, physical affection) as indicators of sensitivity. However, research has questioned the contribution of parental warmth to the sensitivity construct. Specifically, Davidov and Grusec (2006) reported that parental warmth and sensitive responsiveness have distinct effects on child outcomes. Observed sensitivity was found to independently predict child effective

management of negative emotion and empathy towards others' distress, whereas observed parental warmth independently predicted management of positive emotion. Keown (2012) further reported that maternal sensitivity and displays of warmth and affection were independent predictors of child ADHD symptoms. It appears then, that while global assessments elucidate global aspects of relationship quality, their lack of specificity deems them unable to disentangle closely related constructs in a way that facilitates valid measurement (Loulis et al., 1997; Dishion et al., 2017). For example, a high level of positive emotion accompanied by extreme intrusiveness, (such as a mother vigorously playing with her child while not noticing the child is not enjoying the interaction), may in fact, be indicative of low sensitivity to the child's needs and goals despite the high displays of warmth.

Other global scales that use a wide range of maternal behaviours to assess sensitivity, such as the Erickson Scales (Egeland et al., 1990), also fall into the cluster of behavioural coding systems that methodologically blend complex constructs such as maternal sensitivity and responsiveness, making it difficult to make specific conclusions about links between underlying processes and different domains of child development. We thus see that in focusing on establishing the global qualities of the parent-child relationship (Seifer & Schiller, 1995), the literature may leave our understanding of the organisational and bidirectional processes still in its infancy.

1.5.2 Bidirectionality in the parent-child relationship: A historical and theoretical overview

From the age of 3, children develop the capacity to describe their own and others' emotions as well as articulate the causes and consequences of these emotions and mobilise them to achieve goals (Bretherton et al., 1986). They become more proficient in using skills such as attention shifting, active coping, and selective avoidance of negative stimuli. Yet, parents continue to serve as external emotion regulators over the course of childhood, through parenting practices such as communication of empathy, provision of support and comfort, and reframing distressing events. As Fogel et al (1992) earlier emphasised, rules for social behaviour, communication of goals and desires, and emotional experiences are the product of continuously co-constructed actions over the course of children's interactions with their parents. If the parent-child relationship is considered to be a coregulating (mutually

regulating) system where both parent and child are shaped by each other's states and signals (Feldman, 2003), assessment methods must incorporate children's increasing abilities to alter their state in response to parental behaviour and facilitate the parent's regulation of their own behaviour in response to the child's emotional state (Tronick, 2007). The mutual influence described in the above sections is a bidirectional process; "a property of the dyad and cannot be defined by the behaviour of either individual alone" (Deater-Deckard & O'Connor, 2000, p. 562).

Historically, unidirectional models dominated research on parent-child relationships; with a wealth of studies pointing to parents as the main drivers of relationship quality (Bell, 1968; O'Connor, 2002). However, a large body of research has focused on the influence of child characteristics. The term 'child effects' has been traditionally used in the developmental literature to refer to the influence of child characteristics on parent behaviour (Bell, 1968; Harper, 1971). Most of the traditional child-effects literature has used qualitative descriptions of parent-child interactions. One main proponent of the child-effects literature is Patterson (1976), who described the negative reinforcement trap present in maladaptive parent-child interactions. Child behaviour, Patterson suggests, provides negative reinforcement for negative parent responses. This cyclical pattern is said to play a key role in the development of pervasive problem behaviour in children and hostile/punishing parenting styles. One early example is provided by Carr et al (1991), wherein, participants were instructed to make demands to two types of children; one who tended to comply with demands and displayed little to no problem behaviour, and another child who displayed problem behaviour in response to demands. Higher levels of support and instructive behaviours were used with the more compliant child, while fewer demands were made to the child who engaged in more problem behaviour.

Bidirectionality is often described as an umbrella-term for the dual direction of associations or relationships. Other related terms, such as reciprocity and transactionality are said to represent more specific aspects of bidirectionality (Paschall et al., 2015). In early childhood (ages 3 to 8), bidirectional effects are particularly salient as this period signifies the rapid growth and development of children's self-regulatory capacities, and cognitive and social functioning. Consequently, the parent-child relationship is said to contribute to this growth,

through its role as a mediator of the influence of the environmental context on child emotion and behaviour (Sameroff & Fiese, 2000). Decades of research has evidenced the implication of both parents and children as mutual socialisers of child development, parenting behaviour, and the quality of the parent-child relationship (Bell, 1968; Pardini, 2008; Sameroff & MacKenzie, 2003). The construct of bidirectionality, thus represents the notion of mutual influence and co-creation of parent-child outcomes. Accordingly, bidirectionality has been used as a mechanism of transmission for psychopathology, socialisation, health, and wellbeing; in a range of theoretical frameworks (Belsky, 1984; Kochanska et al., 2010, Smith & Thelen, 2003).

The early works of Thomas and Chess (1977) and Bell (1968) were key in forming the theoretical basis for bidirectionality. Thomas and Chess earlier identified child temperament as a mechanism of influence from child to parent; while Bell reconceptualised socialisation as an interactive process. These early works aimed to identify reciprocal processes in social interactions and relationships and informed models of socialisation. For example, Sameroff's (1975) transactional model of development emphasised the continual reciprocal influences between parent and child. In this model, transactional effects are considered to represent dynamic exchanges within parent-child dyads that stimulate both dyadic and individual-level changes (Sameroff, 1975; Sameroff & MacKenzie, 2003). The incorporation of models of bidirectional effects within developmental theories such as dynamic systems and transactional models; has led to the advancement of methods of examination and assessment. These methods capture the dynamic and transformative associations between genetic, biological, behavioural and psychological characteristics that contribute to observable individual and relationship-level characteristics (O'Connor, 2002). These methods vary in their units of analysis (Granic et al., 2003), as well as their ability to reliably detect effects and draw causal conclusions.

1.5.3 Coregulation defined and operationalised

Self-regulation is considered to play a foundational role in psychological wellbeing across the lifespan. Self-regulation denotes the ability to manage thoughts, emotions, and behaviour to enable goal-directed actions necessary for contexts such as social relationships and the

learning environment (Kochanska et al., 2000). Early self-regulation is said to develop through interactions with caregivers, and is dependent on environments that are predictable, responsive, and supportive (Rosanbalm & Murray, 2017).

Research has increasingly sought to demonstrate emotion regulation as an intrinsic social process (Volet et al., 2009), underlining the importance of the context in which the regulatory process takes place. Echoing notions of emotion dynamics in DS theory, these research efforts have produced new constructs, specifically coregulation. Conceptualisations of coregulation in DS theory label this concept as “the overall dynamic regulatory process by which the social environment supports individuals’ internalization of social and cultural influences” (Volet, et al., 2009, p. 218). In terms of early child development, it is denoted as the supportive process between parent and child, in which the dyadic emotional system is formed, and the co-construction of adaptive emotional states can take place (Feldman, 2003; Tronick, 1989). Effective coregulation functions to provide children with a secure base to acquire and practice new skills and learn from mistakes (Rosanbalm & Murray, 2017). Accordingly, interactions characterised by timely responsiveness to cues that signal needs and desires, as well as sensitivity to distress; are considered to indicate effective coregulation. Naturally, parent-child interactions are ideal for teaching/coaching self-regulation skills through effective modelling, coordination, and achievement of shared goals.

As the capacity for self-regulation develops over time, the optimal amount of coregulation varies according to the developmental period. Early childhood and adolescence are two developmental periods where self-regulation ability sees a dramatic increase, due to corresponding changes in brain development (Rosanbalm & Murray, 2017). Hence, supportive regulation (coregulation) in these developmental windows may be particularly vital for smooth transitions into new phases such as the start of school, adolescence, and adulthood (Rosanbalm & Murray, 2017). The experience of effective coregulation for preschool and school-aged children moves from being centred around parental warmth, nurturance and reorientation of attention to regulate arousal; to promoting autonomy, assisting in problem-solving, and modelling conflict-resolution (Rosanbalm & Murray, 2017). Early social learning perspectives suggested that new patterns of behaviour can be acquired from direct experience or observations of others’ behaviour (Bandura, 1977). Accordingly, a

caregiver’s own emotional expressiveness serves as a model for the child’s expression and regulation of their own emotions (Morris et al., 2007). Hence, while crucially centred on bidirectional influences, parents naturally take on the leading role in the coregulation process.

1.5.4 “What’s in a name?”: Construct versus process

A number of terms closely related to the concept of coregulation have been used in the literature, giving rise to conceptual overlap. Terms such as dyadic synchrony (Harrist & Waugh, 2002; Lindsey, et al., 2009), attunement (Stern, 1985), dyadic mutuality (Deater-Deckard & O’Connor, 2000; Deater-Deckard, et al., 2004; Deater-Deckard & Petrill, 2004; Lindsey & Mize, 2000; Lindsey et al., 1997) and mutually responsive orientation (Aksan, et al., 2006; Kochanska & Murray, 2000) have often been used interchangeably with coregulation, describing various aspects of adaptive parent-child relationships (displayed in Table 1.1). While some of these constructs are said to denote global indicators, others such as reciprocity, responsiveness, and coordination have been argued to denote specific processes. Thus, it is not yet clear if these theoretical constructs signify interactive processes describing moment-to-moment observable actions within the parent-child dyad or if they in fact broader meta-theoretical concepts. Inevitably, this lack of agreement at the conceptual level has also given rise to confusion at the methodological level.

Table 1.1 Dyadic constructs related to coregulation.

| Dyadic construct | Scales | Measurement level |
|------------------|--|-----------------------|
| Reciprocity | CIB, CSMCI, PCERA, MIFS, SGCS | Global |
| Synchrony | CARE, SGCS, TIS, BPCICS, RYT | Global Micro-level |
| Attunement | EAS | Global |
| Mutuality | MRO, CSMCI, ERA, PARCHISY, CARP, R-RCS, DMC, RYT RACS | Global Micro-level |
| Flexibility | SPAFF | Micro-level |

Note: Coding Interactive Behaviour (CIB; Feldman, 1998), Coding System for Mother-Child Interactions (CSMCI; Healey et al., 2010), Parent-Child Early Relational Assessment (PCERA; Clark,

1985), Mother-Infant Coding Scale (MIFS; Salvatori et al., 2016), Synchrony Global Coding System (SGCS; Skuban, 2006), Child-Adult relationship Experimental Index (CARE; Crittenden & Claussen, 2000); Taxonomy of Interactional Synchrony (TIS; De Mendonca et al., 2011), Belsky Parent-Child interaction Coding System (BPCICS; Isabella & Belsky, 1991), Rocissano and Yatchmink Taxonomy (RYT; Rocissano & Yatchmink, 1983), Emotional Availability Scales (EAS; Biringen, 2008), Mutually Responsive Orientation (MRO; Aksan et al., 2006), Parent-Child Interaction System (PARCHISY; Deater-Deckard et al., 1997), Revised Relational Coding System (R-RCS; Fogel et al., 2003), Dyadic Mutuality Code (DMC; Censullo, 1987; Censullo, 1991; Horowitz et al., 2001), Relationship Affect Coding System (RACS; Peterson et al., 2008); Specific Affect Coding System (SPAFF; Shapiro & Gottman, 2004).

1.5.5 Conceptualising parent-child coregulation

We have seen in the above sections that coregulation may be a major contributor to children's healthy social and emotional development. Yet, one hurdle research must overcome is the lack of conceptual clarity regarding constructs related to coregulation and hence the questionable validity of operational definitions. This section will first describe and examine constructs closely related to coregulation, drawing from assessment methods (i.e., traditional and contemporary behavioural coding systems) to eventually conclude that a process-oriented approach that incorporates timing may be the most appropriate way of studying coregulation.

Different terms have been used interchangeably leading to both theoretical and methodological confusion. Central to the concept of **synchrony** is the notion that the essence of human experience is one's emotions and actions being situated in time (Feldman, 2007). In terms of the parent-child relationship, a process-oriented view of synchrony could be said to reflect the temporal and organisational features of the dyadic system. Specifically, the time-bound, coregulatory experiences within attachment relationships, providing the foundation for children's capacities for emotion understanding, empathy, and understanding the intentions of others through joint action. In terms of children's adjustment, research has reported associations between low levels of synchrony and higher child internalising and externalising problem behaviours (Criss et al., 2003; Deater-Deckard et al., 2004). Further, synchronous parent-child relationships have been demonstrated to be associated with children's adaptive self-regulation (Kochanska et al., 2008; Suveg et al., 2016). Thus, synchrony provides an opportunity for children to attune their co-regulatory skills which can be applied to other social contexts where self-regulation is utilised. Leclere et al's (2014)

review of the literature's conceptualisations of dyadic synchrony found that various terms (e.g., mutuality, reciprocity, rhythmicity, and harmony) were used to characterise synchrony as a construct despite some being processes and others meta-theoretical concepts. Their review pointed to the overlap (i.e., assessment of different constructs as attributes of one another) of global constructs such as mutuality and reciprocity with synchrony, which could instead be best characterised as an interactive process. One example is the SGCS (Skuban, 2006), a global synchrony scale measuring synchrony as dyadic reciprocity, mutual focus, and shared affect.

Researchers have also conceptualised interconnected patterns of affect within close relationships as not only synchrony, but also attunement (Harrist & Waugh, 2002; Delaherche et al., 2012). While concepts such as synchrony and attunement have been shown to be related to coregulation (i.e., through harmonisation of moment-to-moment changes in the goals and agendas of each interactive partner) (Harrist & Waugh, 2002; Feldman, 2003), they are often operationalised in global assessment tools as primarily indicating the matching of social partners' emotional systems (Skuban et al., 2006). **Attunement** within the parent-child dyad is said to foster a sense of "togetherness", where both interactive partners become accommodated to the intentions and emotions of each other (McMahon & Newey, 2018), increasingly anticipating each other's actions and reciprocating emotional expressions over time to facilitate the emergence of new dyadic states.

Maccoby and Martin (1983) used the concept of reciprocal compliance to demonstrate how **reciprocity** denotes the co-constructed nature of emotional and behavioural states. Parent's compliance with their child's needs and requests in turn elicits the child's compliance with parental requests, reflecting an ability to reciprocate the actions of others, cooperate willingly, and pursue shared goals. In accordance with DS theory, this could be said to reflect the predictable sequencing of actions and intentions and point to underlying organisational processes (Morelen & Suveg, 2012). Research has also implicated reciprocity in outcomes of child social adjustment. For example, Gardner et al (2003) earlier showed that early cooperative play is linked to reduced conduct problems, and Criss et al (2003) found that boys in dyads with high levels of positive reciprocity were reported to be less likely to engage in antisocial behaviour (Criss et al., 2003).

The operationalisation of **mutuality** by Kochanska and colleagues emphasises the importance of assessing the dyad as a unit of analysis. Based on Maccoby's conceptualisation of reciprocity, Kochanska et al pointed to the role of mutually responsive orientation (MRO), characterised by shared positivity, shared cooperation and responsiveness in the parent-child dyad (Kochanska, 1997; Kochanska & Murray, 2000). Their measure of MRO comprises ratings of how cooperative, responsive and harmonious interactions between a parent and child were (Aksan et al., 2006). Specifically, mutual cooperation- with conflicts resolved with ease, positive emotional ambiance (i.e., frequent instances of shared joy and affection), coordination of routine behaviour, and a harmonious flow of communication indicated high MRO. While few behavioural coding schemes have examined complex constructs such as mutuality, coding systems such as the PARCHISY (Deater-Deckard et al., 1997) are said to capture dyadic qualities such as reciprocity and cooperation. Accordingly, these qualities are used to denote dyadic mutuality. In particular, the PARCHISY captures individual parent and child qualities such as parental affect, responsiveness, persistence, and child affect, autonomy, noncompliance and activity. While these coding methods capture global qualities in the parent-child relationship, early research efforts were made to create observational methods that directly captured bidirectional processes. In noting the link between mutuality and children's social competence, Lindsey et al (1997) extended previous methods of capturing mutuality to the balance between initiations between social partners and the mutual compliance to partners' initiations (Lindsey & Mize, 2000). This negotiation of actions could be said to reflect interdependency in that the initiations of one partner are closely aligned with the reactions and responses of the other (Card et al., 2011).

Pointing again to conceptual overlap, synchrony has been labelled as both mutuality (Deater-Deckard & Petrill, 2004) and mutually responsive orientation (Kochanska & Aksan, 2004). Moreover, some behavioural coding schemes such as the PCERA (Clark, 1985) measure mutuality and reciprocity on one combined dyadic scale. Yet, mutuality and reciprocity differ in the way they characterise bidirectional interactive patterns in the dyad. For example, reciprocal interactions assume that the contributions of each partner are equal in frequency and intensity (Trevarthen, 1980); whereas in mutual interactions, both partners' contributions to the interaction may vary both quantitatively and qualitatively (Beebe et al., 2010).

The dyad is said to be an interactional system in which both partners organise its behavioural and affective functioning. Through the mutual coordination of behaviour, communicative signals, and emotional states; changes at one level impact functioning at other levels of the dyadic system; pointing to the involvement of multiple processes. The entanglement of different global constructs emphasises the lack of conceptual clarity in the literature and calls for more research efforts to tease apart which of these concepts are indeed interrelated broad theoretical constructs, and which are best understood as interactive processes that describe the structural and organisational dynamics of parent-child interaction. Among the constructs described, mutuality and reciprocity would appear to be best framed as broader, global metatheoretical concepts than as processes. They provide distinct indications of coregulatory interactive patterns; reciprocity assumes equality in the influence of the parent and child (Trevarthen, 1980), while mutuality incorporates the different quantities and qualities of both partner's contributions to the dyadic system (Beebe et al., 2010). A number of lower-level processes already touched upon above could then be said to underly these constructs and reflect the dynamics of coregulatory processes. Contingency refers to reciprocal adjustments of behaviour and affect within a micro-temporal window. This process is said to facilitate the child's learning and regulation skills (Provenzi et al., 2018). Coordination is said to foster both attunement and mirroring of emotional states within the dyad. Moreover, insights from studies on reciprocity also show that it is important to note that the parent-child dyad can achieve both coordination of emotion/behaviour and coordination of intentions.

1.6 Methodological considerations

1.6.1 Emotion expression in the context of emotional stress

The assessment of regulation has been carried out using different observational paradigms, with the Face-to-Face Still-Face (FFSF; Tronick et al., 1978) procedure being the most commonly used to examine expressive and coping behaviour in infants (Mesman et al., 2009; Provenzi et al., 2016). Other laboratory procedures include The Frustration Task (Melnick & Hinshaw, 2000), non-standardised stranger approach situations (Zimmerman & Stansbury, 2004), fear-eliciting paradigms (Buss & Goldsmith, 1998), and frustration-eliciting tasks (Stifter & Braungart, 1995; Cole et al., 2003). Many of these paradigms are also included in

the Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith et al., 1993); a set of experimental paradigms originally designed to measure children’s overall temperamental tendencies, but that also enables the observation of behavioural strategies children use to cope with distress (Provenzi et al., 2017; Table 1.2). Few studies have used this assessment tool to examine the dynamic and processual aspects of the regulation of distress, particularly contingencies of children’s behavioural strategies and parent-child coregulatory patterns. Two Lab-TAB episodes were of particular interest to the present thesis: “Stranger Approach” and “Impossibly Perfect Circles”. Details of the paradigms are included in Table 1.2 below.

Table 1.2 Overview of experimental tasks used in thesis.

| Lab-TAB episode | Description | Child expressive behaviours | Child coping behaviours |
|-----------------------------------|--|--|---|
| Impossibly Perfect (Blue) Circles | Elicits frustration/anger and perceptions of self-inefficacy through repeated negative feedback about child’s drawing of a circle. The child is instructed to make repeated attempts at drawing the “perfect” circle with no guidelines on how it should be drawn. | Negative emotions (e.g., anger, frustration) | Non-goal-oriented |
| | | | Avoidance-based: Behavioural avoidance, unfocused distraction |
| | | | Cognitive-behavioural: Helplessness (self-resignation) |
| | | | Goal-oriented |
| | | | Approach-based: Help-seeking |
| Stranger Approach | Elicits fear-related stress through an encounter with an unfamiliar adult. | Negative emotions (e.g., fear, anger) | Behavioural inhibition |
| | | Positive emotion (e.g., sociability) | Active and social engagement |

Note: Based on Provenzi et al (2017)

1.6.2 Observing the coregulatory process during parent-child interaction

Another hurdle for research to overcome is how assessment methods can utilise precise units of measurement to capture the dynamics of coregulatory processes. Despite newer conceptualisations of the parent-child relationship as bidirectional, most observational

research has focused on the unidirectional influences of parent behaviour on child outcomes. This is reflected in the predominance of global observation systems in current literature. In global systems of parent-child interaction, each variable is coded according to a scale or rating-point system, based on the frequency and quality of the observed behaviour. In this sense, global systems enable the incorporation of a wide range of content cues to evaluate the meaning and appropriateness of parental behaviour. For example, Global interaction scales of dyadic synchrony such as the SGCS (Skuban, 2006), comprise of qualitative descriptions of the dyad's reciprocity, shared affect, and mutual focus, treating synchrony as a global concept. Parental behaviours are coded explicitly in the context of child behaviours to imply levels of synchrony, but there is no direct measurement of the co-constructed nature of the dyadic interaction. Moreover, global measures may be subject to the "halo effect" where the observer's positive impression of an interaction are driven by certain aspects of synchrony more so than others (Bardack et al., 2017). Finally, global systems are unable to objectively tease apart which specific composites of observed behaviour drive global ratings. Thus, there is a need for methods that can reveal the constellation of interactive behaviours that best characterise coregulation. The literature confirms that dyadic coregulation captures an array of interactive processes such as contingency and coordination. However, though on one hand, the global concepts related to coregulation portray coregulation as a dyadic quality, the conceptual confusion surrounding global constructs and interactive processes means that there is no agreement on the specific behavioural patterns that indicate adaptive or maladaptive coregulation.

One way to measure coregulation involves the use of micro-level systems which code the onset and offset of observed pre-defined behaviours as they occur, and analytical methods that represent the patterns of behaviour. Parental behaviour is initially coded irrespective of the preceding child behaviour, using a predefined set of observable indicators. For example, in the SPAFF (Shapiro & Gottman, 2004), the 'Validation' variable is coded in terms of its various observable indicators such as 'verbal agreement' or 'head nodding/eye contact'. Thus, micro-level systems enable the objective evaluation of latent constructs. Micro-coded analytical methods are predominantly based on statistical approaches, which typically include frequency counts and durations of specific child and parent behaviours, which are subsequently used to assess temporal and structural patterns via statistical modelling (Cox,

1972). Research has suggested that it is important to distinguish between the content of modalities such as body movement, gaze direction, and facial affect (i.e., 'what is assessed'); and the temporal link between social partners' modalities (i.e., onset and offset, sequential relations) (Delaherche et al., 2012). Accordingly, moment-to-moment covariation of emotion over time may provide the basis for the early development of self-regulation through the co-construction of interactions (Gianino & Tronick, 1985; Tronick, 1989; Tronick & Gianino, 1986). Global systems may be helpful in detecting certain qualities of relationships and have been shown to reliably predict developmental outcomes (Aoki et al., 2002; Shmueli-Goetz et al., 2008), yet the growing body of literature informed by DS theory is increasingly evidencing the utility of identifying patterns in the sequencing of behaviours and emotional responding (Granic & Patterson, 2006; Lunkenheimer et al., 2020; Stanger, 2019; Guo et al., 2017; Morris et al., 2018). The adoption of quantitative analytical methods is thus most effective in helping us understand the structure and organisation of parent-child relationships, particularly, as this thesis aims to demonstrate, in the context of child social and emotional maladjustment. For example, the focus on coordination to achieve mutual adaption in the MRO measure (Kochanka, 1997) and the emphasis on balance of initiations of individual parent and child communicative actions in Lindsey et al's (1997) revision of the PARCHISY (Deater-Deckard et al., 1997), could be incorporated into temporal measurements of coregulation, revealing unique insights.

1.6.3 Statistical methods

The theoretical shift towards bidirectional perspectives has led to the increasing use of methods and analytic approaches that can best detect effects. A number of statistical approaches have been recently used in assessing the dynamics of parent-child interactions. Sequential analysis has been argued to be a fine-grained statistical approach that, beyond providing quantitative measures of specific behaviours, can allow us to determine which child behaviours parents are most likely to respond to as well as which parent behaviours children are most likely to respond to. Examination of the precursors and consequences of behaviours means that we can generate hypotheses about why an individual behaves in a particular way and how the changing environmental context can modify that behaviour (Thompson et al., 2000).

Time-series approaches in particular have been suggested to successfully capture both emotion dynamics and bidirectional influences in the parent-child relationship. Modelling techniques such as Multilevel Survival analysis (MSA) (Cox & Oakes, 1984; Singer & Willet, 2003) can be useful in measuring both intra-individual and inter-individual processes (Lougheed et al., 2019). Time-series methods have the advantage of incorporating time more directly and have been utilised to estimate the degree of influence that parent and child have on one another's subsequent emotions and behaviour (Lougheed et al., 2015; Lunkenheimer et al., 2016). Time-stable characteristics that vary between parent-child dyads can also be included as explanatory factors of coregulatory patterns. For example, research has shown that children's biological predispositions (e.g., temperamental traits) play a role in maladaptive interactions, and these vulnerabilities increase tendencies towards early problem behaviour (Maccoby, 2000; Oliver et al., 2014). Aggregate measures of association, such as Pearson's r and analyses of variance (ANOVA), can indicate the extent to which frequencies of two behaviours increase or decrease, or identify subgroups based on interactive patterns and macro/overall changes in parent-child behaviour. However, they cannot incorporate the temporal ordering of behaviours as they unfold over time. Advanced modelling techniques can isolate the effects of one interactive partner on the other, thus accounting for the interdependent dynamics of the dyadic relationship (Lougheed et al., 2019). Reliance on correlational and mean-difference statistical tests can only provide indications of high likelihoods of bidirectional effects but cannot isolate bidirectional effects from differential stability in individual parent and child characteristics. Thus, this thesis incorporates microanalytic measures to index dynamic relational processes with modelling techniques that can situate these processes in the context of child and parent risk factors.

1.7 Emotion coregulation in parent-child relationships: State of the field

Much empirical effort has gone into understanding the development of coregulation during infancy. Children are thought to develop adaptive behavioural strategies to regulate emotional arousal early in infancy through recurrent coregulatory experiences; gradually moving from relying on external regulation to acquiring the ability to self-regulate (Beeghly & Tronick, 2011; Bornstein & Manian, 2013). For example, the early studies of Feldman (2003) and Tronick & Gianino (1986) showed that mother-infant coordination was inversely related

to infant displays of negative emotion and positively related to displays of positive emotion during interactions, providing early indication of the importance of coregulation for emotional development. Maladaptive emotion regulation can be seen as intense emotional experiences or socially unacceptable emotional displays; and has been related to both internalising and externalising problems (Southam-Gerow & Kendall, 2002). These regulatory experiences often involve displays of emotional distress and enduring expressions of emotions such as anger, fear, and sadness (Gilliom et al., 2002; Buss & Kiel, 2011; Compas et al., 2014). Parents teach children about emotions both explicitly and implicitly through a range of direct (e.g., instruction) and indirect (e.g., modelling) strategies during day-to-day interactions (Chaplin et al., 2010; Kopp, 1989; Morris et al., 2007). Parent-infant interaction studies have also pointed to the importance of dyads being able to flexibly transition between positive and negative emotional states (Beebe & Lachmann, 1998); thus, conceptualising emotion dysregulation as also comprising states of rigidity wherein one remains 'stuck' in one emotional state (Cole et al., 1994; Siegel, 2001). Research has also demonstrated that individuals who have the ability to activate positive emotions during negative experiences, have more resilience in the face of adversity (Fredrickson et al., 2003). Over time, children begin to internalise the ability to regulate their emotions independently through these interactions (Fogel, 1993; Kopp, 1989). While children's self-regulation capacities become more sophisticated with age, coregulation continues well into childhood and adolescence, fostering the formation and maintenance of close relationships (Campos et al., 2011; Fogel, 1993). Thus, parent-child interaction serves as a key context in which researchers can examine children's emotion regulation tendencies and the dyadic emotional processes involved in shaping children's daily emotional experiences. Despite these interesting links between coregulation and social and emotional outcomes in early childhood, we are yet to fully understand the function of coregulation in school-aged children, and particularly in high-risk children. While the literature is yet to agree on the operationalisation of coregulation, in order to facilitate the empirical examination of the dynamics of coregulation, this thesis refers to dyadic coregulation as the contingent coordination of moment-to-moment emotion and behaviour.

1.7.1 Coregulation and socialisation

Coregulation in the parent-child dyad is said to comprise the co-construction of socialisation goals such as taking turns, sharing, and cooperating to reach a collective goal (Hadwin & Oshige, 2011). In supportive (or positive) emotion coregulation, parents are considered to respond positively to their child's positive emotional expressions and respond positively or neutrally to their child's negative emotional expressions (Salonen et al., 2005). This may be reflected in the parent's ability to discuss emotions in a way that validates the child's emotional experiences and help their child learn appropriate emotion regulation strategies (Gottman et al., 1996). Accordingly, Neumann et al (2010) pointed to links between supportive coregulation, prosocial behaviour and resilience in children. In unsupportive (or negative) emotion coregulation, parenting behaviours are predominantly invalidating and dismissive in response to children's emotional expressions, disrupting the development of their child's regulatory ability. Unsupportive coregulation has been associated with emotion regulation difficulties and lack of social competence in children (Eisenberg et al., 1996, Gottman et al., 1996). Findings from Lunkenheimer et al (2007) revealed associations between parent's unsupportive emotional responding and child emotion dysregulation and between parent's unsupportive emotional responding and teacher- and parent-reported internalising and externalising problems. The salience of coregulation in children's daily interactions with their parents and nonfamilial others thus highlights coregulation as a key feature of children's socioemotional development (Cole et al., 2004).

Research has supported the notion that the parent-child dyad is an interdependent emotional system (Cox & Paley, 2003). An early study by Eisenberg et al (1999) found that children's emotion regulation strategies at 6-8 years predicted maternal behaviour at ages 8 to 10, which in turn predicted children's emotion regulation at ages 10 to 12. This points to the bidirectional influences between child emotion regulation and maternal emotion socialisation. Therefore, parent and child emotional states are a function of their own internal emotional experiences and each other's, through mutual interpersonal processes (Butler, 2011). So, just as parent's reactions to their child's emotions have the potential to influence how children internalise self-regulatory behaviour, children's reactions to parental emotional behaviour (as well as the child characteristics that foster children's emotional tendencies), may in turn influence parental attitudes to child emotion (Greene & Ablon, 2003; Lengua, 2006, Verhoeven et al., 2010). Even more, as parent-child interaction patterns stabilise from

early childhood to middle childhood, patterns of unsupportive coregulation may enhance children's susceptibilities to emotional and behavioural problems (Verhoeven et al., 2010). For example, a child prone to negative emotionality and difficulty managing their own and responding appropriately to others' emotions may elicit harsher responses from their parents than a child who is more adept at managing their emotions during challenging interpersonal situations (Eisenberg et al., 2008; Yap et al., 2008). This further asserts the bidirectional nature of coregulation; reaffirming the central role of the mutual adjustment of emotional expressions and behaviour in the modulation and regulation of emotional experiences during interpersonal interactions (Campos et al., 2011; Fogel & Garvey, 2007).

From the age of 3, children increasingly develop the capacity to describe their own and others' emotions, as well as articulating the causes and consequences of emotions and mobilise them to achieve goals (Bretherton et al., 1986). This makes early childhood a key period for examination as children develop the ability to alter their emotional state in response to parent behaviour (Tronick, 2007). Accordingly, early cross-sectional research demonstrated that well-regulated (i.e., responsive) parent-child interactions are associated with lower levels of problem behaviour in early childhood (Harrist et al., 1994; Mize & Petit, 1997). Longitudinal studies in middle childhood have also pointed to predictive relationships between mothers' positive and responsive (i.e., temporally coordinated) behaviours and reductions in externalising problems in children from age 5 to 7 (Cole et al., 2003). Therefore, evidence points to the adaptive function of coregulatory constructs such as mutuality and temporal coordination in children's behavioural adjustment across both small and larger time units.

1.7.2 Parent-child coregulation and children's adjustment problems

Research has noted that both over-control and under-control of negative emotions can be maladaptive. Fox and Calkins (2003) argued that the ability to co-activate positive and negative emotions may be a source of resilience, preventing the need for excessive attempts to suppress negative emotions when they are elicited. This facilitates the child's understanding of internal feelings of distress that provide important information about their current state and the environment. The degree to which the child is exposed to the expression of positive emotions in the face of negative events in their caregiving environments then, may be crucial in developing this capacity. A family's expression of

positive emotions during negative events could be particularly important at the start of middle childhood as this is the time strategies for distress regulation become refined and stabilise. Gottman's (2001) notion of 'emotion coaching' suggests that parents who do not ignore or dismiss a child's distress, but treat negative experiences as opportunities to develop intimacy, and actively communicate empathy, help their child learn to confront distressing or challenging experiences with a sense of control and positivity. They actively model the process of mobilising positive emotion as an adaptive emotional and behavioural response to regulate stress. This also coincides with Cumberland-Li et al's (2003) findings wherein maternal expression of positive emotion mediated the association between maternal negative emotionality and children's emotional adjustment.

Tronick's (1989) early notions of parent-infant coregulation posited that consistent shifts from maladaptive social exchanges towards mutually adaptive interaction is fundamental in children's internalisation of perceptions of the world as a safe place and their caregiver as emotionally available, fostering a sense of agency in being able to manage distressing emotional experiences. In contrast, children were considered to be at risk of internalising problems such as low self-esteem and hopelessness when they were in dyads that struggled to resolve negative emotional experiences or had limited opportunities to practice adaptive ways of resolving conflict (Biringen et al., 1997; Tronick, 1989). These children are said to develop expectations of interactive partners being unresponsive to their signals and emotionally unavailable. Again, these interactional experiences increasingly become key contexts in which we can observe children's active internalisation of self-regulatory abilities as children move through childhood and their cognitive and attentional skills become more refined (Kochanska et al., 2001), emphasising the importance of understanding these processes during this developmental period.

The parent-child relationship has been suggested to play a role in the emergence and maintenance of externalising difficulties (Granic & Lamey, 2002; Hollenstein et al., 2004; Verhoeven et al., 2010). Externalising behaviours are said to be typically exhibited during interpersonal conflicts with parents; with externalising children displaying persistent negative affect and less likely to engage in active problem-solving (Granic & Lamey, 2002). Research has further shown that when working together to solve a challenging task, parent-child dyads

with externalising children tend to persevere within a limited range of expressed emotions (Lunkenheimer et al., 2011). Together this suggests that problem behaviour likely emerges from and become stabilised within the context of inadequate socialisation experiences during childhood; these experiences may then foster conflict in and disruption of children's extra-dyadic interactions (i.e., peer relationships or interactions with teachers). Research has also linked children's internalising problems to dysfunctional interactions. In particular, internalising symptoms have been found to be associated with high levels of parental rejection and overcontrol (Hudson & Rapee, 2001; Letcher et al., 2009). Reduced emotional flexibility during mother-adolescent dyadic conflict has also been reported to predict symptoms of anxiety and depression 5 years later (Van der Giessen et al., 2015). Thus, common to these adjustment difficulties appears to be regulatory dysfunction facilitated by rigid responses to environmental changes and a tendency to persevere in one state (i.e., remain 'stuck'). Over time, these dysfunctional interactions become stable patterns that have the potential to translate in specific child problems.

1.7.3 Fostering children's socioemotional functioning through coregulation

The development of self-regulation skills aids children's coping with interpersonal and environmental stress. The parent-child relationship is the first and primary context in which children learn how to cope with stress and coregulate negative emotions. Parent's supportive coregulation during distress involves fostering acceptance of and coping with negative emotion through appropriate guidance (Eisenberg et al., 2008). The Everyday Stress Resilience model by DiCorcia and Tronick (2013) posits that disruptions or microstressors in mother-child interactions provide dyads with the opportunity to develop 'regulatory resilience'. This resilience represents the dyad's capacity to effectively manage and regulate negative or difficult experiences through resolving conflict. Within a developmental context, this supports the child's own ability to deal with difficult experiences and successfully regulate occurrences in interactions outside of the parent-child relationship (Beeghly & Tronick, 2011).

Research has found that parent's negative affective responses to child negative affect (i.e., reciprocation of negativity) are linked to children's impaired emotion regulation, negative social outcomes (i.e., low peer acceptance), and misbehaviour (Schultz et al., 2001). Thus,

children exposed to repetitive patterns of reciprocated negativity may internalise maladaptive models of conflict resolution, which may in turn lead to more aggressive or socially unacceptable behaviours in other social contexts (Dodge et al., 2006). Kahen et al (1994) suggested that these patterns of reciprocated negativity become a stable 'absorbing state', resistant to change.

Parent's supportive coregulatory behaviour is also said to involve responding to the child's goals and autonomous behaviours in a supportive manner (Salonen et al., 2007). Bowlby earlier suggested that children's motivational orientations comprise of their autonomous exploration, curiosity and mastery; and that healthy parent-child attachment fosters children's novelty seeking tendencies (Bowlby et al., 1989). This closely maps onto socialisation practices such as autonomy-supportive parenting. Autonomy-supportive parenting seeks to promote children's participation in decision making and independent problem-solving (Grolnick & Ryan, 1989). Parents who engage in such behaviours, encourage self-initiation, yet still actively participate in the socialisation process by helping their child express their own views and achieve their own goals (Grolnick & Apostoleris, 2002). Erikson (1963) importantly noted that guidance of autonomy contributes to the child's capacity for autonomous behaviour, whereas parent's overcontrol likely restricts children's autonomy.

Parental overcontrol may function as an unsupportive coregulatory behaviour, wherein parents exert control in a manner that intrusively restricts/limits the child's autonomy (Grolnick & Pomerantz, 2009; Grusec & Davidov, 2007). Intrusion into the child's decision-making and inhibition of the child's motivation to face or solve problems, are prominent manifestations of overcontrol (Bögels & Brechman-Toussaint, 2006; Borelli et al., 2014). This hindrance of independence in developmentally appropriate contexts, may result in children exerting autonomy indiscriminately or impulsively; further reducing opportunities to develop adaptive internal systems of regulation. This in turn provides children with little incentive to engage in positive social behaviours in situations where parents do not monitor them, such as with peers (Miller et al., 2018) and may foster negative social and emotional outcomes.

Guidance and facilitative behaviours that support children's social adaptation are said to contribute to the child's growing repertoire of regulatory strategies (Sigel et al., 1993). Landry et al (2000) demonstrated that parents' autonomy-supporting behaviours with their 2- and

3.5-year-old children, such as providing choice on a task, was associated with increased task persistence at 4.5 years. Moreover, Supplee et al (2004) found that mothers' instructive and open-ended teaching questions at 3.5 years, predicted better emotion regulation at ages 6-7. Still, as discussed earlier, child characteristics may elicit different responses from parents. Eisenberg et al (2010) found that children's self-regulation at 2.5 years predicted later maternal teaching strategies, however the reverse was not found. This not only supports the notion of child development as a bidirectional process, but also highlights the need for further research on the relationship between maternal teaching/autonomy- supportive behaviours and children's regulatory skills. Particularly, further research is needed to ascertain what emotion regulation tendencies (or coping strategies) in school-aged children might be facilitated by coregulatory patterns of maternal autonomy support or overcontrol and child autonomy.

Research has also shown that in well-functioning dyads, mothers regulate their use of directives (instructional behaviours) according to their child's moment-to-moment (real-time) social adaptiveness, demonstrating an accommodation to the child's developing skills. Yet, mothers of children with emotional and behavioural problems show a tendency towards withdrawing less control over time, indiscriminately engaging in over-directive and intrusive behaviours, denoting an overcontrolling parenting style (Brophy & Dunn, 2002; Pomerantz & Eaton, 2001). Further, children displaying non-task-oriented behaviour such as task-avoidance or non-cooperativeness, have been found to receive more exaggerated parental control strategies than more goal- or task-oriented children who are high in autonomy and task persistence. This indicates that socio-emotionally vulnerable children and those low in goal-orientation differ from more emotionally resilient children with task-oriented tendencies in terms of history of parental control and support of autonomy (Skinner & Edge, 2002).

DS researchers have also highlighted the utility of a dynamic and nonlinear approach to child autonomy and parental autonomy support. Within dyads with emotionally dysregulated children, bidirectional relationships were found between children's task-orientation and parental responding such that, higher levels of non-task-orientation were associated with a higher likelihood of parents responding in autonomy-limiting or emotionally controlling ways, and vice versa (Hollenstein et al., 2004). Lunkenheimer et al (2013) also found that mothers'

temporally contingent autonomy support was associated with reductions in mothers' self-reported harsh parenting over time. Importantly rather than the overall amount of autonomy support, the dynamic coordination of autonomy support with children's positive autonomous behaviour, predicted lower behaviour problems and reductions in harsh parenting. This further indicates that dynamic aspects of parent-child relationship may play a critical and unique role in children's developing regulatory skills and the development of psychological dysfunction. Still, the dynamic and nonlinear nature of these behavioural strategies is not yet fully understood in early childhood, and even less understood in children with emerging adjustment difficulties that place them at high risk of future neurodevelopmental disorders.

1.8 Factors influencing coregulation

1.8.1 The overlap between self-regulation and motivation

Research has pointed to the interactive contributions of children's self-regulation and motivation orientation to child psychopathology. Effortful control, in the context of notions of emotional reactivity inherent in theories of temperament (Eisenberg et al., 2004; Nigg, 2000, 2006; Rothbart, 2004; Valiente et al., 2003), appears to be interlinked with children's motivational systems. Child persistence, beliefs about self-efficacy, interest and goal orientation have been associated with the ability to initiate and sustain goal-directed activity (Schunk, 2008). Accordingly, theoretical paradigms have implicated approach-avoidance motivation in the development of child psychopathology. Gray's (1991) neurobiological framework of personality in particular, suggested two motivational systems; a behavioural approach system (BAS), considered to be responsible for sensitivity to reward cues (facilitating reward-seeking and approach-oriented behaviour), and a behavioural inhibition (or avoidance) system (BIS), responsible for sensitivity to threat or nonreward cues (facilitating suppression or avoidance). Research has pointed to role of these systems in children's emotional responding and developmental outcomes. For example, Pekrun et al (2009) showed that expressions of anger, anxiety, helplessness and shame mediated the negative association between children's performance-avoidance goals and poor academic achievement.

Gray's motivation systems closely align with the incentive-response systems proposed by models of temperament and emotion which stipulate that these approach-avoidance tendencies reflect involuntary reactions that stem from distinct neural systems (Beauchaine, 2001; Beauchaine et al., 2009; Nigg, 2000). Inherent in both reactive undercontrol of (or overactivity in) the approach system and reactive overcontrol of (or overactivity in) the avoidance system, is poor effortful control. Therefore, children's effortful control capacities appear critical for controlling impulsive inappropriate approach tendencies (i.e., inappropriate reward-seeking, and aggression) and overriding impulses for avoidance (i.e., emotion suppression) (Carver et al (2008). Taken together, children's effortful control, approach and avoidance systems and the connections between them, appear key in our understanding of the social and emotional adjustment difficulties that map onto different neurodevelopmental disorders. What remains to be seen is whether these interactive effects can be revealed on a micromomentary level (i.e., over the course of seconds); by indexing the moment-to-moment influence of children's effortful control on a temporal level we might be able to more directly assess bidirectional influences between child characteristics and both parent and child emotional responding. Research is also yet to address how these tendencies may influence the adaptiveness of coregulatory patterns during parent-child interaction.

1.8.2 Parental psychopathology

As mentioned earlier, the parent-child dyadic system is continuously shaped by the contributions and interplay of both parent and child characteristics, accordingly, research has investigated the ways in which mothers' psychological difficulties impede or disrupt coregulatory patterns during parent-child interactions. Much of this research has focused on mothers' emotional difficulties such as symptoms of anxiety and depression. While research has begun to examine links between maternal psychopathology and micro-level interactive processes, this research is still in its infancy. Lougheed and Hollenstein (2016) found associations between reduced emotional variability (flexibility) and maternal internalising symptoms. Dix and Meunier (2009) suggested that these dysfunctional interactive patterns were related to difficulties in selecting appropriate emotional responses, associated with internalising problems. Tronick and Reck (2009) found longer displays of emotional mismatch (e.g., lower reciprocations of children's positive emotion) between depressed mothers and

their infants, and fewer instances of shifts back into shared positivity. Findings from Reck et al (2004) also pointed to reduced capacities of depressed mothers to effectively respond to children's needs, showing that parents' own difficulties in managing negative emotions may impede their ability to model effective ways of coping with distress to their children.

Research has also evidenced associations between parental anxiety and parenting behaviours during parent-child interactions. Van Bommel et al (2018) found that in comparison to low internalising mothers, mothers high in internalising problems generally expressed fewer negative emotions. While they also found no differences in reciprocated negativity between low internalising and high internalising mothers, they also found that adolescents with low internalising mothers were more likely to reciprocate their mothers' positivity in comparison to adolescents with high internalising mothers, pointing to low receptiveness and attunement in such dyads. As Cisler et al (2010) suggest, when faced with conflict, anxious parents may have insufficient resources and skills to negotiate alternative ways of responding which inhibits the emotional flexibility of their interactions. Dyads with both anxious mothers and anxious children may also experience reciprocal exchanges that escalate or heighten the experience of emotions, making it difficult for them to return to an optimal level of emotional functioning, thus causing them to "get stuck" in dyadic states (Butler & Randall, 2013).

1.8.3 Parenting cognitions

Research has shown that parental emotion-related characteristics such as attitudes towards emotions and emotion regulation tendencies are associated with engagement in socialisation behaviours to manage emotional experiences during interactions with their children. For example, parents with positive attitudes towards emotions, and who are accepting of emotional expressions, acknowledge and support their children's emotional experiences. They are able to actively help their child resolve negative emotions and maintain positivity, seeing such situations as opportunities for mastery and the child to act independently. Emotionally dismissive parents tend to minimise emotions, placing little to no value on healthy expressions of emotion, and may even punish or minimise their child's expressivity (Chaplin et al., 2010; Fabes et al., 2001; Eisenberg et al., 1996; Gottman et al, 1996; Lunkenheimer et al., 2007; McElwain et al., 2007; Morris et al., 2007; Morris et al., 2011; Shipman et al., 2007).

These attitudes and beliefs may also stem from parents' own attachment histories, feeding into their attachment styles and thus attachment behaviours with their children through the formation of mental models of relationships. The notion of relational schemas originated from Bowlby's internal working model of attachment (Bowlby, 1982). A parent's or caregiver's set of implicit beliefs and attitudes (i.e., cognitions) about the child and the parent-child relationship guide their actions and responses to interpersonal events, and particularly, their emotional responding during interactions with their children (Hayes et al., 2001). Underlying this conception of relational schemata is the notion that we each have a blueprint for our expectations in relationships; they include beliefs about one's self within the context of the relationship and help us negotiate everyday interactions with our social partners (Koerner & Fitzpatrick, 2002; Honeycutt & Cantrill, 2001). They also enable us to evaluate our own and others' feelings and communicative behaviours within this relational context. Thus, it is likely these mental (internal) representations also play a key role in the dynamics of parent-child coregulation. Whilst being a macro-level concept, the incorporation of relational schemas into the study of coregulation may move the field forward in terms of bridging the gap between macro- and micro-analytical concepts. These interconnections at the methodological level may also form the basis for future investigation into emotion dynamics and the developmental trajectory of emotional and behavioural difficulties.

1.9 Concluding remarks, study sample and thesis aims

The processes by which parent and child mutually influence one another's emotions and behaviour have been operationalised in a number of ways in the child development literature, and different terminologies have been used interchangeably. Yet, this literature review has shown that many of these constructs point to a coregulating (or mutually regulating) dyadic system. The term parent-child coregulation depicts the parent-child relationship as a dynamic mutually regulating system that self-organises into stable patterns over time. A better understanding of parent-child coregulatory processes in early childhood has the potential to uncover targets for early intervention for child emotional and behavioural difficulties, moving the field forward. A focus on dynamic coregulatory patterns in high-risk populations provides new avenues for refining theoretical models and clinical practice. The use of micro-level analytical methods also facilitates the identification of unique areas of disruption to or

maladaptiveness of coregulatory processes which may direct clinical efforts, particularly if they can be used to chart specific interactive profiles that map onto risk of specific psychological difficulties. While the tools to evaluate micro-level observations of parent-child interactions may not be able to be directly integrated in clinical practice, such information may instead serve to elucidate specific observable behaviours or patterns that can be identified during clinical assessments and used as mechanisms of change for interventions.

1.9.1 Overview of sample

Children's emotional (i.e., internalising) and externalising (i.e., behavioural) difficulties have been highlighted as early emerging symptoms of neurodevelopmental disorders (Poulou, 2015), having implications for children's social and psychological functioning, as well as academic performance. Yet, such children often do not receive the support they need (Chavira et al., 2004; Dvorsky et al., 2014), and their mental health needs may not be recognised until after symptoms have intensified. Over the course of development, these symptoms become deeply entrenched and more resistant to intervention efforts, suggesting the need for early examination of these difficulties (Dvorsky et al., 2014). Based on categorical conceptualisations of psychopathology, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) is the most widely accepted standard criteria for the classification of neurodevelopmental disorders (American Psychiatric Association, 2013). Yet, it relies on behavioural symptoms that emerge later in childhood to diagnosis neurodevelopmental problems (Sheldrick et al., 2015). Comorbidity between neurodevelopmental problems also points to heterogeneity within DSM classifications (Hudziak et al., 2007; Nock et al., 2006) as multiple diagnoses have overlapping symptoms. For example, research has evidenced comorbidity between anxiety disorders and attention deficit hyperactivity disorder, and between depression and disruptive disorders (Angold et al., 1999; Axelson & Birmaher, 2001; Biederman et al., 1996; Costello et al., 2003). These limitations have led to the adoption of new translational approaches to examining early signs of neurodevelopmental disorders, such as the National Institute of Mental Health (NIMH) Research Domain Criteria framework (RDoC) (Casey et al., 2014).

Central to the RDoC is the conceptualisation of psychopathology in terms of dysfunction in particular transdiagnostic systems and processes involved in children's development (Cuthbert & Insel, 2013) (e.g., poor regulation or modulation of negative emotions). Impairments in emotion regulation have been implicated in the development of both internalising and externalising difficulties, including anxiety, depression, and ADHD (Boschloo et al., 2015; Eisenberg et al., 2000; Gilliom & Shaw, 2004; Hicks & Patrick, 2006; Wernicke et al., 2019). Central domains with the RDoC include transdiagnostic processes and mechanisms said to underlie different neurodevelopmental problems: negative valence systems (i.e., processes involved in responses to aversive stimuli), positive valence systems (i.e., processes involved in responses to rewards); cognitive systems and systems for social processes (i.e., processes involved in constructing representations of the external environment and interpretations of others' psychological states), arousal/regulatory systems, and sensorimotor systems (Insel et al., 2010; Cuthbert, 2014). Psychological difficulties can arise from constructs across multiple domains (i.e., cognition, motivation, and social behaviour) (Shankman & Gorka, 2015). For example, impairment in the socio-cognitive and emotional processes may be implicated in children's abilities to select appropriate responses to emotion-eliciting situations (e.g., fear- and anger-provoking situations) or positive and negative valence systems may be implicated in children's approach-avoidance motivational tendencies (Gray, 1991). Further, these risk processes can differ as a function of environment (i.e., social context) (Kendler et al., 2008). Consistent with this perspective, this thesis focuses on social processes and regulatory systems in the context of the parent-child relationship.

The Neurodevelopment Assessment Unit (NDAU)

The present thesis is part of a wider research project by the Neurodevelopment Assessment Unit (NDAU) at Cardiff University. Targeting primary school-aged children in South Wales reported to be experiencing emotional and behavioural difficulties, the NDAU aims to, (1) collect broad assessment data on primary school-aged children with diverse developmental problems that will enable us to understand the overlapping cognitive and socioemotional bases of different profiles of children with neurodevelopmental problems, and (2) use this key information give advice to teachers to facilitate effective strategies that can be put in place to support the child in school, and inform intervention efforts. Children are referred by

their classroom teacher or Special Education Needs Coordinator (SENCo) involved in the child’s support network at school. This referral process involved the child’s teacher or SENCo reporting on the child’s emotional and behavioural difficulties in the last 6 months using the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). A schematic of the referral process can be found in Appendix 4. Following referral, children and their parents were invited to the NDAU to take part in two assessment sessions across two days (approximately 3 and 2 hours respectively). During each session, children completed a battery of computerised and non-computerised tasks designed to measure dimensions of children’s cognitive, social, and emotional abilities. Parents also completed a number of questionnaires and interviews assessing their child’s psychological functioning over the last 6 months, and the quality of the parent-child relationship. Table A5.1 details the tasks completed in each session (Appendix 5). From October 2017 to January 2020, 281 children (aged 4-9) were referred by their schools (through classroom teachers and other professionals, including Special Education Needs Coordinators) and completed all assessment sessions in the NDAU accompanied by their parents/carers. A subsample of the NDAU study (N = 107) was used for the empirical study detailed in this chapter and the studies detailed in chapters 3 and 4.

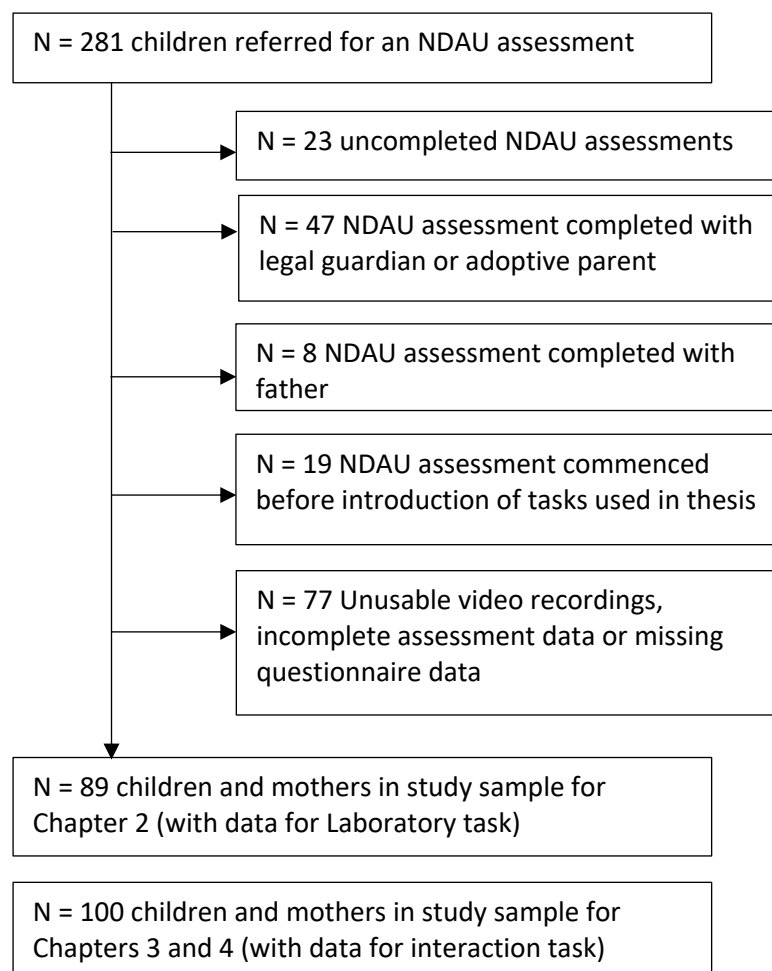


Figure 1.4 Derivation of samples used in Chapters 2, 3 and 4 of this thesis.

Table 1.3 Demographic information for study samples in Chapter 2 and Chapters 3 and 4.

| | Sample for Chapter 2 (N = 89) | Sample for Chapters 3 and 4 (N = 100) |
|--|----------------------------------|--|
| Child age (mean) | 74 months (range = 51-117) | 75 months (range = 51-117) |
| Child gender (%) | 28% girls | 29% girls |
| Household income | | |
| Below £20,000 (%) | 40 | 47 |
| WIMD | | |
| High deprivation | 65 | 65 |
| Maternal education (%) | | |
| No formal education | 13 | 14 |
| O-levels or GCSE | 39 | 41 |
| A-level/higher education | 14 | 20 |
| University degree | 21 | 19 |
| Postgraduate degree | 13 | 7 |
| Ethnicity (%) | | |
| White British | 83 | 84 |
| Other European | 4 | 1 |
| Asian | 7 | 9 |
| Afro-Caribbean | 4 | 3 |
| Multi-ethnic/other | 2 | 3 |
| Child receiving extra school support for SEN (Special Educational Needs) (%) | 52 | 48 |
| CAMHS involvement (%) | 13 | 14 |
| Social Services involvement (%) | 21 | 18 |

Note. WIMD: Welsh Index of Multiple deprivation. High deprivation: % in top 2 most deprived categories by decile.

1.9.2 Thesis aims

The overall aim of this thesis is to explore self-regulatory and coregulatory patterns of emotional responding in a sample of children experiencing emotional and behavioural difficulties and their mothers.

The thesis is split into 4 specific aims covered in Chapter 2, Chapter 3, and Chapter 4:

1. The first aim, addressed in all three chapters, is to ascertain whether micro-analytical methods can successfully capture the dynamics of emotion and the regulation of emotion.
2. The second aim addressed, in Chapter 2, is to examine patterns of emotional responding, specifically, the temporal contingencies between children's emotional experiences and regulatory responses to a frustrative nonreward task. It is expected that the timing of children's displays of negative emotion will be associated with their moment-to-moment use of regulatory strategies. Child emotional and behavioural difficulties, inhibitory control, effortful control, and maternal symptoms of anxiety and depression are also expected to influence the timing of children's negative emotion displays.
3. Chapter 3 addresses the third aim of the thesis: to index the dynamics of socialisation practices in terms of temporal patterns of coordination and contingency between mother and child, thus ascertaining whether it is the interdependency with child emotion that makes these practices adaptive. It is expected that mother's supportive and unsupportive coregulatory behaviours will be temporally contingent with children's positive and negative emotion displays and will have distinct influences on the resolution and enhancement of these emotion displays. Child and mother characteristics are also expected to influence these coregulation patterns.
4. The fourth aim, addressed in Chapter 4, is to investigate the relationship between broad meta-theoretical constructs of attachment and dynamic coregulatory

processes. Focusing specifically on maternal narrative coherence (i.e., mental representations of the child and parent-child relationship), it is expected that increased recurrence of mothers' supportive coregulatory behaviour and decreased recurrence of mothers' unsupportive coregulatory behaviour will be facilitated by higher levels of narrative coherence. It is also expected that contingencies between mothers' supportive coregulatory behaviour and increased recurrence of children's positive emotion displays (and decreased recurrence of children's negative emotion displays) will be found in dyads with more coherent mothers. Child effortful control, autonomous motivation, emotional and behavioural difficulties and maternal symptoms of anxiety and depression are also expected to have interactive effects with narrative coherence in predicting coregulation patterns.

Chapter 2
The role of timing in children's regulation
of emotional stress

2.1 Abstract

Objectives. Emotion regulation is considered to be a critical developmental skill in early childhood, having implications for child adjustment, social functioning and academic attainment. Yet how children's regulatory behaviour influences the temporal dynamics (i.e., latency and timing) of their emotional expressions is not fully known. This study examined the dynamics of displays of negative emotion (i.e., anger, frustration) in 100 children (28% female, mean age = 74 months) during a frustrative nonreward task from the Lab-TAB battery (Goldsmith et al., 1993). **Method.** Multilevel Survival Analysis (MSA) was applied to observational data of child emotion and behaviour to predict the timing of recurring expressions of frustration/anger, examining the effect of risk factors for negative emotionality (i.e., child emotional and behavioural difficulties, inhibitory control, effortful control and maternal psychopathology), and the effect of children's regulatory behaviour (i.e., behavioural avoidance, unfocused distraction, self-resignation, and goal-orientation). **Results.** This study found that children's externalising difficulties and maternal depressive symptoms were associated with quicker and recurrent displays of negative emotion. Children's use of avoidance-based regulatory strategies (i.e., behavioural avoidance), led to decreased recurrence of negative emotion, while self-resignation led to increased recurrence of negative emotion. Interactive effects with children's emotional and behavioural problems pointed to patterns of emotional responding which were suggestive of a reliance on avoidance-based behaviours to downregulate negative emotion. **Conclusions.** In situations where more goal-related behaviour is required to help children persist in the face of negative feedback, children with behavioural problems generally display higher levels of frustration and anger over time, and children at higher levels of both emotional and behavioural difficulties use avoidance-based strategies to cope with emotional stress.

Keywords: emotion regulation, survival analysis, dynamic systems.

2.2 Introduction

Chapter overview

This chapter has three goals. First, conceptualisations of emotion and emotion regulation in the field of developmental psychology are summarised. Second, the dynamic systems approach to emotion development is explored, highlighting how this framework informs contemporary methods of assessing emotion and behaviour in real-time. Lastly, this chapter will examine the dynamic influence of children's regulatory behaviour on their negative emotion displays during an emotionally challenging laboratory task. In doing so, this study illustrates how micro-analytical methods can successfully capture the dynamics of emotion and the regulation of emotion in school-aged children and extends the current literature on emotion regulation processes in children with emotion and behavioural difficulties.

Literature review

The development of emotion regulation

The regulation of emotion, attention and behaviour is thought to play a key role in the development of child psychopathology. Decades of research efforts have explored the multidimensional nature of self-regulation in early life, distinguishing between activating emotions in response to stimuli (Eisenberg et al., 1996) and regulation abilities involving conscious effort and activation of executive functioning skills (Nigg & Casey, 2005). Emotion regulation is defined as the ability to control or modulate one's emotional state in accordance with environmental demands or the social context in which an emotional response is triggered (Eisenberg et al., 2011). This definition can also be extended to include the modulation of one's emotional state to achieve social adaptation or individual goals (Eisenberg & Spinrad, 2004). In the face of a challenging or distressing situation, one might adopt strategies to resolve negative emotional experiences that involve reducing the intensity of the emotion or expressing the emotion in a manner that is appropriate for the environmental context or that enables goal attainment.

Emotion regulation is considered to be a critical developmental skill in early childhood. Particularly in contexts outside of the parent-child relationship, such as when children start school and have to manage their emotions and behaviour independently; children must learn to cope adaptively in situations eliciting negative emotional arousal and control impulsive responses that may lead to peer conflicts. As such, emotion regulation has been reported to play a key role in social, emotional and behavioural outcomes in both typically developing children and those at early risk of neurodevelopmental problems (Baker et al., 2007; Cole et al, 2004; Bunford et al., 2016). Specifically, emotion dysregulation has been implicated in a number of early emotional and behavioural problems, including internalising (i.e., anxiety and withdrawal) and externalising behaviour problems (i.e., defiance, aggression and disruptiveness) (Crundwell, 2005).

Emotional regulation and neurodevelopmental disorders

Appropriate expression of emotion has been highlighted as a key aspect of emotion regulation (Saarni & Crowley, 1990; Thompson, 1994). Differences in children's emotional experiences and responses to emotion-eliciting situations has been explored in children with neurodevelopmental disorders. In situations eliciting responses such as frustration or anger, typically developing preschool children are able to flexibly use a range of regulatory strategies, including self-distraction, help-seeking, comfort-seeking, venting, and goal-directed problem solving (Diener & Mangelsdorf, 1999). In contrast, children with neurodevelopmental disorders such as ADHD and autism have been shown to have a limited repertoire of strategies for coping with distress and challenging situations (England-Mason, 2020).

Young children with ASD are considered to exhibit difficulties in effortful control (i.e., attentional control and inhibiting impulses) (Samyn et al., 2011), which is considered to facilitate children's internal self-monitoring and flexibility in activating appropriate strategies for managing emotion and behaviour (Jahromi & Stifter, 2008; Kopp, 1982; Mathews & Wells, 1999). Jahromi et al (2012) compared negative emotionality, low persistence (i.e., self-resignation) and emotion regulation in high-functioning pre-school children with ASD and their typically developing peers. They found that while there were no differences in displays

of facial/bodily expressions of negative emotionality, children with ASD displayed more intense and longer durations of resignation. Thus, while the children with ASD were able to activate the inhibitory control processes needed to suppress negative reactivity, they demonstrated an impaired ability to flexibly adapt their emotional responses and activate continued persistence (Hill, 2004). In the context of early theories of motivational goals, these findings may reflect potential differences in approach-motivation. Koegel and Mentis (1985) earlier suggested that repeated experiences of failure may lead to low motivation, particularly when faced with tasks involving consistent negative feedback. Thus, while resignation may not be favourable for goal-completion for typically developing children and be ineffective in maintaining reduced negativity, it may be used as a way of coping with negative internal experiences for less goal-motivated children.

Emotion regulation deficits have also been observed in children with ADHD, with studies reporting high emotional reactivity and lability, and reduced attentional control (Graziano & Garcia, 2016). Emotion regulation deficits have also been shown to be highly persistent in children with ADHD, with longitudinal studies reporting associations between emotion regulation deficits and persistence in ADHD symptoms (Biederman et al., 2012). Further, Brocki et al (2019) recently found that maladaptive emotion regulation was predictive of a rise in inattention, while adaptive emotion regulation predicted a decrease in inattention from preschool to adolescence. These studies demonstrate that poor emotion regulation skills are prevalent in children with neurodevelopmental disorders and these deficits may be linked to individual differences in children's effortful control capacities and motivation orientation.

Expanding conceptualisations of emotion regulation

Dysregulated children are considered to be at an increased risk of a range of child adjustment problems such as disruptiveness, poor social functioning and low academic attainment (Calkins & Mackler, 2011). Accordingly, research has demonstrated associations between inefficient self-regulation such as low effortful control, regulatory behaviour, and socioemotional functioning. While well-regulated children who are high in effortful control are able to flexibly adapt their regulation strategies in response to emotion-eliciting events,

over-regulated children who also tend to be high in effortful control, may be at elevated risk of internalising behaviours such as social withdrawal as they typically experience negative emotions such as fear more intensely and are more likely to perceive social situations as threatening. Conversely, under-regulated children who tend to have lower levels of effortful control are considered to show a tendency toward externalising symptomatology (Eisenberg et al., 2004).

Early theories of children's emotion regulation also pointed to its functional role in children's emotional experiences. Thompson (1994) defined emotion regulation as "the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (Thompson, 1994, p. 27). The emphasis on the regulation of emotion serving to accomplish one's goals, characterises emotion regulation processes as both motivational and contextual. According to Thompson, emotional or behavioural responses such as aggression or sadness should not be seen as inherently adaptive or maladaptive without consideration of the situational context and motivational structures at play. For example, Gilliom et al (2002) found associations between toddler's activation of distraction (i.e., shifting attention away from a distressing stimulus) and information-seeking, and decreases in anger. Active distraction also predicted lower externalising problems at age 6. However, in children who perceive situations where there is a risk of failure as threatening, display of negative emotions such as anger or fear may accompany engagement in behaviours such as withdrawal or helplessness. For example, research has shown that when goals are blocked, infants experiencing sadness display an increased stress response and withdraw from goal pursuit (Lewis & Ramsay, 2005; Lewis et al., 1992). Thus, whether a regulation strategy is adaptive or maladaptive depends on its functional role in a particular situational context. In this sense, emotion dysregulation may concern the use of regulatory strategies that focus emotion onto inappropriate goals, reinforcing further maladaptive emotional responses or behaviour, and facilitate social and emotional maladjustment (Ackerman et al., 1998; Cole et al., 1994). Emotion dysregulation may not merely reflect a lack of regulation, but the inappropriate activation of regulatory strategies (Cole et al., 1994; Eisenberg et al., 2010).

The role of motivation in emotion regulation

One key theoretical paradigm that has implicated approach-avoidance motivation in the development of child psychopathology is Gray's (1991) neurobiological framework of personality. In particular, Gray suggested two motivational systems; a behavioural approach system (BAS), considered to be responsible for sensitivity to reward cues (facilitating reward-seeking and approach behaviour), and a behavioural inhibition (or avoidance) system (BIS), responsible for sensitivity to threat or nonreward cues (facilitating suppression or avoidance). Gray's motivation systems closely align with the incentive-response systems proposed by models of temperament and emotion in which these approach-avoidance tendencies are said to reflect involuntary reactions stemming from distinct neural systems (Beauchaine, 2001; Beauchaine et al., 2009; Nigg, 2000).

These theoretical perspectives point to unique profiles of emotional responding. An overactive approach system (and underactive avoidance system) is said to be linked to disruptive behaviour and conduct problems, while an overactive avoidance system (and underactive approach system) is said to be linked to emotional distress and symptoms of depression. Hence, we might expect high approach-oriented children to be less aware of the potential consequences of their actions, disregarding social norms and rules for social adaptation; while high-avoidance-oriented children (with weak approach orientation) likely exhibit heightened withdrawal behaviour and low help-seeking (Carver et al., 2008; Nigg, 2006).

The Role of context

Social interactions play a salient role in child social and emotional development; thus, it may be most appropriate to examine variation in child approach-avoidance motivation within a social context. For example, research has shown that children's success in navigating increasingly challenging social worlds (e.g., developing and maintaining friendships with other children) may be closely linked to individual differences in sensitivity to social reward and social punishment (Erdley et al., 1997; Rudolph et al., 2016; Ryan & Shim, 2008). For example, children sensitive to social reward cues tend to be motivated by a need for social approval, whereas children sensitive to social punishment tend to be motivated by a need to avoid negative judgements and social disapproval from others (Rudolph et al., 2013; Rudolph et al.,

2016; Rudolph et al., 2005; Ryan & Shim, 2008). Accordingly, the imbalance between approach and avoidance motivations may play a crucial role in children's social and emotional adjustment (Asendorf, 1990; Coplan et al., 2006; Rubin et al., 2009).

Links between self-regulation and motivation

The above theories point to the interactive contributions of children's self-regulation and motivation orientation to child psychopathology. Effortful control, in the context of notions of emotional reactivity inherent in theories of temperament (Eisenberg et al., 2004; Nigg, 2000, 2006; Rothbart, 2004; Valiente et al., 2003), appears to be interlinked with children's motivational systems. For example, reactive undercontrol of (or overactivity in) the approach system and reactive overcontrol of (or overactivity in) the avoidance system, both indicate poor effortful control. Therefore, children's self-regulatory capacities appear critical for controlling impulsive inappropriate approach tendencies (i.e., inappropriate reward-seeking, and aggression) and overriding impulses for avoidance (i.e., emotion suppression and escape) (Carver et al (2008). Taken together, children's effortful control, approach and avoidance systems and the connections between them, appear key in our understanding of the social and emotional adjustment difficulties that map onto different neurodevelopmental disorders.

Coping

Aside from emotion regulation being a multidimensional process that involves the active coordination of emotion and goal-directed behaviour (Thompson et al., 2008), research also suggests that emotion regulation should be examined in the context of an internal or external demand such as a stressor or challenge which taps into the process-oriented aspects of children's emotional experiences, such as coping (Cole et al., 2004). The conceptual and methodological overlap between emotion regulation and coping suggests that many of the conclusions drawn from studies linking emotion dysregulation and psychopathology can also be applied to conceptualisations of stress and coping (e.g., Aldao & Nolen-Hoeksema, 2010, Aldao & Nolen-Hoeksema, 2012; Aldao et al., 2010; Webb et al., 2012).

Coping is an adaptive process involving the regulation of emotion, attention, and other subsystems that are activated by emotionally distressing internal or external events. It is also closely linked to the activation of children's motivation systems described earlier (i.e., BAS and BIS). These events are appraised as either constituting a threat or a challenge (Lazarus & Folkman, 1986; Compas et al., 2017), and how they are appraised can determine whether the strategies employed to resolve emotional stress are approach-based (engagement) or avoidance-based (disengagement). Approach-based strategies are used to modify or resolve the stressful event (e.g., problem-solving, and information or support seeking), whereas avoidance-based strategies are used to avoid the distressing event or stressor (e.g., social withdrawal, escape, and distraction). Approach-based coping has been associated with positive adjustment and better social functioning, while avoidant-based coping has been associated with elevated symptoms of psychopathology (Horwitz et al., 2011; Rafnsson et al., 2006); particularly externalising behaviour problems (Krattenmacher et al., 2013). An early review by Compas et al (2001) found consistent associations between elevated internalising and externalising problems, and use of behavioural avoidance, social withdrawal, self-criticism, and resignation in response to emotional stress. However, few studies have examined the use of these strategies in school-aged children and particularly in children exhibiting emotional and behavioural problems. The cognitive complexity of these strategies and the autonomous actions needed to employ them may mean that they are not as widely used in younger age groups or children with particular cognitive and attentional deficits, yet research has not sufficiently explored this.

Parental risk factors

Research has implicated parental psychological functioning in children's emotion regulation difficulties. Loughheed and Hollenstein (2016) found associations between reduced emotional variability (flexibility) during parent-child interactions and maternal internalising symptoms. Dix and Meunier (2009) suggested that these dysfunctional interactive patterns were related to the difficulties in selecting appropriate emotional responses associated with internalising problems. Tronick and Reck (2009) found longer displays of emotional mismatch (e.g., lower reciprocations of children's positive affect) between depressed mothers and their infants, and fewer instances of shifts back into shared positivity. Findings from Reck et al (2004) also

pointed to reduced capacities to effectively respond to children's needs in depressed mothers, showing that parents' own difficulty managing negative emotions may impede their ability to model effective ways of coping with distress with their children. Research has also evidenced associations between parental anxiety problems and parenting behaviours during parent-child interactions. Van Bommel et al (2018) found that adolescents with low internalising mothers were more likely to reciprocate their mothers' positivity than adolescents with high internalising mothers. Anxious parents may have insufficient resources and skills to negotiate alternative ways of responding which inhibits the emotional flexibility of their interactions with their children. Thus, parental psychological difficulties may hinder or disrupt children's development of effective emotion regulation skills, socialising maladaptive coping behaviour and exacerbating emotional and behavioural difficulties.

Dynamic Systems (DS) theory

Contemporary conceptualisations of emotions consider emotions as dynamic interpersonal systems. Emotions serve to regulate (i.e., organise and structure) our interactions with the environment and with others; they evolve dynamically over time, going through cycles where they emerge, evolve and dissolve (Butler, 2011). Though inherently regulatory in nature, emotional responses and the behavioural tendencies associated with them are not always appropriate to the emotion-eliciting context. Therefore, whilst generally serving an adaptive function, emotions themselves must also be regulated so that the experience of an emotion does not have a debilitating effect on the efficacy of one's actions. How we then separate emotion regulation from the experience of an emotion itself poses questions for the field on whether current methods are inadvertently tapping into distinct aspects of emotion regulation (Frijda, 1994; Loughheed, 2020).

Emotion as a construct cannot be reduced to any one of its individual components (e.g., expressive behaviour, function, appraisal), rather it is the interrelation between them that encompasses the emotion system. These components can influence one another and generate relatively stable patterns of emotional responding through the system's self-organisation. Theoretical frameworks such as Dynamic Systems (DS) theory argue that an interrelated multicomponent view of emotion is key to fully capturing its complexity (i.e., how

emotions are generated, how emotions develop, and how they transform) (Fogel & Thelen, 1987; Lewis, 2000).

DS theory is a metatheoretical framework comprising of a number of abstract principles that have been applied to various disciplines (e.g., physics, chemistry, and psychology). One key argument of DS theory is that emotions can be characterised by their self-organisation at multiple time scales; thus, our understanding of emotional development must take into account processes that take place at different time scales if we are to uncover the mechanisms of developmental change. For example, micromomentary emotions (emotions occurring on the smallest time scale, i.e., seconds), become long-lasting moods which, when repeated, form the basis of enduring personality traits. These personality structures in turn determine our emotional states, gradually forming a self-organising system over the course of development with its own internal feedback mechanism (Lewis, 2000).

While DS theory comprises a broad number of concepts, the DS concepts relevant to this chapter include self-organisation, attractors, and feedback loops. Self-organisation is said to denote the continuous interactions between the subcomponents of a system, the manner in which they “move together”, and eventually produces relatively stable patterns (Von Bertalanffy, 1968). Accordingly, the interactions between these subcomponents are considered as lower-level processes and the stable patterns they produce are high-level processes that emerge from these interactions. In terms of child social and emotional functioning, the constellation of emotions, actions, and thoughts could be said to self-organise into children’s concrete experiences (i.e., states) or patterns of emotional responding (e.g., coping styles) (De Ruiter et al, 2017).

These higher-order characteristics also reflect another key DS concept, attractors. Attractors are defined as patterns of emotion or behaviour that pull the emotion system into absorbing states or interaction patterns. Behaviours can move toward these attractors through the self-organisation of the system and as these attractors occur repeatedly over developmental time, they eventually stabilise into increasingly predictable traits (Thelen & Smith, 1994). Therefore, depressive, aggressive and anxious behavioural problems can be seen as attractors that have emerged over the course of weeks, months or years and stabilised into predictable traits. The

principle of attractors has produced novel theoretical insights into children's developmental problems and has contributed to advances in methodological approaches (e.g., examinations of the development of antisocial behaviour) (Granic & Patterson, 2006; Dumas et al., 2001; Granic & Lamey, 2002; Snyder et al., 2003). For example, process-level explanations of reciprocal antisocial talk (e.g., talk about lying or rule-breaking) between antisocial adolescents and their prosocial peers conceptualised antisocial talk as an attractor for antisocial children, but not their prosocial peers (Granic & Dishion, 2003). Instead of examining differences in total time spent in antisocial talk, the authors examined whether antisocial adolescents became 'absorbed' in antisocial talk over the course of their interactions with their prosocial peers. They found that antisocial adolescents became increasingly absorbed in discussions of deviancy, repeatedly returning to these topics, as well as increasingly spending more time in this pattern. Both antisocial and prosocial adolescents engaged in talk about breaking rules and deviancy, yet it was the dynamic (moment-to-moment) organisation of their interactions that differentiated them (i.e., repeated occurrences of antisocial talk in the antisocial youth). Another study by Snyder et al (2003) also applied the principle of attractors to their examination of emotion regulation in early childhood. They looked at children's recurrent displays of anger while interacting with a parent and demonstrated that children's frequent and quicker reciprocations of their parent's expressions of negativity served as a dyadic attractor, increasing the predictability of this interaction pattern and making it more resistant to change. Recursive interactions between the subcomponents of a system are not always uniform, thus, while some components reinforce others in the same or opposing direction, others may have an inhibiting effect. These interactions are collectively defined as feedback loops. Interactions between reinforcing components can lead to rapid growth of traits, whereas interactions between inhibiting components lead to the stability of these traits in the long-term. This points to the nonlinear (i.e., dynamic) nature of these processes.

These concepts have been used to model the processes at play in the emergence and maintenance of normative and non-normative developmental pathways (Prigogine & Stengers, 1984; von Bertalanffy, 1968). Importantly, they can be used to identify and repeatedly measure the drivers of change and stability, thus providing developmental researchers the opportunity to extend analyses beyond descriptions and general ratings of

displays of emotion and behaviour, to precise examination of the interacting systems and the subsystems underlying their activation (Thelen, 1989). Put another way, a DS perspective of development extends our understanding of the developing child beyond the linear processes described by traditional developmental models which fail to incorporate the self-organising processes at play (Butler, 2015).

Contemporary approaches to the study of emotion regulation

Child development involves a number of interacting contextual forces providing input into feedback loops which alter the child's organisational emotion structures and are in turn simultaneously altered by the child's moment-to-moment behaviour (Sameroff, 1975). In this sense, developmental outcomes (e.g., depression, anxiety and conduct problems) are argued to arise from recurrent moment-to-moment emotional behaviour embedded within day-to-day emotional experiences (Fogel, 1993; Thelen & Smith, 1994; van Geert, 1991). We can therefore use DS approaches to not only illustrate how children move from one emotional state to another, but also to understand whether the conditions under which these state changes occur can be adapted to promote healthier behavioural tendencies and reduce problem behaviour. Still, understanding the reciprocal links between the dynamics of children's emotion and behaviour and developmental outcomes requires important discussions on how we operationalise these developmental outcomes themselves. Researchers often use developmental outcomes to summarise behaviour at particular points in time. For example, questionnaire data is often used to classify children as 'depressed', 'anxious', 'antisocial' or 'hyperactive'. While these measures have been shown to reliably and validly predict later outcomes across a number of domains of child development (Aoki et al., 2002; Shmueli-Goetz et al., 2008), they could be argued to be lacking the specificity and complexity needed to produce theoretically and empirically supported treatments that target key processes. Using categories based on summary scores at one point in time to represent the range of child behaviour across different time points likely ignores important information about what might trigger immediate increases or decreases in emotion and behaviour in real-time (i.e., as it happens).

Importantly, when a system is changeable it becomes difficult to make predictions about future outcomes. However, as systems form and become more stable, developmental predictions can be made and maladaptive patterns can be easily identified and targeted both accurately and promptly to aid early intervention. Patterns of emotional responding in children with emotional and behavioural difficulties may crystallise once they reach school age, making it an optimal period to explore dynamic patterns of emotional responding and implement interventions.

Contemporary methodologies

The lack of consensus on the conceptualisation of emotion regulation in the developmental literature has brought about various methodological approaches and paradigms for its assessment in childhood (Bridges et al., 2004; Hessler & Katz, 2007). For example, attachment theory emphasises the role of the parent-child dyadic relationship in shaping children's emotion regulation (Calkins, 1994; Cassidy, 1994; Carlson & Sroufe, 1995; Waters, et al., 2010). Researchers assessing the link between stress-related hormones and children's emotion regulation have suggested cortisol changes in response to stress-inducing stimuli to be a key marker of emotion regulation (Feldman et al., 2009; van Goozen, 2015). Traditionally, researchers have used parent and teacher ratings as indicators of emotion regulation (e.g., Rothbart et al., 2001; Rydell et al., 2003; Shields & Cicchetti, 1997; Spinrad, et al., 2006). Others have used observations of children's behavioural regulatory strategies and emotional expressions in response to challenging situations as an index of emotion regulation (e.g., Gilliom, et al., 2002). While there is a general consensus amongst developmental researchers, that observational methods are more optimal, observational data is often collapsed into global ratings, qualitative descriptions and frequency counts of behaviour. Using static summary scores to represent temporally rich data may obscure nuanced mechanisms underlying developmental pathways. A growing body of research informed by the DS framework illustrates how the dynamic nature of emotions, particularly the interconnected temporal processes that give rise to stable patterns, are related to psychological functioning, over and above static scores and outcome measures (Main et al., 2016; Van der Giessen et al., 2014; Coburn et al., 2015).

Age-related differences in children's cognitive, emotional and behavioural capacities also make it challenging to devise developmentally appropriate paradigms with which we can directly measure children's emotion regulation (Zeman et al., 2007). Various methods of measurement are used at different ages, making it difficult to draw comparisons across different developmental periods. In preschool and school-aged children, researchers typically assess emotion regulation through parent-or teacher-report of regulatory behaviour or physiological indices of emotion regulation during emotion-eliciting and non-emotion-eliciting situations (e.g., Cole, et al., 1996; Eisenberg et al., 2000; Graziano, et al., 2007). There is a lack of research using methods that go beyond proxy-report and examine how children's regulatory strategies function in relation to their emotional experiences, and this is particularly the case for school-aged children.

Given the established need for more refined methods, the question of what methods can be used to study the dynamics of emotion and emotion regulation becomes ever more pertinent to answer in the context of children exhibiting adjustment problems that place them at greater risk of neurodevelopmental disorders. DS approaches are increasingly being used to inform contemporary approaches of examining within-person (or intraindividual) emotion dynamics (Cole et al., 2020; Yang et al., 2019). Accordingly, researchers have used various statistical methods, particularly time-series methods, to examine the effectiveness of regulation strategies in resolving (or down-regulating) negative emotional experiences or enhancing (or up-regulating) positive emotional experiences. These methods are based on prior work utilising contingency analysis to assess changes in children's emotional expressions following the use of regulation strategies (Buss & Goldsmith, 1998). For example, Cole et al (2017) used ordinary differential equations (a mathematical dynamic modelling technique used to extract time-varying features to examine self-regulation in 36-month-old children. They found that children's strategy use had a temporary dampening effect on displays of negative emotionality. Recently researchers have used Multilevel Survival Analysis (MSA) to examine the influence of children's moment-to-moment use of distraction and bidding to mothers on the timing of their recurring displays of anger during a wait task. Loughheed et al (2019) found that occurrences of children's anger increased in the moments when they used bidding strategies that focused their attention on the blocked goal (attaining the restricted item) but decreased in the moments children used distraction. This demonstrates how such

statistical approaches can be used to make inferences about the effectiveness of children's emotion regulation strategies in real-time; and makes a case for the utilisation of these methods in studying patterns of emotional responding that are linked to children's emotional and behavioural difficulties.

Purpose of the current study

The goal of the present study is to examine the dynamics of children's moment-to-moment displays of negative emotion (i.e., frustration, anger) during a laboratory task designed to elicit emotional stress. Few studies have analysed children's emotional expressions on a micro level (e.g., the onset and offset of subcomponents of emotion such as facial expressions and vocalisations) and few studies have employed methodologies that are appropriate for examining the temporal relations between emotion and behaviour (i.e., time-series methods). To meet this aim, multilevel modelling (MSA) will be used to examine observed regulatory behaviours and children's concurrent and subsequent expressions of negative emotion. This study focuses on primary-school-aged children as this age range represents a key developmental transition: the refinement of children's cognitive capacities and the transition to school. By exploring the intraindividual (i.e., within-child) dynamics of emotion displays and emotion regulation strategies in young children experiencing significant emotional and behavioural difficulties this study extends the literature on the emotional development of children at early risk of neurodevelopmental disorders. Research has demonstrated the role of emotion regulation deficits in the maintenance and exacerbation of developmental disorders and child psychopathology, however understanding how these deficits play out in real-time (i.e., as they occur) may uncover organisational features of children's emotional tendencies that can be used as potential targets for intervention.

This study seeks to test the following predictions:

1. The timing of children's recurring displays of negative emotion will be associated with both child (i.e., emotional and behavioural difficulties, effortful control, inhibitory control, and goal-orientation) and mother (i.e., maternal symptoms of anxiety and depression) risk factors.

2. Children's regulatory strategies will influence the timing of their negative emotion displays.
 - a) Recurring displays of negative emotion will be less likely in the seconds children use approach-based regulation strategies.
 - b) Recurring displays of negative emotion will be more likely in the seconds children use of avoidance-based and cognitive-behavioural regulatory strategies.
3. The effect of children's regulatory strategies will depend on the severity of their emotional and behavioural problems, and effortful control in downregulating negative emotion.

2.3 Methodology

2.3.1 Ethical statement

The present study was approved by the School of Psychology Research Ethics Committee at Cardiff University (EC.16.10.11.4592GR). All parents provided signed, voluntary consent for themselves and their children to participate.

2.3.2 Participants

Participants consisted of 100 young children (28% girls) with a mean age of 74 months (range = 51 – 117 months) who were part of a larger cohort of 281 children assessed by the Neurodevelopment Assessment Unit (NDAU). Families were recruited via referrals from teachers and Special Education Needs Coordinators (SENCOs) at local schools in South Wales for emotional and behavioural problems. Forty percent of the children came from households with incomes below £20,000. According to UK household income poverty definitions, which is estimated as income below the threshold of £17,760 (60% of median UK income of £29,600) (Office for National Statistics, 2019), it is estimated that between 30-40% of families were living within poverty. Full demographic details can be found in Table 1.3.

2.3.3 Procedure

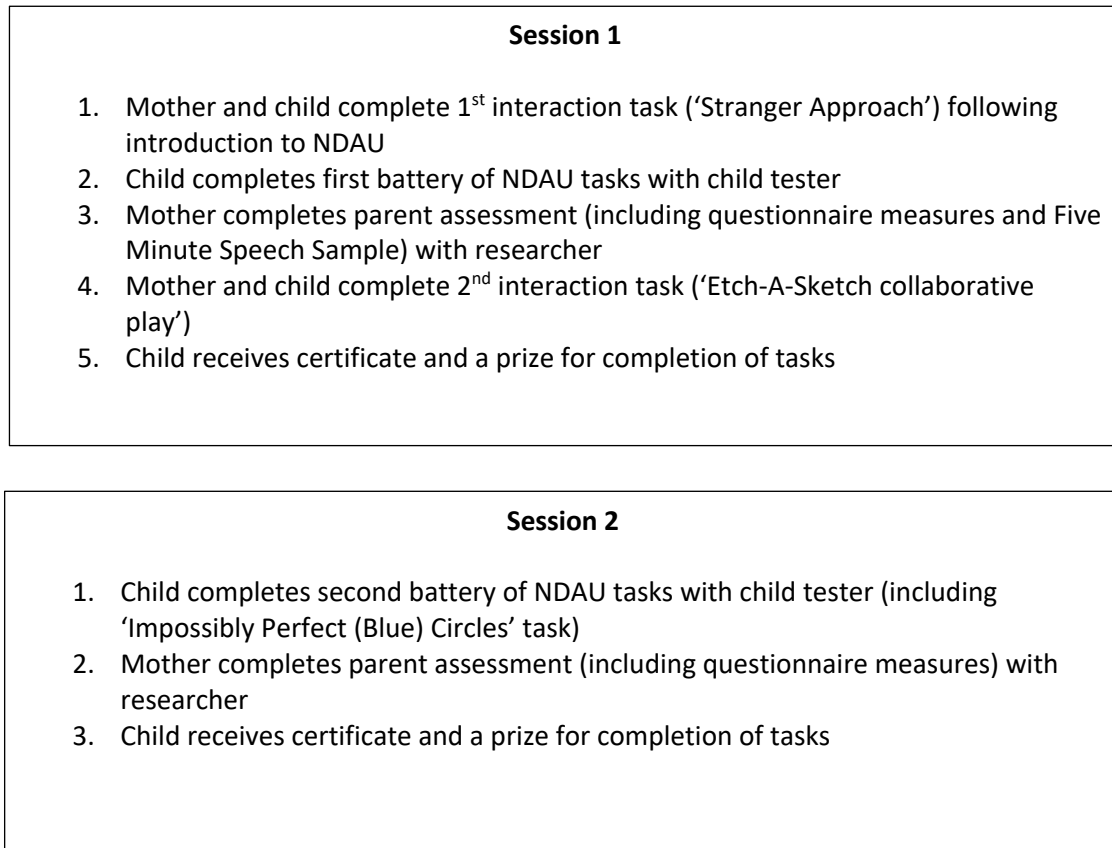


Figure 2.1 Procedural details for NDAU assessment sessions.

The full NDAU assessment involved a combination of computer-based and non-computer-based tasks for children, observational methods for mother-child interaction tasks, and an interview and questionnaires for parents. At the end of each assessment session, children were rewarded with a prize and parents were reimbursed travel expenses. Figure 2.1 provides procedural details for the full assessment. A summary report providing feedback on the child's performance in the tasks was subsequently sent to the referrer at the child's school, with instructions for a meeting to take place with the child's parent to feedback the details of the report and discuss the suggested strategies and advice for interventions. A full list of tasks included in the assessment can be found in Appendix 5.

Data from 2 tasks were used in this study: The NIH Toolbox Flanker task (measuring inhibitory control and executive attention) and the 'Impossibly Perfect (Blue) Circles' (an emotionally

challenging task measuring emotion regulation). Data from 3.30 minutes of the ‘Impossibly Perfect (Blue) Circles’ task were extracted for analysis. Child displays of emotion and behaviour during the task were video recorded for later analysis. Time codes (i.e., onsets and offsets of emotion displays and behaviours) were extracted via Mangold INTERACT 18.1 (Mangold, 2017). Mothers also separately completed measures of child adjustment (i.e., emotional and behavioural difficulties).

2.3.4 Measures

Observed child emotion regulation

Impossibly Perfect Circles (Laboratory temperament assessment battery; Goldsmith et al., 1993)

Table 2.1 Description of “Impossibly Perfect (Blue) Circles task.

| Lab-TAB episode | Description | Child expressive behaviours | Child coping behaviours |
|-----------------------------------|---|---|--|
| Impossibly Perfect (Blue) Circles | Elicits frustration/anger and perceptions of self-inefficacy through repeated negative feedback about child’s drawing of a circle. The child is instructed to make repeated attempts at drawing the “perfect” circle with no guidelines on how it should be drawn | Negative emotions (e.g., anger, frustration, sadness) | <p>Non-goal-oriented</p> <p>Avoidance-based: Behavioural avoidance, unfocused distraction</p> <p>Cognitive-behavioural: Helplessness (Self-resignation)</p> <p>Goal-oriented</p> <p>Approach-based: Help-seeking</p> |

Note: Based on Provenzi et al (2017)

Children’s emotion regulation skills were observed during an emotionally challenging task from the Lab-TAB battery, the “Impossibly Perfect (Blue) Circles”; a task designed to elicit frustration or distress and enables observations of child persistence in response to negative feedback from an adult (further details are in Appendix 6). During this task, the experimenter

repeatedly asked the child to draw a “perfect” circle and critiqued each circle the child drew in a neutral tone. Critiques were specific and did not provide any information on how to draw the perfect circle (e.g., “That one is too pointy”, “That one is not round”). After 3 ½ minutes, the experimenter praised the child’s last drawing before ending the task.

The child’s facial expressions and verbal and non-verbal behaviour were coded using a coding system based on Provenzi et al (2017). The coding system was used to record the occurrence (i.e., onset and offset) of child emotional expressions and regulatory behaviour by applying mutually exclusive and exhaustive coding categories in real-time over the course of the task period. Coders were trained extensively to a criterion of 80% agreement before proceeding onto observation recordings derived from the participants in the current study. Weekly meetings were undertaken to minimize observer drift. Two members of the coding team independently coded 14% of the video recordings to assess coder agreement and were blind to which recordings were used to assess reliability. Disagreements were discussed at the weekly meetings and where needed, recordings were reviewed by both coders and subsequently recoded so that sufficient agreement was attained. Time-unit kappa was used to examine inter-rater agreement between pairs of time units in the GSEQ program (GSEQ5.1 program; Bakeman & Quera, 2011). A 3-second time tolerance was used, thus agreement occurred if a code was assigned by the first coder 3 seconds before or after the same code was assigned by the second coder. Reliability analyses indicated excellent agreement (93 - 94%) with a time-unit kappa falling between 0.81 - 0.83.

Table 2.2 “Impossibly Perfect (Blue) Circles” coding scheme.

| Behavioural code | Example |
|-----------------------------------|---|
| <i>Negative emotion</i> | |
| Facial expressions | Anger |
| Physical protest | Throwing paper, slamming table |
| Verbal protest | Grunts, angry sighs |
| Not waiting for feedback | Continuously drawing circles |
| Aggressive drawing | Jabbing pen into paper or table |
| <i>Regulatory strategy</i> | |
| <u>Avoidance-based</u> | |
| Verbal defiance | Verbally refusing to follow instruction, off-task talk to take control |
| Physical defiance | Not drawing a circle, colouring in same circle even after being told to “try again” Refusing to draw Turning sheet over continuously |
| Verbal redirecting | Off-task talk to distract from task |
| Physical redirecting | Averting gaze away from task; Off-task movements to distract from task (e.g., pointing to objects, picking up objects, moving away from table, getting up from chair) |
| <u>Cognitive-behavioural</u> | |
| Physical resignation | Slumping, hand on face, crying |
| Verbal resignation | Whining, sighs |
| Self-criticism | Critical statements- “I can’t do it” |
| <u>Approach-based</u> | |
| Asks how perfect circle is drawn | “What does it look like?” |
| <i>Control codes</i> | |
| Looks at experimenter | Gaze directed toward experimenter |
| Waiting for feedback | |
| Asks to turn sheet | |
| Experimenter negative feedback | Criticisms |
| Experimenter positive feedback | Praise |

Child emotion displays

Categories labelled child “negative emotion” were defined by combining codes of anger and protest, not waiting for feedback, and aggressive drawing.

Child regulatory strategy

Categories for regulatory behaviour reflected the appropriateness and productivity of the child's behaviour in the context of the task; whether it was directed towards the goals of the task (i.e., task-focused) or inappropriate to the goals of the task. These included strategies that were avoidance-based (i.e., behavioural avoidance, unfocused distraction), cognitive-behavioural (i.e., self-resignation), and approach-based (i.e., help-seeking). Coded data extracted from Mangold INTERACT files were transformed into dichotomous variables which indicated whether negative emotion and each regulatory behaviour had or had not occurred in each second of the task.

Child effortful control

Different instruments have been used to measure effortful control in early childhood, including parental report (e.g., the Children's Behaviour Questionnaire (CBQ; Rothbart et al., 2001) which provide global measures of children's self-regulation and laboratory tasks (e.g., Effortful Control Battery) (ECB; Kochanska et al., 2000) which provide more state-like indices of children's effortful control, but vary in terms of which aspects of effortful control they tap into. From a DS perspective, the child's ongoing emotional state may be key, and the duration of a child's emotion display has been suggested to reflect the child's self-regulatory ability, i.e., the ability to inhibit (or down-regulate) an emotion once it is initiated and displayed, as well as how long this down-regulation lasts. On this basis, the more time and effort a child needs to down-regulate an emotion display, the shorter the length of time till the next recurrence of this display (Snyder et al., 2003; Gardner et al., 1993). For the purposes of this task, effortful control was indexed by the duration of negative emotion across the task period (i.e., children's ability to resolve negative emotional states once they have been activated and sustain this downregulation over time). Longer durations indicated poorer effortful control, illustrating a depletion of the children's regulatory capacity- causing regulatory failure.

Executive Attention

NIH Toolbox Flanker Inhibitory control & Attention task (Weintraub et al., 2013)

The NIH Toolbox consists of brief assessments of motor, cognitive (executive functioning and self-regulation), sensory and emotional skills in individuals aged 3-85 years. The Flanker Task

was used as a direct measure of inhibitory control in the context of selective visual attention. During the task, children were shown a line of fish and a line of arrows pointing in different directions. Children were instructed to choose the button on the touch screen which corresponded to the direction in which the middle fish (or arrow) was pointing. Children's responses were recorded by the touch screen monitor. A composite computed score was derived from a combination of the accuracy score (number of correct responses) and reaction time score and ranged from 0 to 10. The Flanker task has been shown to have excellent developmental sensitivity across childhood, excellent test-retest reliability (ICC = .92, 95% CI = .86 –.95) and good convergent validity with corresponding validation instruments such as the WPPSI–III Block Design and D-KEFS Inhibition measure (Zelazo et al., 2013).

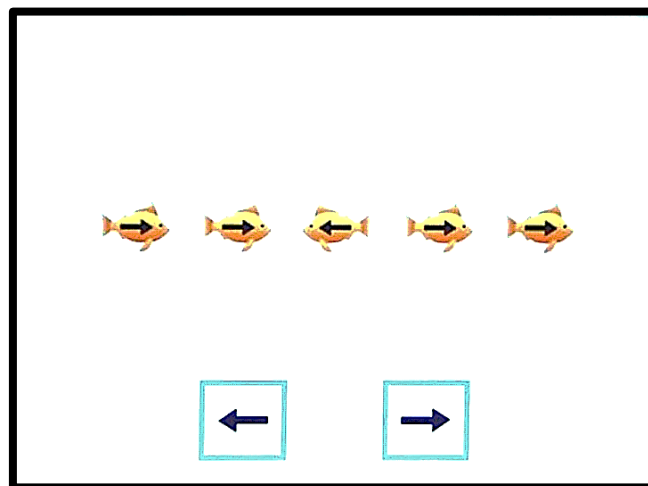


Figure 2.2 Example item from the NIH Toolbox Flanker task.

Child emotional and behavioural difficulties

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997).

The Strengths and Difficulties Questionnaire (SDQ) is a 25-item screening questionnaire for behavioural difficulties in children and young people aged 3-16 years. Mothers were instructed to rate their child's behaviour in the last 6 months across these items on a 3-point Likert scale (0 = not true; 1 = somewhat true; 2 = certainly true). The questionnaire consists of 5 subscales (emotional symptoms, hyperactivity/inattention, conduct problems, peer problems, and prosocial behaviour). A total difficulties score comprising the comprising the first four subscale scores was computed. This score indicates the extent of a child's

socioemotional and behavioural difficulties. Additionally, a broader internalising subscale (combination of the emotional and peer problems subscales) and an externalising subscale (combination of the conduct problems and hyperactivity subscales) were computed. These broader subscales were categorised according to cut-off points recommended by Goodman et al (2010), indicating a high/very high score (9 out of 20 for the internalising subscale and 12 out of 20 for the externalising subscale). In instances where there were missing items, scale means were calculated from the remaining valid items regardless of the proportion of missingness for the scale. Good discriminative validity has been reported in typical and high-risk children (Goodman, 1999; Mullick & Goodman, 2001) and the SDQ has been shown to be effective in screening for psychiatric disorders in community samples (Goodman, 2001). Table 2.3 reveals that over half of the participants had high/elevated emotional and behavioural difficulties, highlighting relevance of this sample and the general study to literature on children with emerging psychological difficulties on the pathway to developing neurodevelopmental problems.

Table 2.3 Prevalence of emotional and behavioural difficulties in the sample.

| | Low/average | High/elevated |
|----------------|-------------|---------------|
| Internalising | 68 | 32 |
| Externalising | 40 | 60 |
| Total problems | 42 | 58 |

Note: % of children.

Maternal psychopathology

Hospital Anxiety and Depression Scale (HADS, Zigmond & Snaith, 1983).

The Hospital Anxiety and Depression Scale is a 14-item brief screening measure designed to assess symptoms of anxiety and depression in non-psychiatric populations, identifying individuals at elevated risk for anxiety and depressive disorders. Scores range from 0-21, with scores from 8-10 indicating borderline or abnormal levels and scores from 11-21 indicating abnormal levels warranting clinical assessment. To address missing items, scale means were calculated from the remaining valid items. Data was considered missing in instances where data was missing for more than 20% of items. This measure has been shown to have sensitivities of 82% and 70%, and specificities of 94% and 68%, for depressive and anxiety

disorders respectively (Barczak et al., 1988). A Cronbach's alpha of 0.83 for anxiety and 0.82 for depression has also been reported (Bjelland et al., 2002).

2.3.5 Data analysis

Before examining associations between the aggregated variables (durations of real-time emotion and behaviour) and child and parent risk factors, the distributions of the variables were explored. Duration variables for negative emotion, self-resignation, behavioural avoidance, unfocused distraction, and help-seeking were found to be non-normally distributed and so were log transformed. Pearson's correlations were then conducted to establish associations between these macro-level indices of emotion and behaviour and child and parent risk factors.

Statistical modelling of children's negative emotion displays

Statistical analyses were conducted in *R* (R Core Team, 2019) based on methods used by Lougheed et al (2019). Multilevel survival analysis was used to analyse children's displays of negative emotion in real time. MSA models the timing and transitions among emotional and behavioural states to generate a likelihood of a given emotion or behaviour over the course of the observation period. These time frames consist of periods in which an individual is "at risk for" (not currently) experiencing the emotion or behaviour of interest. Once the emotion or behaviour occurs, the clock resets, meaning the length of the time frames between the displays or expressions of emotion or behaviour vary. Thus, MSA has the advantage of being able to incorporate the durations of states (Lougheed et al., 2019).

MSA can be used to examine the effects of time-varying covariates (i.e., factors that change over the course of the task) and time-invariant covariates (i.e., factors that do not change over the course of the task) on the occurrence of emotional and behavioural states. In the current study, the effects of both time-varying (i.e., regulatory strategy) and time-invariant covariates (i.e., emotional and behavioural difficulties, inhibitory control, goal-orientation, effectiveness of effortful control, and maternal symptoms of anxiety and depression) on the occurrence of children's repeated displays of negative emotion over the course of the task

were examined. Moment-to-moment negative emotion was conceptualised as recurring events as these states can be expressed repeatedly and also have the advantage of increasing the power to detect effects. The timing of recurrent events can provide insight into the dynamic nature of regulatory processes, yet only a few studies have examined recurrent emotional and behavioural states in observational data (Dagne & Snyder, 2011; Lougheed et al., 2015; Snyder et al., 2003; Lougheed et al., 2019).

A continuous time approach was applied to the transformed coded data. Semi-parametric methods (Cox Regression models) were used rather than parametric or non-parametric approaches as this was deemed most suitable for incorporating both time-invariant and time-varying covariates (predictors) into the model and because the distribution of event times was not known prior to analysis (Cox, 1972; Stoolmiller & Snyder, 2014; Singer & Willet, 2003). Repeated events occurring within the same individual tend to be correlated, thus breaking the assumption of independence of events. To rectify this, a random effect (frailty model) was introduced (Wienke, 2014; Lougheed, 2019).

Prior to fitting the survival models, the data were examined for censoring. Censoring occurs when the event times are unknown because the event did not occur within the observation period (Allison, 1984). Right censoring occurs when the observation period ends before the event occurs for an individual. The data were checked for right censoring for participants who did not express negative emotion before the end of the task. The end of the task period (i.e., duration of task – 215 seconds) was used as the time to event for censored children.

The baseline hazard model (predictors excluded) was fitted to the data to obtain the baseline hazard function, illustrating how the hazard rate changes as a function of time while the participant is “at risk for” the event. Next, the predictors were added to the model to test the hypotheses. The *coxph()* function in the R package *survival* was used to fit all models (Therneau, 2015). The model fit and diagnostics were examined prior to interpreting the results. The data for were found to not violate the proportional hazards assumption and likelihood ratio tests for each model were significant indicating that each model fit the data better than the unconditional models. To interpret the results of the hazard models, the parameter estimates were transformed into hazard ratios which indicate the effect size.

Higher hazard rates indicate shorter latencies until event occurrence, meaning on average, more events will occur per time unit.

Separate models were used to test each of the research questions. Hazard rates were used as individual parameters and converted (exponentiated) into hazard ratios for ease of interpretation. This indicated the ratio of the hazard rate for a one-unit increase of the covariate relative to the hazard rate without that increase (i.e., the likelihood relative to a constant value of 1). A value of more than 1 indicated the event was more likely to occur, and a value of less than 1 indicated the event was less likely to occur.

The models examined:

1. The association between child and mother risk factors and the time until recurrent displays of negative emotion.
2. Within-child changes in displays of negative emotion
 - a) The effect of each regulatory strategy (i.e., avoidance, unfocused distraction, self-resignation, and help-seeking) in downregulating (i.e., resolving) or upregulating (i.e., enhancing) child displays of negative emotion.
 - b) The influence of child emotional and behavioural difficulties and effectiveness of effortful control in downregulating (i.e., resolving) negative emotion.

2.4 Results

The findings are presented in several sections. First, descriptive statistics of child displays of negative emotion and use of regulatory behaviours are provided. The second section describes associations between time-invariant child and mother risk factors and the time to recurrence of children's displays of negative emotion. Lastly, the influence of the child's moment-to-moment regulatory behaviour (time-varying factors) on the time to recurrence of children's displays of negative emotion is described.

Descriptive statistics

Before reporting the results of the recurrent-events Cox Regression model for time to displays of negative emotion, descriptive statistics on the key variables were examined. The average durations at which children displayed negative emotion and their strategy use are displayed in Table 2.5. An examination of these aggregates revealed that almost all children (91%) experienced negative emotion during the task. While only 11% of children engaged in approach-based (i.e., help-seeking- asking how a perfect circle is drawn), most children employed behavioural avoidance (81%) and self-resignation (75%). Due to the low rates of help-seeking amongst the sample, children's goal-orientation was used as a measure of approach, indexed as latency to non-goal-oriented behaviour (i.e., avoidance, unfocused distraction, and self-resignation).

Table 2.4 Means and standard deviations for child and parent factors.

| | M | SD | Range |
|------------------------------|-------|------|-------|
| Child internalising problems | 6.51 | 3.88 | 1-20 |
| Child externalising problems | 11.97 | 4.18 | 0-17 |
| Child inhibitory control | 4.38 | 2.03 | 1-9 |
| Maternal anxiety | 7.15 | 3.68 | 0-17 |
| Maternal depression | 4.27 | 2.86 | 0-10 |

Note: SDQ: Child internalising problems (Emotional and Peer problems subscales), Child externalising problems (Conduct and Hyperactivity subscales). HADS: Maternal anxiety and Maternal depression-Normal (0-7), Borderline (8-10), Abnormal (11-21).

Table 2.5 Descriptive statistics for child emotion displays and regulatory behaviour.

| | Mean duration (SD) | Number of episodes | | | % of children |
|-----------------------------|--------------------|--------------------|---------|---------|---------------|
| | | Mean (SD) | Minimum | Maximum | |
| Negative emotion | | | | | |
| Anger/frustration | 22.48 (19.63) | 7.41 (4.79) | 1 | 28 | 91 |
| Regulatory behaviour | | | | | |
| Behavioural avoidance | 20.18 (30.21) | | | | 81 |
| Unfocused distraction | 5.47 (11.51) | | | | 56 |
| Resignation | 13.47 (14.40) | | | | 75 |

| | | |
|--------------|----------------|----|
| Help-seeking | 0.47 (1.63) | 11 |
|--------------|----------------|----|

Note: SD: Standard deviation. No significant effect of gender or age on regulatory behaviour. Significant effect of gender on overall display of negative emotion ($t(78) = 3.04, p = .003$).

Bivariate correlations

The results can be seen in Table A1.1 (Appendix 1). Significant correlations were found between total number of episodes of negative emotion and children's externalising difficulties ($r = .226, p = .034$) and maternal depression ($r = .411, p = .002$). Duration in negative emotion was also positively associated with maternal depression ($r = .336, p = .021$). An inverse correlation was found between duration of behavioural avoidance and inhibitory control ($r = -.247, p = .049$). No significant associations were found between child internalising difficulties and any of the risk factors.

Primary analyses

Effect of child emotional and behavioural difficulties, effortful control, maternal psychopathology, and children's goal-orientation on timing of negative emotion displays

Cox Regression models revealed that children's externalising difficulties were significantly associated with shorter latencies until subsequent episodes of negative emotion (hazard rate = 0.05, standard error (SE) = 0.02, $p = .012$), generating a hazard ratio of 1.05. This indicated that recurrence of negative emotion was more likely in children showing higher externalising difficulties. No association was found for children's internalising difficulties (hazard rate = 0.01, standard error (SE) = 0.02, $p = .800$).

Goal-orientation was also found to be significantly associated with the time to recurrence of negative emotion (hazard rate = - 0.003, standard error (SE) = 0.002, $p = .032$), generating a hazard ratio of 0.99. This indicated that children who took longer to engage in non-goal-directed behaviour were less likely to express negative emotion. Further, the findings also revealed that maternal depressive symptoms were associated with shorter latencies until subsequent episodes of child negative emotion (hazard rate = 0.11, standard error (SE) = 0.05,

$p = .012$), generating a hazard ratio of 1.12, whereas no association was found for maternal anxiety (hazard rate = 0.01, standard error (SE) = 0.04, $p = .860$). As such, the results indicated that children of mothers with higher depressive symptoms were more likely to exhibit recurrent displays of negative emotion. Interestingly, there was no association between recurrence of negative emotion over time and levels of inhibitory control (i.e., executive attention) (hazard rate = 0.03, standard error (SE) = 0.05, $p = .510$).

Table 2.6 Hazard rate estimates for child negative emotion by risk factor.

| Predictor | Estimate | Standard Error | p | Hazard Ratio | 95% CI of Hazard Ratio |
|----------------------------|----------|----------------|------|--------------|------------------------|
| Externalising difficulties | 0.05 | 0.02 | .012 | 1.05 | [1.00, 1.10] |
| Internalising difficulties | 0.01 | 0.02 | .800 | 1.01 | [0.96, 1.05] |
| Inhibitory control | 0.03 | 0.05 | .510 | 1.03 | [0.94, 1.13] |
| Goal orientation | -0.004 | 0.001 | .032 | 0.99 | [0.99, 1.00] |
| Maternal anxiety | 0.01 | 0.04 | .860 | 1.01 | [0.94, 1.08] |
| Maternal depression | 0.11 | 0.05 | .012 | 1.12 | [1.00, 1.22] |

Note: Estimate: Hazard rate. SDQ: Child internalising problems (Emotional and Peer problems subscales), Child externalising problems (Conduct and Hyperactivity subscales). Inhibitory control: NIH Toolbox Flanker task. HADS: Maternal anxiety and Maternal depression- Normal (0-7), Borderline (8-10), Abnormal (11-21). Goal orientation denotes latency to first expression of avoidance, unfocused distraction, or self-resignation.

Interactive effects of regulatory strategy, child emotional and behavioural difficulties, and effortful control on timing of recurrent negative emotion displays

Next, Cox Regression models were used to test whether children’s emotional and behavioural difficulties influenced the effect of children’s strategy use (i.e., moment-to-moment regulatory behaviours) on the timing of their recurring displays of negative emotion; specifically, whether negative emotion was more likely when children were avoidant, used unfocused distraction, or were self-resigned compared to seconds they were not, and whether this depended on the extent of children’s emotional and behavioural difficulties and effortful control. The results are displayed in Table 2.7. Avoidance (hazard rate = -0.71,

standard error (SE) = 0.29, $p = .016$, hazard ratio = 0.49) was associated with reduced likelihood of subsequent displays of negative emotion, while no significant effect was found for unfocused distraction (hazard rate = 0.12, standard error (SE) = 0.47, $p = .790$). Thus, children were less likely to display negative emotion in the seconds they were avoidant, than in the seconds they were not. As expected, self-resignation was marginally associated with increased likelihood of recurrent displays of negative emotion (hazard rate = 0.33, standard error (SE) = 0.22, $p = .120$, hazard ratio = 1.39). This indicated that recurrent negative emotion displays occurred in the seconds children were resigned.

Table 2.7 Hazard rate estimates for child regulation of negative emotion.

| Predictor | Estimate | Standard Error | p | Hazard Ratio | 95% CI of Hazard Ratio |
|------------------------------|----------|----------------|------|--------------|------------------------|
| Avoidance | -0.71 | 0.29 | .016 | 0.49 | [0.28, 0.88] |
| Distraction | 0.12 | 0.47 | .790 | 1.13 | [0.45, 2.82] |
| Self-resignation | 0.33 | 0.22 | .120 | 1.39 | [0.91, 2.13] |
| Internalising difficulties x | | | | | |
| Avoidance | -0.12 | 0.07 | .092 | 0.89 | [0.77, 1.02] |
| Distraction | -0.26 | 0.18 | .140 | 0.77 | [0.55, 1.09] |
| Self-resignation | -0.02 | 0.04 | .580 | 0.98 | [0.90, 1.06] |
| Externalising difficulties x | | | | | |
| Avoidance | -0.24 | 0.09 | .008 | 0.79 | [0.66, 0.94] |
| Distraction | -0.001 | 0.14 | .990 | 1.00 | [0.77, 1.30] |
| Self-resignation | -0.06 | 0.06 | .320 | 0.95 | [0.85, 1.06] |
| Effortful control x | | | | | |
| Avoidance | 0.03 | 0.04 | .510 | 1.03 | [0.94, 1.12] |
| Distraction | -0.11 | 0.12 | .390 | 0.90 | [0.71, 1.15] |
| Self-resignation | -0.01 | 0.03 | .840 | 0.99 | [0.93, 1.05] |

Note: Estimate: Hazard rate.

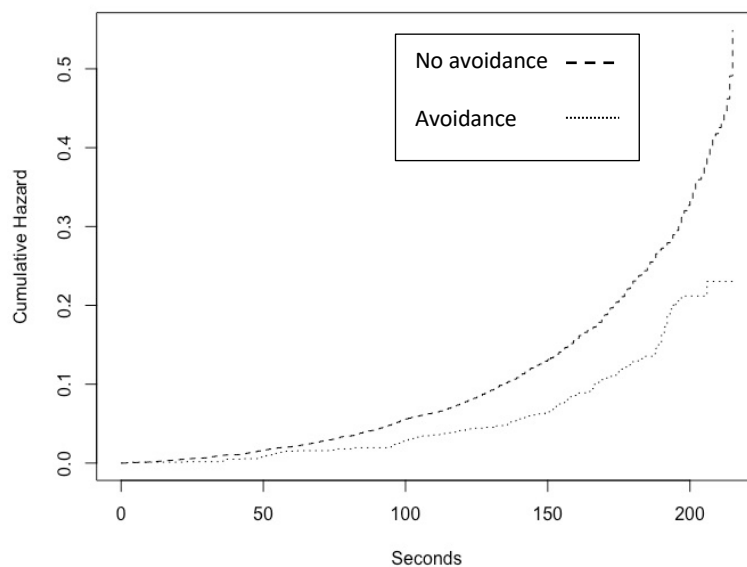


Figure 2.3 Likelihood of anger/frustration during activation/no activation of behavioural avoidance. Higher hazards indicate increased risk of negative emotion.

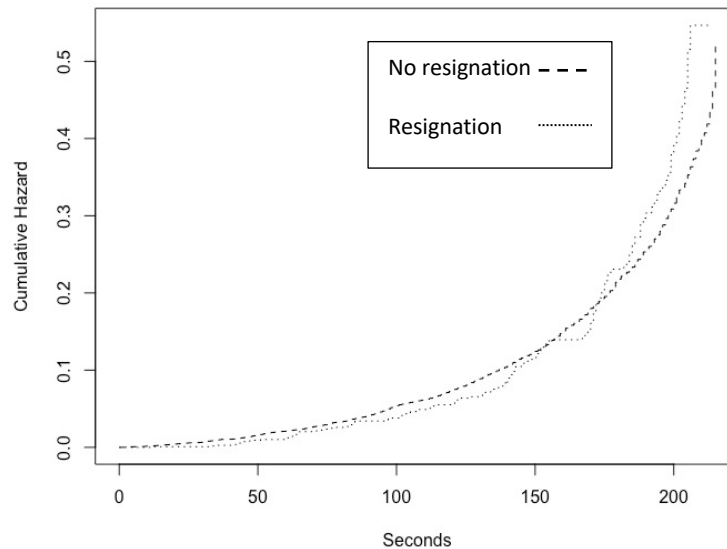


Figure 2.4 Likelihood of anger/frustration during activation/no activation of self-resignation. Higher hazards indicate increased risk of negative emotion.

These patterns in emotional responding were further examined by interactive effects with child emotional and behavioural difficulties, and effectiveness of effortful control, to ascertain in which children these patterns were prevalent. A significant interaction was found for children's externalising difficulties (hazard rate = -0.24, standard error (SE) = 0.09, $p = .008$, hazard ratio = 0.79) and use of behavioural avoidance and a marginally significant interaction effect for internalising difficulties (hazard rate = -0.12, standard error (SE) = 0.07, $p = .092$, hazard ratio = 0.89). Thus, at higher levels of internalising and externalising problems, recurrent displays of negative emotion were less likely when children were avoidant. While there was a trend towards reductions in negative emotion when children at higher levels of internalising difficulties used unfocused distraction (hazard rate = -0.26, standard error (SE) = 0.18, $p = .140$, hazard ratio = 0.77), no significant interactive effect was found between children's internalising difficulties and self-resignation (hazard rate = -0.02, standard error (SE) = 0.04, $p = .580$, hazard ratio = 0.98). No significant interactions were found between effortful control and behavioural avoidance (hazard rate = 0.03, standard error (SE) = 0.04, $p = .510$, hazard ratio = 1.03), between effortful control and unfocused distraction (hazard rate

= -0.11, standard error (SE) = 0.12, $p = .390$, hazard ratio = 0.90) or between effortful control and self-resignation (hazard rate = -0.01, standard error (SE) = 0.03, $p = .840$, hazard ratio = 0.99).

2.5 Discussion

The aim of this study was to examine the dynamics of children's recurring displays of negative emotion (i.e., frustration/anger) and the influence of children's use of regulatory/coping strategies during an emotionally challenging blocked-goal task. Multilevel Survival Analysis was used to test predictions that, (1) child and maternal risk factors would be associated with the timing of children's expressions of negative emotion, and (2) children's strategy use would either resolve or enhance displays of negative emotion depending on whether the strategy was adaptive/approach-based or maladaptive/avoidance-based. Associations with children's internalising and externalising problems and effortful control in downregulating negative emotion were also examined.

Associations among macro-level indicators of emotional responding

Bivariate correlations revealed significant associations between parent-reported externalising behaviour (i.e., disruptiveness and anti-social tendencies) and total episodes of negative emotion. Given that 60% of mothers rated their children as showing elevated behavioural difficulties on the SDQ, this finding implies that, children with significant maladjustment exhibit recurrent expressions of negative emotion in response to emotional stress, specifically, when goals are blocked. It also shows that even in the presence of unfamiliar others, such children have difficulty controlling their anger/frustration. Interestingly, no significant association was found for children's internalising symptoms. This could be due to the majority of children (68%) being rated as close to average/slightly raised for internalising difficulties. Significant associations were found between total episodes of negative emotion and maternal depression (i.e., more episodes of negative emotion in children of depressed mothers), as well as between inhibitory control and duration in behavioural avoidance (i.e., less recruitment of avoidant behaviour in children more proficient in controlling attentional resources). It is important to note that no associations

were found between aggregates of children's strategy use (i.e., duration) and duration in negative emotion, suggesting a lack of sensitivity of macro-level aggregates in picking up variation in real-time emotion and behaviour.

Micro-level indicators of emotional responding

Significant time-invariant effects were found for children's externalising difficulties, goal-orientation, and maternal depressive symptoms in predicting the timing of children's displays of negative emotion. Higher externalising problems were associated with shorter latencies to recurring negative emotion, while children's goal-orientation (i.e., latency to engagement in non-goal-directed behaviour) was associated with decreases in recurring displays of negative emotion. Goal-orientation may be more critical in buffering children against perseveration in negativity. Interestingly, inhibitory control (i.e., executive attention), was associated with increases in child negative emotion displays. On a macro-level, inhibitory control may generally decrease risk of perseveration in reflexive strategies like avoidance over longer periods, however on a micromomentary scale (second-to-second), adaptive activation of children's motivational systems (oriented towards adaptive goals) may be required for the downregulation of negative emotion.

Significant associations were also found between maternal depressive symptoms and shorter latencies to recurring displays of negative emotion; thus, children of mothers with elevated levels of depression had quicker and more frequently occurring displays of negative emotion. This is not surprising given the reported links between maternal depressive symptoms and reduced maternal responsiveness, as well as a general unavailable parenting style and failure to model effective ways of coping with distress or challenges to offspring (Bugental et al., 2003; Dix et al., 2004; Sturge-Apple et al., 2006). Poorer emotion regulation in depressed parents may also point to the intergenerational transmission of emotion regulation deficits (Buckholdt et al., 2015).

Strategy use and emotion expression

Given the few studies using DS methods to examine regulatory behaviour, the present study sought to ascertain whether children's real-time strategy use influenced the timing of their expressions of negative emotion over the course of the task. In line with expectations, strategy use demonstrated temporally contingent associations with the timing of negative emotion displays, highlighting the dynamic influence of children's regulatory behaviour on their emotional experiences. Children's moment-to-moment use of behavioural avoidance served to downregulate (i.e., reduce) occurrences of frustration and anger such that children were less likely to display negative emotion in the seconds they engaged in avoidance-based strategies. As avoidance-based strategies do not help the child reach the goals of the task, it was surprising that they did not trigger negative emotional arousal. However, as detailed below, interactions with children's emotional and behavioural difficulties pointed to unique patterns of emotional responding. As expected, the study found a trend towards increased recurrence of negative emotion in the seconds children engaged in self-resignation. Resignation/helplessness may function to maintain focus on the stressor and may be related to low task persistence (Jahromi et al., 2012). Research has reported strong associations between sadness and anger and has suggested that both reflect an underlying emotional system that is sensitive to the blockage of goals (Lewis & Ramsey, 2005). Further, these rapid shifts between negative emotional states (i.e., negative emotion lability) have been highlighted in the literature and associated with children's social and emotional adjustment (Stringaris & Goodman, 2009).

Patterns of emotional responding

Interactions between children's strategy use and internalising and externalising difficulties, revealed interesting patterns that pointed to specific profiles of emotional responding in children at the extremities of emotional and behavioural difficulties. Subsequent displays of negative emotion were less likely in children higher in internalising and externalising difficulties whilst employing behavioural avoidance. Drawing from Gray's (1991) motivational systems, avoidance-based strategies in children with high sensitivities to social punishment, motivated by a need to avoid negative judgements and social disapproval, may be effective in temporarily coping with intense emotional stress from the task. However, these strategies may also contribute to the maintenance of adjustment problems over developmental time

(Nelson et al. 2005). Again, drawing from Gray's motivational systems, an overactive avoidance system has been linked to emotional distress and depressive symptoms. While overactive approach systems are implicated in conduct and disruptive behaviour problems (Heym et al., 2008), the findings suggest a need for further research. Low rates of approach-based strategies meant that direct examination of these behaviours were not possible. Future examinations could incorporate a wider range of approach-based strategies.

Implications of the findings

The findings of the present study coincide with Thompson's earlier definition of emotion regulation entailing both the evaluation of one's emotional experience and the management of emotional experiences (Thompson, 1994; Thompson & Calkins, 1996). Regulatory strategies are employed to both manage subjective experiences of an emotion (e.g., intensity and duration) and the expression of an emotion (Saarni, 1999). In the present study, children employed avoidance-based strategies (strategies to avoid the stressor, i.e., behavioural avoidance) to down-regulate experienced anger/frustration. The reliance on avoidance-based coping and low activation of constructive coping strategies (i.e., help-seeking) in both high internalising and externalising children could serve as a potential intervention target. Such children may be less skilled in employing active problem-solving strategies. While orienting or shifting attention away from emotion-eliciting stimuli is thought to be effective in decreasing negative emotional experiences (Eisenberg et al., 1996), research suggests that deliberately focusing attention on the distressing stimuli (e.g., via information-seeking and problem solving) can enable better understanding of the source of distress in order to resolve negative emotions (Gilliom et al., 2002). Thus, interventions aimed at increasing approach-based coping and reducing reliance on avoidance-based coping in high-risk children could be used to encourage more adaptive regulation patterns in such children and prevent later psychopathology. Alternatively, this pattern of emotional responding could reflect contextual factors such as ineffective modelling and socialisation of effective coping, warranting further investigation.

Strengths of the study

MSA is an effective method for examining the timing of emotional and behavioural states, and more precisely, testing the dynamic processes underlying their expression and regulation (Cole et al., 2004; Thompson, 1994). MSA provides the sensitivity needed for time-series data extracted from real-time observations of emotion and behaviour. The successful application of this method in the present study demonstrates the utility of going beyond aggregated counts of emotion and strategy use to directly examining the temporal influence of a particular strategy on real-time changes in emotion and behaviour. MSA could be extended to examine the development of children's strategy use by incorporating multiple timescales (e.g., weekly, monthly or yearly). For example, Stoolmiller (2016) used MSA to examine the relationship between short-term emotion dynamics and later development of externalising problems. Other studies have embedded MSA within Structural Equation Models (SEM) to follow longitudinal changes in emotion dynamics (Stoolmiller & Snyder, 2014; Wong et al., 2017). MSA can also be applied to the examination of the dynamics of dyadic (e.g., parent-child) processes (Granic & Loughheed, 2016; Lunkenheimer et al., 2016; Loughheed et al., 2016).

Limitations and future directions

The present study was able to reveal temporarily contingent patterns of emotion expression and emotion regulation in a cohort of high-risk children experiencing emotional and behavioural difficulties. However, given that the dynamic processes underlying emotion expression and emotion regulation occur not only over the course of seconds, but also days, weeks, months and years, we cannot infer longitudinal changes in these emotion dynamics; longitudinal studies are needed to increase understanding of these processes throughout development. For example, we do not yet know whether improvements in emotion regulation reflect changes in the temporal influences of adaptive regulation strategies, or what dynamic changes in emotion processes signify increased skill in maintaining the effect of successful regulatory attempts over longer periods.

Additionally, though subjective reports of internal experiences are often criticised for bias and may not provide a full picture of regulatory experiences, they could reveal key information on how appraisals of emotionally arousing stimuli shape children's regulatory attempts and motivational tendencies. Incorporating additional response channels such as expressive

physiology may also prove to be a more informative approach to studying emotion regulation in children (Sloan et al., 2004). Similarly, research is yet to ascertain how well children understand how emotions are regulated and what strategies they should use. Self-awareness and particular cognitive or language skills may be required to be able to conceptualise and verbalise about strategies to regulate emotional experiences. Identifying one's own emotional state is also considered to be a key aspect of emotion regulation (Zeman et al., 2006). Research has suggested that low emotion understanding, or awareness may lead to inaccurate interpretations or appraisals of internal and external emotional cues (Lemerise & Arsenio, 2000). Thus, individual differences in emotion recognition and emotion understanding may also be an influential risk mechanism (Halberstadt et al., 2002; Saarni, 1999).

Conclusions

The present study used MSA to test predictions that factors associated with children's expressions of anger or frustration and the regulatory strategies they employ would influence the timing of these negative emotion displays. This study found that children's behavioural problems, goal-orientation, and the mental health of their caregivers (i.e., maternal depressive symptoms) are associated with quicker and recurrent displays of negative emotion. While the activation of non-goal-oriented strategies can be maladaptive and unproductive in situations where more goal-related behaviour is required to help children persist in the face of negative feedback; children with emotional and behavioural problems demonstrate a reliance on avoidance-based behaviours to cope with negative experiences. To the author's knowledge, this is the first study to apply time-series approaches to an experimental paradigm involving a blocked goal inducing both negative emotion and low approach motivation. The study's findings also lend support to a growing body of research on how regulatory behaviour influences the longevity of emotional experiences, pointing to potential intervention targets for encouraging adaptive regulation patterns and preventing later psychopathology.

Chapter 3

Timing, socialisation, and children's social adaptiveness: The role of mother-child coregulation

3.1. Abstract

Objectives. A large body of research suggests that children begin to acquire the ability to appropriately express and regulate emotions in the context of their early caregiving experiences. Parent-child interactions provide ample opportunities for parents to model effective ways of coping and respond to children's emotions and behaviour in a manner that communicates empathy and encourages independent thinking. Yet, the immediate (or moment-to-moment) influence of emotion socialisation on children's emotional responding is not fully known. This study examined the dynamics of mother and child coregulation of positive emotion (i.e., autonomy/social adaptiveness) and negative emotion (i.e., inhibition, anger) in 100 dyads (29% of children female with a mean age = 75 months) using an interaction task adapted from the "Stranger Approach" episode from the Lab-TAB battery (Goldsmith et al., 1993). **Method.** Multilevel Survival Analysis (MSA) was used to predict the timing of children's recurring displays of positive and negative emotion, examining the effect of both mother and child risk factors and the effect of mother's coregulatory behaviour (i.e., autonomy support, positive directives, hostility, and intrusiveness). **Results.** Children's internalising symptoms were associated with increased recurrence of negative emotion. Children's autonomous motivation was associated with reductions in recurrent negative emotion, while poorer effortful control was associated with reductions in recurrent positive emotion. Mother's unsupportive coregulatory behaviour (i.e., intrusiveness) led to reductions in positive emotion, particularly in high internalising children. While reductions in children's recurrent displays of negative emotion were associated with mother's supportive coregulatory behaviour (i.e., autonomy support), these strategies were less effective in dyads with high internalising children. **Conclusions.** Supportive coregulation plays a key role in downregulating negative emotion expression in children, while unsupportive coregulation impedes children's social adaptiveness. Mother-child dyads with children higher in emotional difficulties may show less receptiveness to supportive coregulation, potentially reflecting low attunement and disrupted attachment security.

Keywords: coregulation, survival analysis, dynamic systems.

3.2 Introduction

Chapter overview

This chapter has three goals. First, emotional development in the context of the parent-child relationship is discussed, exploring the role of emotion socialisation. Second, the Dynamic Systems approach to quantifying social processes in parent-child interactions is described, with a focus on how mutual regulatory processes are involved in emotion socialisation efforts. Third, conceptualisations of parental scaffolding behaviours and how these come to be key mechanisms in children's developing regulation skills are summarised. Lastly, this chapter will empirically examine interpersonal processes during mother-child social exchanges, identifying key adaptive and maladaptive coregulatory patterns. In meeting these goals, this study extends current literature on bidirectional influences in parent-child dyadic interactions and provides much needed evidence of moment-to-moment use of scaffolding behaviours to regulate child emotion and behaviour.

Literature review

Emotion regulation in the context of the parent-child relationship

The ability to appropriately express and regulate one's emotions, as well as the ability to interpret emotions in others, plays a central role in children's socioemotional development and their psychological wellbeing. Delayed or impaired development of such skills can place children at risk for adjustment problems (e.g., internalising and externalising problems) (Denham, 2007). This is even more pertinent for children on the clinical pathway to early-onset neurodevelopmental disorders such as antisocial behaviour and ADHD (England-Mason, 2020). A large body of research suggests that children begin to acquire these regulatory skills in the context of early caregiving experiences (Morris et al., 2007; Morris et al., 2018; Cassidy, 1994; Repetti et al., 2002; Feldman, 2015). Research has also shown that when parents model effective ways of coping and appropriately respond to children's emotions and behaviour, they communicate how emotions should be managed (Lunkenheimer et al., 2007). Parent-child co-regulation characterises this developmental

process and has been associated with children's internalisation of social rules, self-regulation (or self-control), and behaviour (Cole et al., 2003; Feldman et al., 1999; Kochanska, 1997). One key aspect of parent-child coregulation is the mutual (or bidirectional) influence parent and child have on one another during their social exchanges (Gentzler et al, 2005; McKee et al., 2015). Importantly, research has suggested that these parent-child coregulatory patterns can act as markers for mechanisms of change in interventions aimed at enhancing healthy and adaptive parent-child relationships, especially amongst high-risk dyads (Granic et al., 2007).

Although emotions are considered private internal events, they are also social in their very nature, having important social consequences on those around us (Butler & Gross, 2009). This extends to the regulation of emotion in that emotions come to be generated and regulated in the context of close bonds such as the mother-child relationship, making mother-child emotional processes an important mediator of the pathway to children's emotional development. Thus, self-regulation efforts to control negative emotions such as anger and sadness, for example, play out within the confines of a network of social, contextual and cultural influences (Butler & Gross, 2009). Also central to our understanding of emotions as social events, is the process of change; the give-and-take of interpersonal social exchanges where the flow of actions and responses creates a continuous feedback loop that provides both social partners information about what is happening. If we are to viewing emotions in this way, a social level of analysis must be used which takes into account the input of both social partners.

From infancy through to childhood children depend on caregivers to coregulate their emotions and behaviour, gradually acquiring the skills to self-regulate as their attentional and inhibitory control systems become more refined (Posner & Rothbart, 2000). Social learning experiences may contribute to individual differences in regulation, for example through caregiver interactions that involve emotion labelling, communicating emotion display rules, and modelling of effective problem solving. Social learning theory posits that children learn vicariously through observing the behaviour of others and imitating modelled behaviour, with proximal relationships providing the best context in which children can learn new skills (Bandura, 1977; Bandura et al., 1963; Morris et al., 2007). Consequently, parent's

responsiveness and own beliefs and thoughts about emotion play a key role in shaping children's emotion regulation ability and psychological adjustment (Eisenberg et al., 1996; Gottman et al., 1996).

The socialisation of children's emotion regulation

Emotions are also considered to have motivational properties, thus in situations deemed as distressing or emotionally challenging, positive or negative emotional responses may reflect motivation to approach or avoid such situations and the internal emotional experiences they elicit. For example, individual differences in sensitivity towards cues of threat or reward may determine whether anger is motivated towards approach or avoidance (Carver & Harmon-Jones, 2009; Cooper et al., 2008). The perceived loss of control over task outcomes may also influence whether emotion expression is motivated towards approach or avoidance of the emotion-eliciting situation, and may elicit low persistence (Greenaway et al., 2015; Roth & Kubal, 1975). According to Gray's (1991) model of motivational systems, an overactive approach system (and underactive avoidance system) is said to be linked to conduct problems, while an overactive avoidance system (and underactive approach system) is said to be linked to emotional distress and symptoms of depression. Hence, we might expect high approach-oriented children to be less aware of the potential consequences of their actions, disregarding rules for social adaptation; while high-avoidance-oriented children (with weak approach orientation) likely exhibit heightened withdrawal behaviour and appraise situations of perceived threat as uncontrollable (Carver et al., 2008; Nigg, 2006). Importantly, how children manage these emotional responses may be largely due to their socialisation histories (Elliott & Dweck, 1988; Gillet et al., 2013; Meinhardt & Pekrun, 2003).

Emotion socialisation may play a key role in the motivational structures of children's emotions and how they are expressed. Children in families where the expression of negative emotions is accepted, effective coping strategies are taught, and the causes and consequences of negative emotions are openly discussed, may be socialised to appraise distressing or challenging situations in a non-threatening manner and be more motivated to face challenges. Such children are then more likely to express negative emotions in healthy and appropriate ways (Cole et al., 2010; Eisenberg et al., 1998; Fabes et al., 2001; Jaffe et al., 2010;

Morris et al., 2011). Conversely, research has suggested that when children are socialised to suppress emotion, particularly in families where the expression of negative emotion is viewed as unacceptable, they tend to withdraw or disengage due to perceiving loss or failure as threatening (Bariola et al., 2012; Berlin & Cassidy 2003; Eisenberg et al., 1998; Fabes et al., 2001; Gunzenhauser et al., 2014). Accordingly, research has suggested that children who tend to engage in withdrawal or avoidance in the face of challenges may be at higher risk for adjustment problems and academic failure in comparison to children who actively persist (Elliot et al., 1999; Pekrun et al., 2009). Thus, it is important to take into account how children's emotional responses and their socialisation histories shape emotional behaviour in the face of adverse events or challenges. We are yet to fully understand exactly how parental responses to child emotion and behaviour, such as those highlighted by socialisation theories (e.g., coaching behaviours communicating warmth and responsiveness – autonomy support, emotion labelling, and promoting problem-solving) shape changes in children's emotion expressions; this requires methods that directly tap into the organisational and structural features of parent-child interactions.

Child motivation in the context of parent-child coregulation

Social interactions play a salient role in child social and emotional development; thus, it may be most appropriate to examine variation in child approach-avoidance motivation within a social context. For example, children's success in navigating increasingly challenging social worlds (e.g., developing and maintaining friendships with other children) may be closely linked to sensitivity to social reward and social punishment; and research has pointed to individual differences in children's sensitivity to social reward versus social punishment (Erdley et al., 1997; Rudolph et al., 2016; Ryan & Shim, 2008). For example, children sensitive to social reward cues tend to be motivated by a need for social approval, whereas children sensitive to social punishment tend to be motivated by a need to avoid negative judgements and social disapproval from others (Rudolph et al., 2013; Rudolph et al., 2016; Rudolph et al., 2005; Ryan & Shim, 2008). Accordingly, the imbalance between these approach and avoidance motivations may play a crucial role in children's social and emotional adjustment (Asendorf, 1990; Coplan et al., 2006; Rubin et al., 2009).

A Dynamic Systems (DS) approach to emotion socialisation

A number of theoretical perspectives in developmental psychology have pointed to patterns of bidirectional (i.e., mother-to-child and child-to-mother) influences in mother-child relationships (Eisenberg et al., 1998), yet methods employed by most studies tend to focus on unidirectional influences (e.g., mother-to-child) (Miller-Slough et al., 2016). Despite this, increasing interest in dynamic systems modelling of child development has resulted in a shift from viewing bidirectionality as an additive combination of unidirectional influences to considering the self-organising dynamics of the parent-child system (Granic, 2005; Granic et al., 2016; Coburn et al., 2015; Hollenstein et al., 2016; Lunkenheimer et al., 2013; Van der Giessen et al., 2015). Recent years have seen a spur of research efforts geared towards the development of emotion dynamics in interpersonal contexts that have contributed to new insights into the structure of emotion socialisation. However, many of these efforts have focused on infants and adolescents, warranting much needed research on early to middle childhood (i.e., the start of formal schooling).

Given that most emotions emerge within the context of social interactions, it is not surprising that the emotional responses of social partners to external stimuli become inextricably linked and coordinated in time (Butler, 2011). We modify one another's emotional states through interpersonal modulation (or coregulation), become part of other's emotion regulatory systems, and have the ability to influence one another's emotional reactions. Therefore, emotional responses are not merely a result of external input. Research has touched upon this notion of mutual influence through examinations of physiological synchrony in parent-infant dyads and has pointed to the importance of early biobehavioural synchrony for healthy dyadic relationships and the infant's developing self-regulation (Feldman, 2007; Feldman, 2012). Research has suggested that behavioural attunement of caregivers to infant's cues contributes to this physiological synchrony (Feldman, 2007; Fogel, 1993).

DS theory provides a framework for understanding how emotional and behavioural states emerge and stabilise through a system's self-organisation (Prigogine & Stengers, 1984; von Bertalanffy, 1968). While DS theory comprises of a number of abstract principles, the DS concepts relevant to this chapter include interdependence, self-organisation, attractors, and

feedback loops. Underlying the interdependency between the system and the environmental context is the notion that such contexts are continuously and bidirectionally linked to the system and its changes over time. For example, regarding child social adaptiveness, if the context is defined as parental attitudes towards the child's displays of positive emotion in social interactions, both changes in the child and parental attitudes must be defined over time, as well as how they mutually influence each other over time. Self-organisation is said to denote the continuous interactions between the subcomponents of a system, the manner in which they "move together" and eventually produces relatively stable patterns (Von Bertalanffy, 1968). Accordingly, the interactions between these subcomponents are considered as lower-level processes and the stable patterns they produce are high-level processes that emerge from these interactions. In terms of child social and emotional functioning, the constellation of emotions, actions, and thoughts could be said to self-organise into children's concrete experiences (i.e., states) or patterns of emotional responding (e.g., coping styles) (De Ruiter et al, 2017). Recursive interactions between the subcomponents of a system are not always uniform, thus, while some components reinforce others in the same or opposing direction, others may have an inhibiting effect. These interactions are collectively defined as feedback loops. Interactions between reinforcing components can lead to rapid growth of traits, whereas interactions between inhibiting components lead to the stability of these traits in the long-term. This points to the nonlinear (i.e., dynamic) nature of these processes.

Attractors are defined as stable patterns of interactions with the environment or social context; or absorbing states that pull the self-organising system towards a particular state and away from other competing states. In real-time, emotions and behaviour move toward or away from these attractors and over time these attractors come to reflect recurrent patterns that gradually become stable and increasingly predictable traits (Thelen & Smith, 1994). For example, Granic and Lamey (2002) found that parent-child dyads with externalising children showed a tendency towards asynchronous (i.e., child hostile- parent neutral/positive) states, whereas parent-child dyads with children with mixed symptomatology (i.e., co-occurring internalising and externalising problems), tended to move towards mutually hostile or mutually negative states. Snyder et al (2003) further reported evidence of negative dyadic attractor states for children's displays of anger. Specifically,

children's reciprocation of their parent's negativity rapidly increased over the course of the interaction, pointing to increased predictability and reduced perturbability (opportunity for adaptive reorganisation) of their interactions.

Healthy emotion at the interpersonal level then functions within a self-regulating system (Boker & Laurenceau, 2007; Steele & Ferrer, 2011; Chow et al., 2005). Within this system, a person's current state is a result of their own and their partner's previous state, and through self-organisation this system can trigger repeated changes that oscillate around multiple dyadic states reflecting a "co-construction" of emotional meaning. This interpersonal process produces a wide range of interpersonal emotional dynamics such as synchrony (i.e., the convergence of social partners' emotional responses), transmission (i.e., the influence of social partners' emotions on each other at different points in time), and coregulation (i.e., the mutual convergence of social partners' emotion oscillations towards or away from a stable state). Understanding the complexity of these interpersonal emotion dynamics is critical. Research has shown that patterns of converging and diverging emotions between social partners are associated with social behaviour, interpersonal conflict (Lichtwarck-Aschoff, Kunnen, & Van Geert, 2009) and relationship quality (Saxbe & Repetti, 2010).

Unsupportive responses to a partner's expressions of negative emotion may function to pull the interpersonal system into negative attractors, whereas supportive responses may pull the interpersonal system away from negative attractors. One study showed that parent's angry and dismissive responses to their child's negative emotion displays predicted shorter latency (quicker time) to subsequent episodes of child anger (Snyder et al., 2003). This dynamic pattern also predicted later development of antisocial behaviour problems. Additionally, the structural patterns of mother-child interactions (e.g., flexibility among dyadic states regardless of emotional valence) have been shown to predict psychosocial functioning from infancy through to early and middle childhood (Coburn et al., 2015; Lunkenheimer et al., 2013; Loughheed & Hollenstein, 2016). These findings suggest that the dynamics of how and when emotional states rise and fall (i.e., the ebb and flow) should be considered as core indicators of functioning. While negative emotionality is thought to convey risk for psychopathology, rather than the absence of negativity, the structure (i.e., how these

negative states are expressed and unfold over time) may be key in understanding the pathways to later psychopathology (Lunkenheimer et al., 2013; Granic & Loughheed, 2016).

Maternal scaffolding

Although the progression through childhood sees emotion regulation begin to shift from being largely scaffolded by a caregiver to an intrinsic process within the self, social interactions with others serve as prime opportunities for children to build self-efficacy and internalise rules and expectations for the adaptive expression of emotion and behaviour (Bandura, 1977). Bandura (2001) earlier argued that behaviour is modelled through social interactions, with interactions with proximal caregivers having more influence on children's emotional and social learning than distal social partners (e.g., teachers). The pre-school and school years see mothers actively model and intentionally scaffold regulation strategies (Eisenberg et al. 2001; Russell et al. 2013). As the more experienced communicator, mothers can model and scaffold culturally or situationally appropriate responses, conveying emotional meaning through the use of gestures and rhythmic exchanges of behaviour (Morris et al., 2011; Tronick & Beeghly, 2011; Vygotsky, 1962).

Emotion socialisation enables children to learn effective strategies to intentionally control their emotions and behaviour and independently adapt to emotionally arousing changes in the environment so that they can respond in socially appropriate ways (Garner & Hinton, 2010). Over the course of development, these strategies become more refined and extend to a variety of contexts, and children grow to become efficient regulators adept in managing a variety of emotionally challenging situations (Kopp, 1989). As Bandura noted, children are cognitively active during interactions with their behavioural models. Thus, parent-child exchanges that support children in *actively* navigating social situations play an important role in the shift from interpersonal regulation processes to intrapersonal regulation processes (Tudge & Winterhoff, 1993). In this sense, effective scaffolding is characterised by parents responsively adjusting their level of guidance as the child's needs and goals change. Research has shown that parents who engage in scaffolding behaviours such as using positive feedback, positive directives (e.g., instructions or directions that do not serve to control or intrude), and respecting the child's autonomy (e.g., allowing the child to lead), increase children's self-

regulatory capacities (Russell et al. 2013; Silverman & Ippolito, 1995; Silverman & Ragusa, 1990). Accordingly, effective scaffolding has been associated with fewer behaviour problems, better interpersonal relationships, and better academic performance (Russell et al. 2013).

Research has suggested that ineffective emotion regulation may be linked to high levels of emotion lability, which is characterised by rapid and frequent shifts between emotional states and intense emotional experiences (Kim-Spoon et al., 2013). Emotionally labile children have a tendency to react quickly in the face of emotional stimuli and experience more negative than positive emotions. Consequently, they also may have low self-efficacy, and unlikely to perceive themselves as skilled regulators (Spritz et al., 2010). Such children may lack the skills needed to effectively manage their emotional responses, resulting in dysregulated behaviour (e.g., defiance) (Kochanska et al., 1998; Stifter et al., 1999). Children in high-risk families are often exposed to high levels of negativity and poor modelling of positive responding. Additionally, children in such caregiving environments may not be able to rely on their caregivers for sensitive and responsive parenting (Eisenberg et al., 2001).

Fostering self-regulation through parental scaffolding of child autonomy

Autonomy (also referred to as self-determination), is considered to be one of the key psychological human needs by self-determination theory (Deci & Ryan, 2000). With its focus on motivation and social development, autonomy appears key in enabling development of a sense of volition in one's actions. Self-determination theory posits that when parents adopt supportive ways of creating structure by communicating clear instructions for appropriate behaviour, creating a responsive environment, and support the child's autonomy, children's needs are nurtured (Joussemet et al., 2008; Soenens & Vansteenkiste, 2010).

Autonomy support is considered to be a stable dimension of parenting (Matte-Gagne et al., 2013), serving as a particularly key mechanism through which parents scaffold children's emotion regulation (Morris et al., 2007). Parents who understand that their child has needs and feelings that differ from their own, and support their child's unique goals and interests, are considered to be autonomy supportive (Grolnick et al., 1997; Joussemet et al., 2008). For example, parents may acknowledge the child's perspective through empathy, communicating

to the child that they understand their subjective experience (Deci et al., 1994; Grolnick et al., 1997). Further, autonomy-supportive parents may foster effective regulation by talking about challenging situations in a neutral and balanced manner, modelling appropriate ways of coping (Andreadakis et al., 2019). During emotionally challenging or distressing situations, autonomy-supportive parents create an atmosphere of openness and acceptance in which children are encouraged to explore and discuss their emotions (Roth et al., 2009).

Low levels of autonomy-support have been associated with anxiety, high emotional reactivity, and emotion regulation deficits (Ryan et al., 2006). In early childhood, low parental autonomy support may serve to dampen children's perceptions of control, which may in turn result in heightened negativity. This low level of perceived control may come to function as an attractor state for high-risk dyads and later result in stable trait-like characteristics conveying risk for maladjustment. Such instances can prevent children from learning that they can cope with challenges independently, resulting in repeated displays of helplessness, withdrawal or avoidance, and dependency on parents. They may also lead to children perceiving normative everyday experiences as threatening and beyond their control (Chorpita et al., 1998; Rekart et al., 2007). Low autonomy support has been associated with the broader construct of parental control. Parental overcontrol (synonymous with intrusiveness) involves attempts to control the child's environment and emotional expressions, providing few opportunities for children to learn how to independently regulate their emotions and behaviour (Luebbe et al., 2014; Woodruff-Borden et al., 2002). Family environments that hinder children's autonomy have been shown to have a negative impact on children's adjustment (Barber & Harmon, 2002), putting children at higher risk of poor self-regulation (Gershoff, 2002), internalising and externalising symptomatology (Joussemet et al., 2008; Barber & Harmon 2002; Morris et al., 2002) and peer rejection (Deković & Janssens, 1992).

Investigating factors that may contribute to low parental autonomy support may prove useful in uncovering pathways from parental risk factors to problems in children's social and emotional development. Parental psychopathology has been linked to use of controlling, unresponsive and intrusive parenting (Hurley et al., 2008; Hughes et al., 2015). Research has also pointed to poor parental emotion regulation as a key factor in vulnerability to psychopathology in children of depressed parents (Rutherford et al., 2015). For example,

studies have reported that children of depressed mothers are more likely to wait passively and less likely to engage in active distraction during a delay task (Silk et al., 2006). Capacities for socialising, and scaffolding emotion regulation in particular, may be disrupted in depressed parents. Early studies demonstrated that parent-child dyads with depressed mothers tend to display atypical interaction patterns; they are less responsive to their children's emotional expressions, experience less mutually positive emotional states, and display more negative (anger and sadness) than positive emotions (Hay et al., 2003; Weinberg & Tronick, 1998). Deficits in parent's own emotion regulation may indicate a lack of skills needed to model and reinforce adaptive ways of coping with distress in others.

Assessing the dynamics of parent-child coregulation

There is lack of consensus on how we determine when regulation has occurred and how we measure its effectiveness in managing emotional experiences. Emotions oscillate in the context of individual goals and contextual demands that also simultaneously fluctuate, supporting the notion of emotion regulation as a dynamic process (Cole et al., 1994). Consequently, the methodological approaches we employ must be sensitive enough to detect regulatory change in emotion and behaviour. Research suggests that this can only be achieved by perturbing (or challenging) the self-regulatory system, i.e., disrupting the system enough for it to change (Cole et al., 2004) and has demonstrated the effectiveness of examining the regulation of emotion, behaviour and physiology in this way (Carlson & Wang, 2007; Schmitz et al., 2011; Tobin & Graziano, 2011). Research has shown that experimental perturbation is effective in examining the interpersonal dynamics of parent-child interactions. For example, observable interactive patterns have been demonstrated in the Strange Situation (Ainsworth & Bell, 1970) and Still-face paradigms (Tronick et al., 1978). These tasks enable examination of both individual and dyadic regulation (i.e., the effect of a stressor on parent and child emotion and behaviour) and across different situations and contexts. DS frameworks for understanding emotion regulation can be applied to these paradigms to demonstrate how emotions and behaviours are coordinated and co-constructed to achieve individual or dyadic goals (Lazarus, 1991). They can also tell us how emotions organise into predictable patterns that give rise to individual differences in both individual and dyadic functioning (Hollenstein & Lewis, 2006). Though research is still in its infancy, studies have successfully demonstrated

the dynamic interdependence of emotions and goal-directed behaviour in parent-child coregulation (Del Vecchio & Rhoades, 2010; Lunkenheimer et al., 2011).

Recent advances in statistical approaches to the study of interpersonal dynamics have produced methods that directly capture emotion dynamics. These approaches can examine whether the use of a strategy is effective in resolving negative emotions or enhancing positive emotions. Time-series approaches have the advantage of incorporating time more directly and have been utilised to estimate the degree of influence that parent and child have on one another's subsequent emotions and behaviour (Lougheed et al., 2015; Lunkenheimer et al., 2016). Thus, these methods can simultaneously model intra-individual and inter-individual processes. Lunkenheimer et al (2016) used Multilevel Survival Analysis (MSA) to show that mothers with externalising children were more rigid in their interactions with their children but became inconsistent (highly variable) when the child displayed problem behaviour. Lougheed et al also used MSA to demonstrate that mothers in dyads with externalising children were less contingent in responding to children's negativity with supportive regulation strategies, and externalising children were less responsive to their mother's supportiveness (i.e., maternal supportiveness was less effective in helping these children regulate negative emotions (Lougheed et al., 2015). These studies highlight the utility of microanalytic observations of emotion and behaviour in parent-child interactions. However, there is a lack of research examining bidirectional and evocative effects of child emotion dynamics on parenting behaviour. Moreover, though studies have begun to apply DS methods to parent-child interactions, much of this research tends to be conducted in community samples. Further research is needed to ascertain how these interpersonal processes work in high-risk dyads with children experiencing elevated levels of emotional and behavioural difficulties.

Despite the recent interest in dynamic methods, most research on emotion co-regulation in the context of parent-child relationships has used global measures and macro-level analytical methods that obscure the dynamic processes involved in coregulation (Denham et al., 2000). Moreover, only a few studies have assessed the dynamics of emotion socialisation (particularly autonomy-support and parental overcontrol) in school-aged children (Eisenberg et al., 2003; Lunkenheimer et al., 2007; Shipman & Zeman, 2001; Valiente et al., 2007). Observational data is also more common in studies of infants and toddlers, and this data is

often aggregated, preventing the examination of the temporal features of parent-child interactions. Methods that can demonstrate the influence of moment-to-moment emotion socialisation practices on ever-changing expressions of emotions are needed.

Purpose of the present study

The application of DS methods to micro-level time scales is relatively new in developmental research, thus the first goal of this study was to explore and describe the dynamic processes underlying how parents and children effectively reduce the expression of negative emotionality (and increase positive emotionality) during a task designed to elicit negative emotional arousal. To meet this aim, this study used multilevel modelling (i.e., multilevel survival analysis) of observed socialisation behaviours and children's subsequent expressed negative emotion and social approach (i.e., positive emotion) during a novel interaction with an unfamiliar person. Accordingly, this study seeks to illustrate the reciprocal dynamics of maternal supportive and unsupportive coregulation behaviours and child emotion and behaviour. The present study focuses on late preschool- to early school-aged children as this age range reflects critical developmental transitions such as the transition to formal schooling and sophistication of cognitive and attentional skills (Calkins & Bell, 1999). Although self-regulation increasingly becomes more independent of parental input as children develop and begin attending school, parental socialisation behaviours continue to have an influence on how these regulation skills become refined.

Therefore, this study seeks to test the following predictions:

1. Children's emotional and behavioural difficulties, effortful control, and autonomous motivation, and maternal symptoms of anxiety and depression will be associated with the recurrence of children's displays of positive and negative emotion.
2. Mother's unsupportive coregulatory strategies will increase children's recurring negative emotion displays, while mother's supportive coregulatory strategies will decrease children's recurring negative emotion displays.

3. Mother's supportive coregulatory strategies will increase children's recurring positive emotion displays, while mother's unsupportive coregulatory strategies will decrease children's recurring positive emotion displays.
4. Effectiveness of children's effortful control capacities, children's autonomous motivation, and children's emotional and behavioural difficulties will influence the effectiveness of mothers' coregulatory strategies.

3.3. Methodology

3.3.1 Ethical statement

The present study was approved by the School of Psychology Research Ethics Committee at Cardiff University (EC.16.10.11.4592GR). All parents provided signed, voluntary consent for themselves and their children to participate.

3.3.2 Participants

Mother-child social exchanges were observed in 100 mother-child dyads taking part in laboratory-based assessments at the Neurodevelopment Assessment Unit (NDAU). Families were recruited via referrals from teachers and Special Educational Needs Coordinators (SENCOs) at local schools in South Wales for emotional and behavioural problems. At the time of their participation, children's mean age was 75 months (6.22 years; range = 51 – 117 months) and 29% of the children were female. Fifteen percent of the children came from households with incomes below £10,000, 32% between £10,000 and £20,000. According to UK household income poverty definitions, which is estimated as income below the threshold of £17,760 (60% of median UK income of £29,600) (Office for National Statistics, 2019), it is estimated that around 40% of families were living within poverty. Full demographic details can be found in Table 1.3.

3.3.3 Procedure

During a 3-hour laboratory visit, children completed a battery of computerised and non-computerised tasks while mothers completed questionnaires on their child's emotional and behavioural functioning as part of the wider Neurodevelopment Assessment Unit (NDAU) project. For the current study, data from a novel interaction with an unfamiliar researcher (adapted from Lab-TAB the "Stranger Approach" episode to include the presence of the mother) were used. Mother and child displays of emotion and behaviour during the task were video recorded for later analysis. Time codes (i.e., onsets and offsets of emotion displays and behaviour) were extracted via Mangold INTERACT 18.1 (Mangold, 2017).

3.3.4 Measures

Mother-child interaction

Laboratory temperament assessment battery (Lab-TAB) 'Stranger Approach' episode (Goldsmith et al., 1993)

Laboratory measures of children's regulation abilities in the context of stress have the advantage of using standardised procedures that can be controlled by the experimenter to elicit specific emotions or behaviours of interest (Majdandzic & van den Boom, 2007; Zeman et al., 2007). Observational measures in particular utilise objective criteria to code observed emotions and behaviour which precludes bias often found in parents' interpretations of child behaviour. In the present study, the child's social approach to a novel experimenter during introduction to the lab setting was observed. While seated with their mother, children were approached and greeted by this unfamiliar person. The stranger attempted to interact with the child, asking a set of questions (full details and examples can be found in Appendix 7).

Child negative and positive emotion and mother's coregulatory behaviours were recorded for 3 minutes enabling observation of social communication processes based on facial expressions and verbal and non-verbal behaviour. Interactions were coded based on the procedures of Kochanska (1995) and Deater-Deckard et al (1997). The occurrence (i.e., onset and offset) of mother and child behaviour was denoted by mutually exclusive and exhaustive

coding categories in real-time over the course of the interaction. Coders were trained extensively to a criterion of 80% agreement before proceeding onto observation recordings derived from the participants in the current study. Weekly meetings were undertaken to minimize observer drift. Disagreements were discussed at the weekly meetings and where needed, recordings were reviewed by both coders and subsequently recoded so that sufficient agreement was attained. Two members of the coding team independently coded 10% of the video recordings to assess coder agreement and were blind to which recordings were used to assess reliability. Time-unit kappa was used to examine inter-rater agreement between pairs of time units in the GSEQ program (GSEQ5.1 program; Bakeman & Quera, 2011). A 3-second time tolerance was used, thus agreement occurred if a code was assigned by the first coder 3 seconds before or after the same code was assigned by the second coder. Reliability analyses indicated good agreement (ranging from 77-78%) with time-unit kappa's ranging from 0.73 and 0.75.

Table 3.1 Description of adapted Lab-TAB “Stranger Approach” episode.

| Lab-TAB episode | Description | Child expressive behaviours | Child coping behaviours |
|-------------------|---|---|------------------------------|
| Stranger Approach | Elicits fear-related stress through an encounter with an unfamiliar adult | Negative emotions (e.g., fear, anger) Positive emotion (e.g., sociability) | Active and social engagement |

Note: Based on Provenzi et al (2017)

Table 3.2 Coding scheme for adapted Lab-TAB “Stranger Approach” episode.

| Behavioural code | Examples |
|--|---|
| Child | |
| <u>Negative emotion</u> | |
| Expressions of fear, anger/frustration | Facial and vocal expressions of negative emotion (e.g., screaming, crying, whining, |
| Social withdrawal | Orienting away from stranger or mother with body movements, averting gaze |
| Disruptiveness | Acts to disrupt or avoid interaction (e.g., deliberately refusing to speak; noncompliance with mother’s requests) |
| <u>Positive emotion</u> | |
| Independent social engagement (autonomy) | Vocalisations to stranger (e.g., initiations, responses) |

MotherSupportive coregulatory behaviour

Physical comfort

Initiates physical contact (e.g., hugging, stroking)

Autonomy support

Facilitative behaviours that foster child's autonomy (e.g., gestures such as nodding when child initiates engagement with stranger, elaborating on child's vocalisations, verbal acknowledgement of child's emotion display, attempts to reframe negative emotion expressions)

Positive directives

Attempts to refocus child's attention, instructive behaviours (e.g., verbal prompts to respond to stranger's questions, leading interaction through asking child specific questions)

Unsupportive coregulatory behaviour

Negative directives

Hostility: Criticisms of child (e.g., of child's emotion expression, behaviour or ability), shouting at child, eye rolling, physical aggression.

Intrusiveness: Taking over interaction (e.g., interrupting child, speaking over child)

Coded data extracted from Mangold INTERACT files were transformed to include a dichotomous variable which indicated whether the emotion or behaviour had or had not occurred during each second of the task. This data was then used to test the hazard models of child negative emotionality and adaptive social behaviour, and maternal co-regulation of child negative emotion displays and adaptive social behaviour.

Child emotion displays

Children's emotion displays were coded independently of mother's behaviours. Coders recorded instances where children engaged in each of the following behaviours both verbally and non-verbally: Negative emotion (i.e., anger, behavioural inhibition and irritability, and disruptiveness), positive emotion (i.e., autonomous interaction with the experimenter). Instances of social approach could be verbal (e.g., initiating conversation with the stranger or responding to the stranger's questions) or behavioural (e.g., approaching the stranger or orienting attention towards the stranger). Use of autonomy was coded when children

independently persisted in the task without their mothers' prompting (e.g., independently interacting with the stranger, taking the lead in conversations). Negative emotion was coded when children exhibited anger/fear, became irritable or disruptive, or withdrew from the interaction.

Mother coregulatory strategies

Codes for mothers' coregulation strategies during the interaction task were based on investigations of scaffolding by Kochanska (1997) and Peterson et al (2008). Coders recorded instances where mothers engaged in each of the following behaviours both verbally and non-verbally: positive directives, autonomy supporting, hostility, and intrusion. Positive directives were coded when mothers used commands to elicit a specific response or behaviour. Autonomy support was coded when mothers used speech or gestures to support children's autonomy (independent initiations), or when mothers followed their child's lead. For example, complying with child's request or providing the child with opportunities to make choices. Hostility was coded when mothers criticised the child or displayed rejection. Lastly, intrusion was coded when mothers verbally or physically took over the interaction.

Child effortful control

Different instruments have been used to measure effortful control in early childhood, including parental report (e.g., the Children's Behaviour Questionnaire (CBQ; Rothbart et al., 2001) which provide global measures of children's self-regulation and laboratory tasks (e.g., Effortful Control Battery) (ECB; Kochanska et al., 2000) which provide more state-like indices of children's effortful control, but vary in terms of which aspects of effortful control they tap into. From a DS perspective, the child's ongoing emotional state may be key, and the duration of a child's emotion display has been suggested to reflect the child's self-regulatory ability, i.e., the ability to inhibit (or down-regulate) an emotion once it is initiated and displayed, as well as how long this down-regulation lasts. On this basis, the more time and effort a child needs to down-regulate an emotion display, the shorter the length of time till the next recurrence of this display (Snyder et al., 2003; Gardner et al., 1993). For the purposes of this task, effortful control was indexed by the duration of each episode of negative emotion across

the task period. More specifically, children's ability to resolve negative emotional states once they have been activated and sustain this downregulation over time. Longer durations indicated poor effortful control, illustrating a depletion of the children's regulatory capacity, resulting in regulatory failure.

Child autonomous motivation

A DS approach to children's motivation was used (Grolnick et al., 1991). Specifically, the duration of each episode of child autonomy across the task period was used to index this variable. Accordingly, increasingly longer durations over time indicated higher levels of autonomous motivation.

Child emotional and behaviour difficulties

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997)

The Strengths and Difficulties Questionnaire (SDQ) is a 25-item screening questionnaire for behavioural difficulties in children and young people aged 3-16 years. Mothers were instructed to rate their child's behaviour in the last 6 months across these items on a 3-point Likert scale (0 = not true; 1 = somewhat true; 2 = certainly true). The questionnaire consists of 5 subscales (emotional symptoms, hyperactivity/inattention, conduct problems, peer problems, and prosocial behaviour). A total difficulties score comprising the first four subscale scores was computed. This score indicates the extent of a child's socioemotional and behavioural difficulties. Additionally, a broader internalising subscale (combination of the emotional and peer problems subscales) and an externalising subscale (combination of the conduct problems and hyperactivity subscales) was created (Goodman et al., 2010). These broader subscales were categorised according to cut-off points recommended by Goodman et al (2010) indicating a high/very high score (9 out of 20 for the internalising subscale and 12 out of 20 for the externalising subscale). In instances where there were missing items, scale means were calculated from the remaining valid items regardless of the proportion of missingness for the scale. Good discriminative validity has been reported in typical and high-risk children (Goodman, 1999; Mullick & Goodman, 2001) and the SDQ has been shown to be effective in screening for psychiatric disorders in community samples (Goodman, 2001).

Table 3.3 Prevalence of emotional and behavioural difficulties in the sample.

| | Low/average | High/elevated |
|----------------|-------------|---------------|
| Internalising | 66 | 34 |
| Externalising | 39 | 61 |
| Total problems | 41 | 59 |

Note: % of children.

Maternal psychopathology

Hospital Anxiety and Depression Scale (HADS, Zigmond & Snaith, 1983)

The Hospital Anxiety and Depression Scale is a 14-item brief screening measure designed to assess symptoms of anxiety and depression in non-psychiatric populations, identifying individuals at elevated risk for anxiety and depressive disorders. Scores range from 0-21, with scores from 8-10 indicating borderline or abnormal levels and scores from 11-21 indicating abnormal levels warranting clinical assessment. To address missing items, scale means were calculated from the remaining valid items. Data was considered missing in instances where data was missing for more than 20% of items. This measure has been shown to have sensitivities of 82% and 70%, and specificities of 94% and 68%, for depressive and anxiety disorders respectively (Barczak et al., 1988). A Cronbach's alpha of 0.83 for anxiety and 0.82 for depression has also been reported (Bjelland et al., 2002).

3.3.5 Data analysis

Before examining associations between the aggregated variables (frequencies and durations of real-time emotion and behaviour) and risk factors, the distributions of the variables were explored. Variables indicating durations of child negative emotion, and mother hostility and intrusion were found to be skewed and so were log transformed. Pearson's correlations were conducted to establish associations between macro-level indices of emotion and behaviour and child and parent risk factors.

Statistical modelling of mother-child co-regulation

Statistical analyses were conducted in *R* (R Core Team, 2019) based on methods used by Snyder et al (2003). Multilevel survival analysis (MSA) was used to analyse children's displays of negative and positive emotionality and mother's use of coregulatory behaviours in real time. Full procedural details can be found in Chapter 2.

In the current study, mother and child risk factors theorised to influence emotional development were used as time-invariant covariates and maternal co-regulatory behaviours (i.e., autonomy-support, positive directives, hostility and intrusiveness) were used as time-varying covariates (predictors) to assess their moment-to-moment influence on timing of children's emotion displays. Specifically, state changes in these covariates were hypothesised to affect the hazard of child positive and negative emotion, either increasing or decreasing the time until the next occurrence. The data were also checked for right censoring for children who did not express negative and positive emotion, and mothers who did not display any coregulatory behaviours. The end of the task period (i.e., duration of task – 200 seconds) was used as the time to event for censored dyads.

Separate models were used to test each of the research questions. Hazard rates were used as individual parameters and converted (exponentiated) into hazard ratios for ease of interpretation. This indicated the ratio of the hazard rate for a one-unit increase of the covariate relative to the hazard rate without that increase (i.e., the likelihood relative to a constant value of 1). A value of more than 1 indicated the event was more likely to occur, and a value of less than 1 indicated the event was less likely to occur.

Specifically, these models examined:

1. The association between mother and child risk factors and the time until recurrent displays of positive and negative emotion.
2. Within-dyad changes in children's emotion displays, specifically, whether children's displays of negative emotion were, a) more likely in the seconds mothers used unsupportive coregulatory strategies than in the seconds they did not, and b) more

likely in the seconds mothers used supportive coregulatory strategies than in the seconds they did not.

3. Within-dyad changes in children’s emotion displays, ascertaining whether children’s displays of positive emotion were, a) more likely in the seconds mothers used unsupportive coregulatory strategies than in the seconds they did not, and b) more likely in the seconds mothers used supportive coregulatory strategies than in the seconds they did not.
4. Interactive effects between mother and child risk factors and mother coregulatory strategies on the time until recurrent displays of positive and negative emotion.

3.4 Results

The findings are presented in several sections. First, descriptive details of mother and child emotion and behaviour are provided. The second section describes how maternal coregulatory behaviours were associated with the time to recurrence of children’s positive and negative emotion displays. Lastly, interactive effects between mothers’ coregulatory strategies and child emotional and behavioural difficulties, effortful control, autonomous motivation, and maternal symptoms of anxiety and depression, on the timing of children’s positive and negative emotion displays are described.

Descriptive Statistics

Table 3.4 Means and standard deviations for risk child and parent risk factors.

| | M | SD | Range |
|------------------------------|-------|------|-------|
| Child total difficulties | 19.18 | 6.71 | 4-36 |
| Child internalising problems | 6.86 | 4.08 | 0-17 |
| Child externalising problems | 12.28 | 4.32 | 3-20 |
| Maternal anxiety | 6.68 | 3.65 | 0-17 |
| Maternal depression | 4.45 | 3.30 | 0-11 |

Note: Child total difficulties: SDQ, Child internalising problems (Emotional and Peer problems subscales), Child externalising problems (Conduct and Hyperactivity subscales). Maternal anxiety and Maternal depression (HADS)- Normal (0-7), Borderline (8-10), Abnormal (11-21).

Mother and child emotion and behaviour

Before reporting the results of the recurrent-events Cox regression model for time to child negative and positive emotion displays, descriptive statistics on the key variables are provided in Tables 3.5 and 3.6, detailing the average durations at which mother-child dyads displayed specific positive and negative emotions and behaviour.

Table 3.5 Descriptive statistics for child emotion displays.

| | Mean duration (SD) | Number of episodes | | |
|----------------------------------|--------------------|--------------------|---------|---------|
| | | Mean (SD) | Minimum | Maximum |
| Supportive coregulation | | 14.18 (5.73) | 2 | 26 |
| Autonomy support | 19.18 (12.16) | | | |
| Positive directives | 21.20 (13.32) | | | |
| Unsupportive coregulation | | 3.60 (2.45) | 1 | 11 |
| Hostility | 3.14 (2.45) | | | |
| Intrusiveness | 9.41 (18.14) | | | |

Note: SD: Standard deviation. No significant effect of gender or age on supportive or unsupportive coregulation.

Table 3.6 Descriptive statistics for mother coregulatory strategy.

| | Mean duration (SD) | Number of episodes | | |
|-------------------------------|--------------------|--------------------|---------|---------|
| | | Mean (SD) | Minimum | Maximum |
| Child emotion displays | | | | |
| Negative emotionality | 47.20 (39.19) | 7.1 (3.54) | 1 | 16 |
| Positive emotionality | 44.76 (31.84) | 12.21 (5.89) | 1 | 24 |

Note: SD: Standard deviation. No significant effect of gender on child positive and negative emotion displays. Significant correlation between age and child positive emotion displays ($r = .248, p = .018$).

Bivariate correlations

The results can be seen in Table A2.1 (Appendix 2). No significant associations were found between duration of child positive or negative emotion and any of the child and mother risk factors. Significant associations were found between duration of mother autonomy support and both child internalising difficulties ($r = -.310, p = .003$) and total difficulties ($r = -.222, p = .038$). Interestingly, duration of mother's intrusiveness and children's externalising difficulties were found to be inversely correlated ($r = -.313, p = .034$).

Primary Analyses

Effect of child emotional and behavioural difficulties, effortful control, autonomous motivation, and maternal psychopathology, on timing of child negative emotion displays

Cox Regression models revealed no significant associations between any of the maternal risk factors and the timing of children's displays of negative emotion. Only children's emotional problems (internalising difficulties) had a significant effect on the timing of children's negative emotion displays (hazard rate = 0.08, standard error (SE) = 0.04, $p = .021$, hazard ratio = 1.08) indicating shorter latencies until negative emotion displays for children with more emotional problems (i.e., recurrence of negative emotion was more likely in children showing high internalising problems). While children's autonomous motivation reduced recurrences of negative emotion (hazard rate = -1.76, standard error (SE) = 0.54, $p = .001$, hazard ratio = 0.17), effectiveness of children's effortful control was not significantly associated with the timing of their negative emotion displays (hazard rate = 0.21, standard error (SE) = 0.41, $p = .610$).

Table 3.7 Hazard rate estimates for child negative emotion.

| Predictor | Estimate | Standard Error | p | Hazard Ratio | 95%CI of Hazard Ratio |
|----------------------------|----------|----------------|------|--------------|-----------------------|
| Internalising difficulties | 0.08 | 0.04 | .021 | 1.08 | [1.01, 1.16] |
| Externalising difficulties | -0.03 | 0.04 | .450 | 0.97 | [0.91, 1.04] |
| Effortful control | 0.21 | 0.41 | .610 | 1.23 | [0.55, 2.74] |

| | | | | | |
|-----------------------|--------|------|------|------|--------------|
| Autonomous motivation | -1.76 | 0.54 | .001 | 0.17 | [0.06, 0.50] |
| Maternal anxiety | -0.003 | 0.04 | .940 | 1.00 | [0.91, 1.09] |
| Maternal depression | 0.01 | 0.05 | .870 | 1.01 | [0.91, 1.12] |

Note: Estimate: Hazard rate.

Main effect of mother’s coregulatory strategy, and interactive effects with child emotional and behavioural difficulties, and autonomous motivation on timing of negative emotion displays

The results are displayed in Table 3.8. As expected, mother’s use of autonomy support was associated with decreased likelihood of subsequent displays of negative emotion (hazard rate = -0.81, standard error (SE) = 0.32, $p = .012$, hazard ratio = 0.45), while no significant association was found with mothers’ use of positive directives (hazard rate = 0.26, standard error (SE) = 0.21, $p = .220$). Mother’s unsupportive coregulatory behaviour was not significantly associated with children’s displays of negative emotion.

Cox Regression models were then used to test whether children’s emotional and behavioural problems influenced the effect of mother’s coregulatory behaviour (i.e., moment-to-moment regulatory behaviours) on the timing of their recurring displays of negative emotion; specifically, whether child negative emotion was less likely when mothers used supportive coregulatory behaviours (i.e., autonomy support and positive directives), and more likely when mother’s used unsupportive coregulatory behaviours (i.e., hostility and intrusiveness); and whether this depended on the extent of children’s emotional and behavioural difficulties, and autonomous motivation.

Table 3.8 Hazard rate estimates for coregulation of child negative emotion.

| Predictor | Estimate | Standard Error | p | Hazard Ratio | 95%CI of Hazard Ratio |
|---------------------|----------|----------------|------|--------------|-----------------------|
| Autonomy support | -0.81 | 0.32 | .012 | 0.45 | [0.24, 0.84] |
| Positive directives | 0.26 | 0.21 | .220 | 1.29 | [0.86, 1.94] |
| Hostility | 0.08 | 0.47 | .870 | 1.08 | [0.43, 2.72] |
| Intrusiveness | 0.35 | 0.42 | .400 | 1.42 | [0.63, 3.22] |

| | | | | | |
|------------------------------|-------|------|-------|--------|---------------|
| Internalising difficulties x | | | | | |
| Autonomy support | -0.04 | 0.08 | .640 | 0.96 | [0.82, 1.13] |
| Positive directives | 0.13 | 0.05 | .010 | 1.14 | [1.03, 1.26] |
| Hostility | <.001 | 0.11 | .100 | 1.00 | [0.81, 1.24] |
| Intrusiveness | -0.01 | 0.09 | .920 | 0.99 | [0.83, 1.19] |
| Externalising difficulties x | | | | | |
| Autonomy support | -0.11 | 0.07 | .120 | 0.89 | [0.78, 1.03] |
| Positive directives | 0.04 | 0.04 | .350 | 1.04 | [0.96, 1.14] |
| Hostility | 0.06 | 0.11 | .570 | 1.06 | [0.86, 1.31] |
| Intrusiveness | 0.10 | 0.13 | .420 | 1.11 | [0.86, 1.42] |
| Autonomous motivation x | | | | | |
| Autonomy support | 1.23 | 1.33 | .360 | 3.41 | [0.25, 46.58] |
| Positive directives | 0.25 | 1.13 | .820 | 1.29 | [0.14, 11.76] |
| Hostility | 6.76 | 1.94 | <.001 | 863.14 | [19.27, >500] |
| Intrusiveness | 3.27 | 1.79 | .068 | 26.37 | [0.78, >500] |

Note: Estimate: Hazard rate.

A trend towards an increased likelihood of negative emotion in the seconds mothers were hostile was found in children with higher internalising difficulties (hazard rate = < .001, standard error (SE) = 0.11, $p = .100$, hazard ratio = 1.00). Interestingly, the interactions between children's internalising difficulties and mother's use of positive directives (hazard rate = 0.13, standard error (SE) = 0.05, $p = .010$, hazard ratio = 1.14) and between children's externalising difficulties and mothers' autonomy support (hazard rate = -0.11, standard error (SE) = 0.07, $p = .120$, hazard ratio = 0.89) revealed differing interaction effects on child negative emotion. At higher levels of internalising problems, recurrent displays of negative emotion were more likely when mothers used positive directives. Conversely, at higher levels of externalising problems, recurrent displays of negative emotion were less likely when mothers were autonomy supportive.

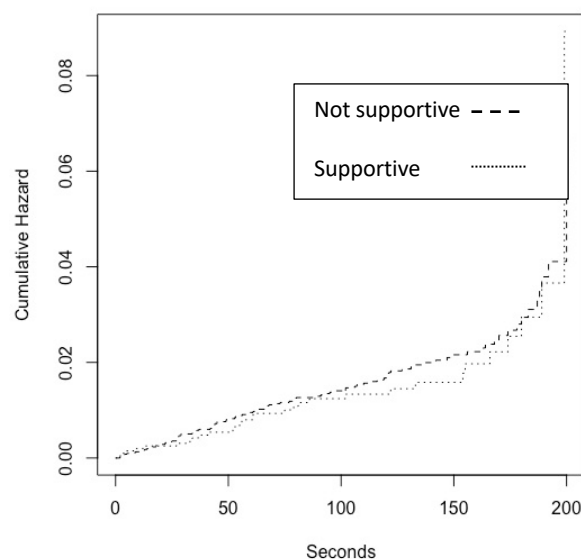


Figure 3.1 Likelihood of negative emotion during activation of supportive coregulation/no activation of supportive coregulation. Higher hazards indicate increased risk of negative emotion.

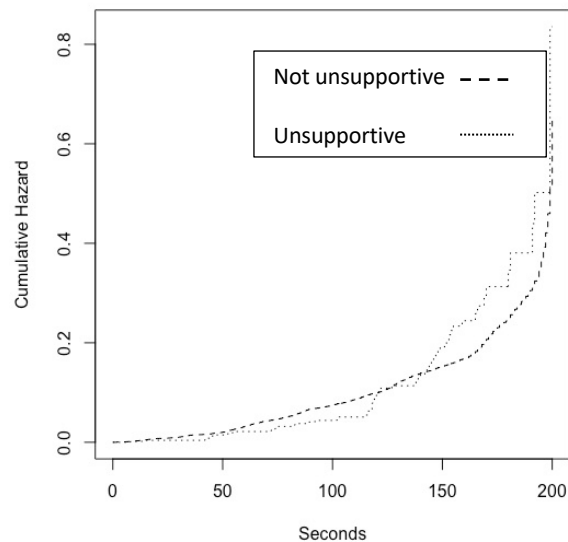


Figure 3.2 Likelihood of negative emotion during activation of unsupportive coregulation/no activation of unsupportive coregulation. Higher hazards indicate increased risk of negative emotion.

Effect of child emotional and behavioural difficulties, effortful control and maternal psychopathology, on timing of child positive emotion displays

Cox Regression models revealed no significant association between children’s internalising difficulties and the timing of their displays of positive emotion (hazard rate = $<-.001$, standard error (SE) = 0.02, $p = .700$), and between children’s externalising difficulties and the timing of their positive emotion displays (hazard rate = $<.001$, standard error (SE) = 0.02, $p = .820$). Poor effortful control was significantly associated with the timing of children’s positive emotion displays (hazard rate = -0.75, standard error (SE) = 0.19, $p = <.001$, hazard ratio = 0.47), indicating that children with less effective effortful control in sustaining downregulation of negative emotion were less likely to display positive emotion. The findings revealed interesting patterns for maternal psychopathology. While there was no significant association between maternal anxiety and recurrence of children’s positive emotion displays (hazard rate

= 0.02, standard error (SE) = 0.02, $p = .310$), higher maternal depressive symptoms were marginally associated with reductions in children's positive emotion displays (hazard rate = $<-.001$, standard error (SE) = 0.03, $p = .100$, hazard ratio = 1.00).

Table 3.9 Hazard rate estimates for child positive emotion.

| Predictor | Estimate | Standard Error | p | Hazard Ratio | 95%CI of Hazard Ratio |
|----------------------------|-----------|----------------|---------|--------------|-----------------------|
| Internalising difficulties | $<-.001$ | 0.02 | .700 | 0.99 | [0.96, 1.03] |
| Externalising difficulties | $< .001$ | 0.02 | .820 | 1.00 | [0.97, 1.04] |
| Effortful control | -0.75 | 0.19 | $<.001$ | 0.47 | [0.32, 0.69] |
| Maternal anxiety | 0.02 | 0.02 | .310 | 1.02 | [0.98, 1.07] |
| Maternal depression | $< -.001$ | 0.03 | .100 | 1.00 | [0.95, 1.05] |

Note: Estimate: Hazard rate.

Main effect of mother's coregulatory strategy, and interactive effects with child emotional and behavioural difficulties, and effortful control on timing of child positive emotion displays

Cox Regression models were then used to test whether children's emotional and behavioural problems influenced the coregulatory effect of mothers' behaviour on the timing of children's recurring displays of positive emotion; specifically, whether positive emotion was more likely when mothers used supportive coregulatory behaviours (i.e., autonomy support and positive directives), and less likely when mother's used unsupportive coregulatory behaviours (i.e., hostility and intrusiveness); and whether this depended on the extent of children's emotional and behavioural difficulties, and effortful control. The results are displayed in Table 3.10. Mother's use of hostility (hazard rate = -1.15, standard error (SE) = 0.45, $p = .011$, hazard ratio = 0.32) and intrusiveness (hazard rate = -1.04, standard error (SE) = 0.30, $p = .001$, hazard ratio = 0.35) was associated with decreased recurrence of child displays of positive emotion. Interestingly, positive directives (hazard rate = -1.29, standard error (SE) = 0.19, $p < .001$,

hazard ratio = 0.27) and autonomy support (hazard rate = -0.46, standard error (SE) = 0.14, $p = .001$, hazard ratio = 0.63) reduced displays of positive emotion.

There was a marginally significant interaction between children’s internalising difficulties and mothers’ intrusiveness, resulting in reduced recurrence of positive emotion (hazard rate = -0.13, standard error (SE) = 0.08, $p = .120$, hazard ratio = 0.88). This indicated that unsupportive coregulation had a particularly negative impact on higher internalising children. Interactions between children’s internalising difficulties and mothers’ positive directives (hazard rate = -0.07, standard error (SE) = 0.05, $p = .130$, hazard ratio = 0.93) pointed to low receptiveness to supportive coregulation of positive emotion in these dyads. No significant interactions were found with children’s effortful control.

Table 3.10 Hazard rate estimates for coregulation of child positive emotion.

| Predictor | Estimate | Standard Error | p | Hazard Ratio | 95%CI of Hazard Ratio |
|------------------------------|----------|----------------|--------|--------------|-----------------------|
| Autonomy support | -0.46 | 0.14 | .001 | 0.63 | [0.48, 0.84] |
| Positive directives | -1.29 | 0.19 | < .001 | 0.27 | [0.19, 0.40] |
| Hostility | -1.15 | 0.45 | .011 | 0.32 | [0.13, 0.77] |
| Intrusiveness | -1.04 | 0.30 | .001 | 0.35 | [0.19, 0.64] |
| Internalising difficulties x | | | | | |
| Autonomy support | -0.05 | 0.03 | .190 | 0.96 | [0.89, 1.02] |
| Positive directives | -0.07 | 0.05 | .130 | 0.93 | [0.84, 1.02] |
| Hostility | 0.17 | 0.12 | .160 | 1.18 | [0.94, 1.49] |
| Intrusiveness | -0.13 | 0.08 | .120 | 0.88 | [0.75, 1.04] |
| Externalising difficulties x | | | | | |
| Autonomy support | 0.03 | 0.03 | .340 | 1.03 | [0.97, 1.10] |
| Positive directives | 0.07 | 0.05 | .130 | 1.08 | [0.98, 1.18] |
| Hostility | 0.13 | 0.13 | .300 | 1.14 | [0.89, 1.45] |
| Intrusiveness | 0.04 | 0.11 | .730 | 1.04 | [0.83, 1.29] |
| Effortful control x | | | | | |
| Autonomy support | -1.02 | 0.67 | .130 | 0.36 | [0.10, 1.34] |
| Positive directives | -0.38 | 0.84 | .650 | 0.68 | [0.13, 3.61] |
| Hostility | 1.59 | 1.88 | .400 | 4.88 | [0.12, 194.17] |
| Intrusiveness | -3.10 | 2.59 | .230 | 0.04 | [0.00, 7.16] |

Note: Estimate: Hazard rate.

3.5 Discussion

Situations, events and stimuli can evoke a range of positive and negative emotional responses; however, the management and regulation of these emotional experiences have been argued to play a crucial role in psychological functioning and wellbeing (Denham, 2007). According to DS theory, this regulation process involves both negative and positive feedback loops in the emotion system that work to either amplify or dampen emotions and reinforce or crystallise patterns of emotional responding over time. Importantly, these mechanisms also play a role in how the emotions of social partners become interconnected (Butler, 2011). The present study sought to examine the dynamic processes underlying mother-child coregulation as the early caregiver relationship (particularly with mothers) is thought to have key implications on children's social and emotional development. Specifically, this study used a social approach paradigm designed to elicit negative emotional arousal and low social approach to assess how mother-child dyadic coregulation can effectively reduce expressions of child negative emotion and increase expressions of child social adaptiveness (positive emotion). In doing so, it illustrates the reciprocal dynamics between maternal socialisation behaviours and child emotion.

Initial bivariate correlations revealed significant associations between parent-reported internalising behaviour (emotional and peer problems) and duration of maternal autonomy-support. Given that only 34% of children were rated by their mothers as experiencing elevated internalising difficulties on the SDQ and mean scores were generally below the clinical cut-off, this finding may point to a general lack of autonomy support (i.e., efforts to scaffold children's autonomous behaviour) even amongst parents of children rated as average in internalising difficulties. This also highlights the utility of examining emotional problems dimensionally (or continuously); patterns of parenting across the scale of child difficulty may be overlooked by categorisation. Interestingly, no significant associations were found between maternal risk factors (i.e., maternal psychopathology) and macro-level child emotion, yet as will be discussed below, this study was able to pick up variations in temporal contingencies.

Interdyadic (between-dyad) social processes

Examination of between-dyad variation in child negative and positive emotion as a function of mother and child risk factors revealed a significant effect of child internalising difficulties on the timing of children's negative emotion displays. Children rated as higher in internalising difficulties were more likely to display negative emotion (e.g., behavioural inhibition and irritability). Research has suggested that children's appraisals of situations as threatening or rewarding may determine tendencies toward approach or avoidance (Greenaway et al., 2015; Roth & Kubal, 1975). Internalising children may be sensitive to cues of threat and thus be motivated towards avoidance of emotion-eliciting situations.

Interestingly, whilst not statistically significant, the results pointed to increased likelihood of positive emotion displays (e.g., social approach) for children rated as higher in externalising difficulties. While research has demonstrated links between child positive emotion and self-regulation, with positive emotion promoting children's self-regulation by orienting attention to goals (Carver, 2003) and enhancing self-regulated conduct in interactions with parents (Kochanska et al., 2005), other research has pointed to the role of positive emotion in self-regulatory deficiencies. Particularly, strong approach and high-intensity pleasure has been associated with impulsivity and poor regulation of behaviour (Putnam et al., 2006; Rothbart et al., 2001; Rothbart & Bates, 2006). Accordingly, an overactive Behavioural Approach System has been linked to reward sensitivity and poor executive function skills in tasks that engage effortful attention (Blair et al., 2004). The higher levels of social approach may be reflective of individual differences in the strength of children's approach and novelty-seeking tendencies. Future research could incorporate other aspects of positive emotionality such as verbal and non-verbal expressions of joy (e.g., laughter and excitement). This study also found that poor effortful control was associated with reductions in positive emotion; coupled with the notion that poor effortful control may be more associated with less rule-compatible conduct in externalising children, this further highlights the heterogeneity in children's emotional responding. Further, the associations between maternal anxiety, maternal depression, and children's positive emotion displays point to the utility of the micro-level methods applied. While no correlations were found between maternal anxiety or depression and total duration of child emotion, this study found decreased recurrence of positive emotion in dyads with depressed mothers. This supports previous findings on parental

psychological functioning and emotional responding during parent-child interactions (Hay et al., 2003; Silk et al., 2006; Van Bommel et al., 2018).

We know from research reviewed earlier in this chapter that; social partners may come to act as stimuli for one another such that one partner's emotions elicit an emotional response in the other (Lorber & Smith, 2005). Social partners may also actively attempt to manage or regulate each other's emotional behaviour during distress or conflict (Diamond & Aspinwall, 2003; Zaki & Williams, 2013). This reflects the coupling (organisation) of each partner's fluctuating emotions (i.e., the dynamics of one partner's emotions influencing the dynamics of the other partner's emotions). Interpersonal contexts provide ample opportunities for researchers to examine how partners may be pulled in to or out of coordination, and whether their regulatory attempts have a mutually dampening or amplifying effect on the other's emotions and behaviour (Steele & Ferrer, 2011).

Intradynamic (within-dyad) social processes

Coregulation is an interpersonal emotional pattern that is considered to reflect the bidirectional influence of social partner's emotions and behaviour (Boker & Laurenceau, 2007; Chow et al., 2005). In the present study, the effect of mother and child emotional behaviour on one another reflected a negative feedback loop when the child's emotional expressions began to deviate from non-negativity, and the effect of the mother's coregulatory behaviour was to pull the child back towards non-negativity, ultimately moving the dyadic system into emotional stability. Conversely, a positive feedback loop ensued when the child's emotional expressions began to deviate from non-negativity, but the effect of the mother's coregulatory behaviour was to push the child into further negativity, ultimately moving the dyadic system into further emotional instability. This coincides with the notion of feedback loops in DS theory wherein interactions between components of the system (i.e., mother's supportive and unsupportive socialisation behaviour and child emotion) can have a reinforcing or inhibiting effect on the dyadic system. Thus, temporally contingent associations between mothers' supportive coregulatory behaviour and reductions in child negative emotion over time effectively models appropriate ways of coping that may inhibit maladaptive child emotion regulation over developmental time.

Though no temporally contingent association was found for mother's unsupportive coregulatory strategies (i.e., hostility and intrusiveness). In line with predictions, mothers' autonomy-support (supportive coregulatory strategies) were found to reduce the recurrence of subsequent child negative emotion displays. This lends support to previous studies reporting the protective effects of parental support on child coping (Calkins, 2010) which may have implications for the efficacy of parenting interventions aimed at increasing parental attunement to children's needs and goals (Denham et al., 2000; Mares & McMahon, 2020). Timely activation of scaffolding behaviours that are geared towards acceptance and understanding of child emotion seem to be effective in helping children immediately downregulate negative emotions and sustain this downregulation over time.

Autonomy-supportive parents engage in scaffolding behaviours that actively encourage children's independent problem-solving, and increase participation and choice (Grolnick & Ryan, 1989). They are responsive to their child's needs and their current level of competence, facilitating initiative during challenging situations and engaging in behaviours that foster children's motivation and mastery (Grolnick, 2009; Pomerantz & Grolnick, 2017). Particularly in school-aged children, autonomy-supportive parenting has been associated with increased engagement, social competence (Grolnick et al., 2012), and self-esteem (Grolnick et al., 2000).

As expected, in the present study, child positive emotion displays were less likely to recur in the seconds mothers employed unsupportive coregulatory strategies (i.e., hostility and intrusiveness). Interestingly, recurring child positive emotion displays (i.e., autonomous behaviour) were also less likely in the seconds mothers were autonomy-supportive or used positive directives. One interpretation of these findings is that responsiveness in interpersonal contexts reflects an accommodation of the mother and child to one another. Low receptiveness or responsiveness to the mother's supportive regulatory efforts may reflect disengagement. Interactions with children's emotional difficulties appeared to corroborate this as while mothers' supportive coregulatory strategies appeared to help children higher in externalising difficulties downregulate negative emotion and increase positive emotion, they were found to upregulate (i.e., increase) negative emotion displays and impede positive emotion displays in children higher in internalising difficulties.

Research has shown that individual differences in children's self-regulation capacities are a function of both child characteristics (e.g., temperament vulnerability) and the early child-caregiver relationship (Kim-Spoon et al., 2013). Thus, the child's ongoing emotional state and regulatory behaviour alongside the parent's regulatory efforts may influence the timing of children's emotional responses and behaviour. From a DS perspective, the ongoing duration of child negative emotion displays may reflect the child's capacity for effortful control, i.e., their ability to resolve negative emotional states once they have been activated and sustain this downregulation (Snyder et al., 2003). Longer durations indicate that the child's regulatory abilities may be depleted causing regulatory failure. In this study, poor effortful control of negative emotion was associated with the reductions in of child positivity, while motivational tendencies (i.e., high autonomous motivation) were associated with reductions in child negativity. Previous research has pointed to the interactive contributions of self-regulatory skills such as effortful control and children's motivation in terms of the child's tendencies toward approach or avoidance (e.g., Gray, 1991). Yet, these findings may particularly point to the specific protective role of motivation in the regulation of emotion such that, high motivation towards appropriate goals may orient the child away from "getting stuck" in cycles of negativity. Thus, it may serve as potential mechanism for altering negative attractors.

The start of formal schooling sees children's cognitive, attentional and regulatory skills become more refined, thus social environments that encourage mastery and motivation may be key during this developmental period. As shown in this study, children's motivational tendencies may also influence the support parents provide regarding basic psychological needs such as autonomy (Aunola et al., 2003). The present study touches upon maternal scaffolding practices and children's motivation and mastery beliefs, however future research could employ paradigms that directly elicit individual differences in children's motivational structures in non-distressing situations to further assess evocative effects on parent's coregulatory efforts. Research has suggested that failure to acquire the skills to independently manage emotional responses may lead to difficulty in extradyadic social interactions such as those with peers (Shields et al., 2001). Children who see interactions with unfamiliar others as threatening and develop a pattern of withdrawal (or low approach) from stimuli or situations that arouse these regulatory responses may display such tendencies in other social situations such as play, leading to an overreliance on ineffective regulatory behaviours

(Thompson & Calkins, 1996). Equally, children who act out or resort to disruptive behaviours when faced with such situations may engage in such strategies with peers and escalate more conflict. Therefore, use of a variety of interactional contexts (e.g., cooperative play) could reveal how interpersonal processes play out across contexts and tap into other structural and organisational processes such as dyadic flexibility.

Limitations and suggestions for future research

The findings of the present study have promising implications for the field, particularly in terms of a shift to more advanced statistical methods of examining interpersonal processes in parent-child interactions. Multilevel Survival Analysis (MSA) has the advantage of being able to incorporate time as well as the sequencing of behaviour between social partners. This method also enables researchers to investigate both time-invariant and time-varying factors simultaneously. Such data is fundamental to our understanding of the role of emotion dynamics in the development and socialisation of emotion regulation to elucidate sources of risk and resilience. However, a number of limitations were highlighted in the present study. The dynamics of interpersonal processes in parent-child interactions may depend on the social goals and task contexts that organise these interactions. This study focused on a mildly novel situation that elicited low social approach, however, it may be useful to examine these interpersonal dynamic processes across contexts using other modelling techniques (e.g., Competing Hazard models; Stoolmiller & Snyder, 2006). In addition, developmental outcomes also change with time, thus there could be interactions between these developmental changes and the interpersonal processes examined in this study across different developmental periods. Over the course of development, new age-related interpersonal processes may emerge as a result of new developmental milestones being reached, changing parenting styles, and increasing influence of extra-dyadic interactions (e.g., peers). This further points to the need for longitudinal assessments of the dynamics of interpersonal processes.

This study focused on process-oriented aspects of parent-child emotion processes (i.e., emotion coregulation) in light of the conceptual overlap in the literature. However, the unclear findings on the influence of mothers' unsupportive coregulatory behaviour may point

to the need to incorporate additional statistical methods. Research has questioned the conceptualisation of ineffective coregulation (or codysregulation). For example, Butner et al (2005) argue that if we define coregulation in terms of emotional oscillations between social partners then methods that reveal more complex oscillatory patterns such as the dampening or amplification of emotions arising from regulatory dynamics could be adopted. Alternative methods such as coupled linear oscillatory (CLO) models have been recently suggested to be able to directly measure these processes. Future research could use these methods to examine the stability of fluctuations in unsupportive coregulation and child negative emotion (Reed et al., 2015). This could be particularly key for our understanding of the role of children's regulatory behaviours in effortful downregulation and inform the development of parenting interventions aimed at reducing maladaptive socialisation behaviours. Further, these methods could be applied to the assessment of other aspects of emotions dynamics such as emotional escalation and de-escalation and the movement between these states (Hessler et al., 2013). Moreover, in order to obtain a comprehensive understanding of interpersonal processes, other components/aspects of emotion should be assessed. For example, emotional responding, physiological responses and behavioural changes could be assessed simultaneously.

The possible involvement of other factors such as parental appraisals of the child's behaviour and ability; cognitive processes that may be at play during parent-child interactions (Ansari et al., 2020; Gagne et al., 2018), must also be considered. Parenting practices such as scaffolding behaviours may be rooted in the parent's own philosophies of emotion (i.e., thoughts, feelings, and approaches to their own and their children's emotions) (Gottman et al., 1996). Parents with emotion-dismissing philosophies may invalidate their children's emotions, or haphazardly seek to avoid or protect their child or themselves from negative emotions. They may also be less aware of low-intensity emotions in their children (Lunkenhimer et al., 2007). Thus, examining the influence of parent's emotion philosophies on the timing of their emotional and behavioural responses might yield interesting insights into the links between emotion and cognitive processes in the context of the parent-child relationship.

Conclusions

The recent uptake of advanced statistical modelling tools has made it easier to empirically examine dynamic theories of interpersonal emotion systems in parent-child dyads, particularly parent-child coregulation processes. The present study used MSA to test predictions that maternal socialisation behaviours (indexed as supportive and unsupportive coregulatory strategies) would influence the timing of children's displays of negative and positive emotion during a novel interaction with an unfamiliar person. The downregulating effect of mother's supportive coregulatory behaviour on child negative emotion coincides with theories of maternal scaffolding and points to the importance of mothers' acceptance and acknowledgement of child negative emotion. Surprisingly, both mother's supportive and unsupportive coregulatory behaviours failed to enhance positive emotion displays in children; and child maladjustment was associated with low receptiveness to supportive coregulatory behaviour. Further investigation into related cognitive processes may shed light on the lack of receptiveness or possibly low levels of attunement/attachment bonds in such dyads.

Chapter 4

The child in the mother's mind: Reconceptualising maternal sensitivity

4.1 Abstract

Objectives. Research has evidenced the role of parenting cognitions in parenting behaviour, the parent-child relationship and children's emotional development. Yet, much of this research has focused on the affective content of parenting cognitions and has relied on global measures of parent-child interaction. The present study examined the influence of maternal narrative coherence and the dynamics of mother-child coregulation of positive and negative emotion in 100 dyads (29% of the children were female with a mean age of 75 months) during the Lab-TAB "Stranger Approach" episode (Goldsmith et al., 1993). **Method.** Multilevel Survival Analysis (MSA) was used to predict the timing of mothers' supportive (i.e., autonomy support and positive directives) and unsupportive (i.e., hostility and intrusiveness) coregulatory strategies, examining the influence of maternal narrative coherence and other mother (i.e., maternal symptoms of anxiety and depression) and child (i.e., emotional and behavioural difficulties and effective effortful control) risk factors. **Results.** Higher levels of narrative coherence were associated with mother's increased engagement in supportive socialisation practices (i.e., autonomy support), and with marginally higher levels of contingent responsiveness with children's displays of positive emotion (i.e., autonomous behaviour). Furthermore, the findings pointed to a trend towards increases in positive emotion displays following supportive coregulatory strategies in children of more coherent mothers. Narrative coherence also reduced mothers' engagement in unsupportive coregulatory strategies with children with poorer effortful control in downregulating negative emotion. **Conclusions.** Narrative coherence enhances mothers' abilities to enact supportive coregulatory strategies and is associated with mother's successful regulatory efforts in enhancing child positivity and reducing child negativity.

Keywords: narrative coherence, coregulation, dynamic systems, socialisation

4.2 Introduction

Chapter overview

This chapter has three goals. First, the constructs of parental sensitivity and responsiveness are examined within the framework of Attachment Theory. Second, links between these constructs and socialisation practices are described, with a discussion on how current conceptualisations of parental sensitivity and responsiveness can be expanded to incorporate the parent's thoughts, attitudes, and beliefs. Third, this chapter describes how Dynamic Systems theory can help us understand the influence of parenting cognitions on parent-child interaction, drawing from links with Differential Emotions theory. Lastly, this chapter will use an attachment-based measure of parenting cognitions to examine links between parent's thoughts and feelings about their child and their relationship and interpersonal processes during mother-child social exchanges; identifying whether adaptive coregulatory patterns are associated with more adaptive cognitive processes. In meeting these goals, this study extends current literature on the links between parenting cognitions and parenting behaviour, providing key insights that can inform clinical practice and intervention efforts.

Literature review

Children exhibiting internalising and externalising problems in childhood are considered to be at a higher risk of psychopathology and continuing maladjustment into adolescence (Campbell et al., 2000). Developmental research has sought to identify factors associated with the emergence and maintenance of children's emotion and behavioural problems and protective factors that can inform preventative intervention efforts. Alongside emotion regulation (i.e., the ability to modify one's emotional experiences), cognitive processes have also been implicated in the development of psychopathology (Bell, 2004; Sheppes et al., 2015). In the context of the parent-child relationship, research has highlighted the role of negative schemas and maladaptive information processing (e.g., erroneous interpretations of others' emotions and behaviour), with maladaptive schemas thought to produce errors in information processing through its influence on what the parent attends to and how they process their beliefs about the child and the parent-child relationship (Izard et al., 2008).

Antecedents of attachment in the context of the parent-child relationship

A large body of research has evidenced the influence of the parent-child relationship on child development. Prominent frameworks such as Bowlby's (1988) attachment theory emphasised the importance of responsive caregiving for the development of secure attachment relationships and in turn, reduced risk of psychological difficulties later in life (Groh et al., 2016). Attachment theory also highlights the central role parents (or the primary caregivers) play in shaping the child's expectations about the protection and availability of others (Ainsworth et al., 2015; Jack, 2010; Mikulincer et al., 2003). One fundamental concept introduced by proponents of attachment theory such as Ainsworth et al (1974) is parental sensitivity. Defined as the parent's ability to recognise and interpret their child's signals and respond appropriately (Lavallée et al., 2019), it has traditionally been used to characterise the quality of early parent-child relationships. Attachment theory postulates that parents' consistent and sensitive responding promotes security in the parent-child relationship through nurturance and protection and facilitating the child's exploration of their environment. Hostile interactions are thought to provide few opportunities for parents to model (and children to learn) adaptive ways of coping with stress (Gottman et al., 1996), instead teaching children to avoid rather than attempt to understand negative emotional experiences (Cummings & Davies, 1996; Eisenberg et al., 1998). In contrast, parents who are emotionally available, sensitive and responsive to their child's needs reduce the child's emotional distress by empowering children to cope adaptively in difficult situations independently (Klimes-Dougan & Zeman, 2007; Ispa et al., 2017). However, differences in how parental sensitivity and attachment have been measured (Fearon & Roisman, 2017) have resulted in mixed findings. For example, high levels of responsiveness may not always coincide with adaptive attachment relationships when maternal behaviours are inappropriate (e.g., intrusive or inconsistent with the child's needs or goals) (Nievar & Becker, 2007). This points to the complexity of constructs such as parental sensitivity and calls into question whether current conceptualisations and operationalisations of parental sensitivity adequately capture its complexity (Lohaus et al., 2001). Micro-level measures of temporal contingency may thus be better suited, providing an indication of both parental sensitivity and responsiveness by measuring the temporal interdependency of child and parent behaviours and ascertaining whether the parent's behaviour is attuned to the child's signals.

Sensitive parenting is said to be vital to a child's emerging sense of mastery and self-regulation (Cassidy, 1994). Research has argued that parent's socialisation efforts must be centred on sensitivity towards the child and knowledge of their child's thoughts and feelings in order to anticipate their responses and respond appropriately (Grusec et al., 2000). Responsiveness to child distress is considered key for children's adaptive regulation of negative emotion and positive engagement (Von Suchodoletz et al., 2011). Accordingly, child distress is a typical context in which individual differences in parental sensitivity can be revealed. Responsive parents provide their children with opportunities to learn effective strategies for coping with and managing negative emotions through the appropriate and well-timed modelling and coaching behaviours. This provides the child with enough opportunities to hone their regulatory skills. Such children may then be less likely to perceive emotionally arousing events or stimuli as threatening or beyond their control (Gottman et al., 1996; Thompson, 1994). Early studies showed that children of parents who respond to their distress punitively or negatively typically express negative emotions more intensely during peer interactions and exhibit greater negative emotionality and poorer regulation of behaviour (Fabes et al., 2001; Eisenberg et al., 1999). A more recent study by Shewark and Blandon (2014) found that children exhibited more negativity when their mothers were unsupportive of their positive emotions (i.e., reprimanding the child for laughing too loudly).

The methodological variation in parental sensitivity research further emphasises its multifaceted nature. Researchers have traditionally used global ratings and qualitative descriptions of relationship quality to study sensitivity and responsiveness and have demonstrated important links with children's social competence (Bretherton & Munholland, 2008) and behaviour (Thompson, 2008). While global methods have been helpful in detecting certain qualities of relationships and have been shown to reliably predict developmental outcomes, we must consider more fine-tuned analytical methods to tease apart parent-child interaction processes underlying these constructs. This may thus facilitate the identification of specific patterns or behaviours that could be targeted in clinical practice.

Macro-analytic approaches which use aggregates and descriptive qualities of behaviour, could be argued to still provide a unidirectional perspective of the parent-child relationship, overlooking the co-construction of interaction patterns (i.e., the influence of the parent and

child's emotions and behaviours in moving the dyad towards or away from adaptive and maladaptive states). Micro-level approaches have been shown to be more effective in providing a bidirectional perspective wherein both parent and child influence one another (Lunkenheimer et al., 2020). Moreover, micro-analytic methods take into account the temporal dimension of parent-child interactive processes- revealing changes in individuals and the dyadic system over time (Lunkenheimer et al., 2020).

Socialisation of child emotion regulation through parental sensitivity and responsiveness

Parenting serves as the main context in which the socialisation of children's social and emotional development takes place (Mikulincer et al., 2003). Research has typically assessed socialisation in two areas: events or situations eliciting distress (activating parental comforting or sensitive responding) and events or situations requiring the negotiation of compliance and discipline (Leerkes, 2011; Leerkes et al., 2012; McElwain & Booth-LaForce, 2006). Both require parents to accommodate and be understanding towards the child and balance the use of structure (through clear direction) with the child's need to feel that their behaviour is self-directed (i.e., autonomy). Research has highlighted a number of socialisation practices that have formed the basis of different conceptions of adaptive and maladaptive interactive patterns: security (protection), parental control, mutual reciprocity, and guided learning (Grusec and Davidov, 2010).

While research has reported associations between these socialisation practices and different socialisation outcomes (Grusec, 2011), it could be argued that they are all facets of parent-child mutuality or coregulation (i.e., the contingent and immediate responsiveness of parent and child to one another) as they reflect both the parent and child becoming accommodated (attuned) to one another (Kochanska, 2002; Grusec & Davidov, 2010). Importantly, as children's cognitive and attentional capacities develop, and their desire for mastery of the environment becomes more prominent, parent and child goals may not always be synonymous. Thus, changes in patterns of parent-child mutual responsivity (attunement) may vary as function of the developmental period. In this sense, parenting practices must be enacted so as to support children's growing competency and self-regulation.

Socialisation and attunement: The role of parental control

Barber (2002) modified Baumrind's (1971) typology of authoritarian and authoritative control, postulating two alternative forms of parental control: psychological control and behavioural control. Psychological control involves the parent's attempts to influence the child's emotional state through intrusiveness or withdrawal of love, demonstrating insensitivity to the child's emotional needs. Children of such parents are likely to develop internalising problems such as anxiety, depression or low self-esteem (Barber, 2002). Conversely, behavioural control involves parents' monitoring of their children's activities. These parents set reasonable rules or limits but do not enforce them in a way that impedes the child's autonomy. Accordingly, children of such parents have been shown to exhibit fewer externalising difficulties (Barber, 2002). Related to these notions of control is parent's use of autonomy support and provision of structure. Parental autonomy support is characterised by nonintrusive management of child behaviour, with parents providing appropriate choice and opportunities for independent problem-solving, facilitating the child's sense of autonomy. Provision of structure (or guidance) sets out clearly what is expected of the child, communicated in a way that makes the child willing to accept instruction and guidance. Such practices likely reflect parents' abilities to think flexibly about their child and acknowledge their child's thoughts, desires, goals and beliefs, in order to accurately interpret their communicative behaviours.

Expanding conceptualisations of sensitivity and responsiveness

Research suggests that parents who are knowledgeable about their child's thoughts and feelings are more successful in selecting effective parenting strategies and are more adept at matching their teaching and coaching behaviour to their child's developmental level. An early study by Miller et al (1996) found that parents' accuracy in predicting their child's cognitive performance predicted children's cognitive ability. Research has also looked at the role of parent knowledge in children's social development within the context of parent-child conflict. Hastings and Grusec (1997) found that parents reported better outcomes when they were more accurate about their child's thoughts and feelings during conflict. As Davidov and Grusec (2006) suggest, accurate parents acknowledge their child's perspective and respond in a way

that is likely to promote compliance and communicates sensitivity towards the child. This coincides with Eisenberg et al's (1998) earlier suggestion that the child's exposure to such sensitive and responsive caregiving facilitates children's abilities to identify and cope with their own negative emotional experiences as well as appropriately respond to the distress and needs of others.

Individual differences in what distresses children and how easily they can be comforted, further suggest a need to expand current conceptualisations of sensitive and responsive parenting. Individual differences in temperament, child effortful control (Tiberio et al., 2016) and motivation (Gray, 1991), for example, may mean that a particular parenting behaviour may be sensitively responsive for one child and not so for another child. Research has pointed to the role of parent's knowledge of their child and how accurate they are at predicting the child's thoughts and feelings as possibly explaining evocative effects of temperament on the effectiveness of parenting practices. Keil and Buss (2006) found that mothers' accuracy in predicting how their toddlers would respond in distressing situations partially predicted reductions in toddlers' fearful temperament. Thus, knowledgeable mothers may be better able to provide the optimal amount of sensitive prompting needed to reduce toddlers' hesitancy and withdrawal tendencies. These findings suggest that knowledge of the child's thoughts and feelings may be key aspect of parental sensitivity.

Perspective-taking, the ability to understand another person's internal frame of reference (Long, 1990) has been suggested to be a key antecedent of effective parenting (Soenens et al., 2007). Accordingly, a lack of willingness or ability to understand the child's point of view is said to lead to insensitive parenting and parent-child conflict (Lundell et al., 2008). In the context of self-determination theory, perspective-taking may facilitate parents' engagement in autonomy-supportive practices (Grolnick & Pomerantz, 2009; Grolnick & Ryan, 1989). For example, in order to give choice or facilitate the child's active participation (i.e., in decision-making or problem-solving) parents must first understand that their child's preferences, goals and desires may be different from their own. Moreover, in order to acknowledge the child's emotions or feelings, parents must first be attuned to them. Thus, perspective-taking enables parents to accrue knowledge about when and how to offer their child choices, provide

rationales for rules and limits, and empathise with their child's emotions, because it increases parents' sensitivity to their child's internal experiences.

Parenting cognitions and the parent-child relationship

Research has demonstrated the key role of parenting cognitions in parenting behaviour (Trapolini et al., 2008; McMahon & Meins, 2012), and has suggested that parental cognitions may moderate the relationship between parenting behaviour and child outcomes (Snyder et al., 2005). Patterson et al's (1992) early conceptions of coercion dynamics highlighted the key role of parent's selective tracking of child misbehaviour and overreactions when misbehaviour occurred; and pointed to the implicit and unconscious nature of these social interaction dynamics. In particular, Patterson et al suggested that parents' implicit and unconscious beliefs about the intentions and causes of their child's behaviour feed into negative parental responses that trigger and maintain coercive interactions. Recent evidence also corroborates these notions (Bullock & Dishion, 2007; Pasalich et al., 2011; Smith et al., 2013; Waller et al., 2012).

Originating from Bowlby's internal working model of attachment, the term relational schema refers to a parent's or caregiver's set of implicit beliefs and attitudes (i.e., cognitions) about the child and the parent-child relationship (Bullock & Dishion, 2007). These schemas guide actions and responses to interpersonal events (Hayes et al., 2001). Underlying this conception of relational schemata is the notion that we each have a blueprint for our expectations in relationships; they include beliefs about oneself within the context of the relationship and help us negotiate everyday interactions with our social partners (Koerner & Fitzpatrick, 2002; Honeycutt & Cantrill, 2001). They also enable us to evaluate our own and others' feelings and communicative behaviours within this relational context.

Koerner and Fitzpatrick (2002) earlier argued that interactions amongst family members function primarily to create family relationship schemata. Hence, during parent-child interactions, children learn about relational behaviour from their parents and internalise their parent's communicative acts. In this sense, both parent and child co-construct relational meaning- what constitutes the expectations, rules and norms within the parent-child

relationship. Importantly, parents' relational schemas are not only shaped by their everyday interactions with their children, but also by their own interpersonal histories such as negative childhood experiences (e.g., experiences of harsh parenting and rejection), which may influence how they perceive interactions with their own children. Studies have also highlighted the role of parental mental health in the attachment relationship- influencing both parental cognitions and parenting behaviour. For example, depressed parents have been found to have fewer child-centred goals, less positive affect, distorted evaluations of coercive parenting behaviour, and more negative attributions about their child and their own competency (Dix and Meunier, 2009). These findings suggest that parent characteristics such as mental health problems and distortions in parental cognitions about the child and the parent-child relationship can lead to more ineffective parent-child interactions, which in turn, can impede children's emotional development- particularly their emotion regulation ability.

Relational schemas may provide useful insight into the interaction patterns of dyads with children exhibiting emotional and behavioural difficulties. Schemas guide parents' evaluations of and responses to child behaviour, and attributions of the intent of their child's behaviour (Fonagy & Target, 1997). Accordingly, negative relational schemas could be denoted by a parent primed to expect noncompliance and perceive that their child is intentionally frustrating their attempts to parent even when the child is well behaved. Additionally, insights provided by examinations of relational schemas could help inform family-centred intervention efforts for families with such children (Hill, 2002). Early research evidenced differences between mothers of children with and without behaviour problems, with mothers of difficult children being more likely to read ambiguous behaviours as intentionally defiant (Strassberg, 1997; Harrison & Sofronoff, 2002). More recently Smith et al (2015) found that caregiver's negative relational schemas of their child and the parent-child relationship when the child was 2 years old was associated with the stability of coercive interactions at age 4, suggesting that parent cognitions may influence child emotional and behavioural outcomes through their influence on parenting behaviours. Smith et al (2013) also found that reductions in parent's negative relational schemas following a video feedback intervention for families with children with problem behaviour were fully mediated by reductions in coercive parenting behaviour at age 5 Hooley, 2007. Other studies have demonstrated links between parents' relational schemas and child maladjustment. Pasalich

et al (2011) found that less positive and more negative relational schemas were associated with higher conduct problems in children and were more prevalent in parents with externalising children.

Measuring parenting cognitions

In the context of parent-child relationships, these interrelated cognitive processes (i.e., relational schemas, attributions, and information-processing rules) form the parent's internal representations of the child. Attachment theory posits that the "coherence" of parents' narratives- the extent to which the parent can provide a clear, balanced and multifaceted portrayal of the child- is a key indication of the emotional climate of the parent-child relationship (Bowlby, 1982; Bretherton, 1990), with the coherence of the parent's narratives suggestive of the coherence of their internal representations. These mental (internal) representations guide how the parent interprets their child's behaviour as well as how they respond to their child during interactions (Bowlby, 1982; Main et al., 1985).

The Five-Minute Speech Sample (FMSS: Magaña et al., 1986; Sher-Censor & Yates, 2010) has been shown to be an effective measure of relational schemas which are considered to be involuntary cognitive processes as they operate outside of a parent's awareness. The FMSS is able to capture both conscious and unconscious affective attitudes (Bullock & Dishion, 2007) and has traditionally been used to assess expressed emotion, a construct used to understand family dynamics associated with psychopathology (Asarnow et al., 1982; McFarlane, 2006). More recently, the FMSS has been expanded to measuring coherence. In contrast to the psychiatric model which emphasises the affective content of parents' narratives (i.e., expressed emotion) (Hooley, 2007), attachment theory highlights the importance of the consistency and balance of parents' narratives – the organisation of parents' mental representations (Oppenheim, 2006).

Bowlby (1969) and Hesse (2008) argue that coherence is more strongly associated with parenting and child adjustment than the affective content of parents' narratives. While a narrative with a high number of positive comments about the child may indicate warmth and acceptance, it may also be indicative of an idealised and unidimensional representation of the

child, thus less coherent (Oppenheim, 2006). More recently, Sher-Censor et al (2013) found associations between FMSS-Coherence (but not FMSS-Expressed Emotion) and pre-schoolers' positive portrayals of their relationship with their mothers, demonstrating that children can internalise the sensitive responding of coherent parents, and that parental sensitivity is reflected in positive representations of the parent-child relationship (Main et al., 1985). High levels of coherence in parents' narratives of their child and the parent-child relationship are thought to enable flexible interpretations of their child's behaviour and promote attuned responses to their child's needs, facilitating child adjustment (George & Solomon, 1996; Oppenheim, 2006). These parents are considered to hold accurate representations that acknowledge the child's strengths as well as challenging aspects of the child and the relationship (Ainsworth et al., 1974). Indicative of sensitive caregiving, such representations have been argued to contribute to the child's sense of security, competency and self-regulation skills (Dykas & Cassidy, 2011; Sroufe, 2005). Sher-Censor et al (2016) found higher externalising difficulties and lower peer acceptance in children with self-regulation difficulties with non-coherent mothers in comparison to children of coherent and non-coherent mothers without self-regulation difficulties, demonstrating the elevated risk of incoherent parent cognitions on children with emerging maladjustment. Research has also found lower reports of internalising and externalising difficulties in coherent mothers (Sher-Censor et al., 2018) as well as less observed externalising behaviours in children of coherent mothers (Sher-Censor & Yates, 2015).

Situating parenting cognitions within Dynamic Systems (DS) theory

Given the association between parental mental representations and parenting behaviour (i.e., qualitatively higher levels of sensitivity), research must identify the processes underlying these links. A DS approach may help ascertain how parenting cognitions feed into the timing of sensitive parenting behaviour (i.e., whether it increases or decreases temporal contingencies with child emotion and behaviour, and whether it fosters adaptive coregulation patterns). If these mental representations are accessible and responsive to real-time feedback during ongoing parent-child interactions, it is likely they form part of the positive and negative feedback loops from which interactive patterns emerge. Research is yet to ascertain associations between these affective-cognitive structures and the self-organisation of the

parent-child dyadic system. Such research efforts could help illuminate the complexities of parenting constructs such as sensitivity and responsiveness.

Differential emotions theory (Izard, 1971) posits that emotions are complex systems that create emotion patterns which stabilise over time through repeated activation. This systems perspective maps onto the principle of self-organisation in dynamic systems (DS) theory (Smith & Thelen, 1993; Thelen, 1989). Differential emotions theory postulates that emotion patterns stem from interrelations between the emotion system and cognitive system that then feed into positive and negative feedback loops that lead to the emergence of affective-cognitive structures (i.e., relational schema, attributions and appraisals). These structures are considered to function as attractors. Echoing notions of DS theory, through repeated person-environment and interpersonal interactions, the interrelated subsystems underlying these emergent forms and patterns (attractors), become consolidated and stabilise, giving rise to emotional experiences and emotion-cognition action tendencies that become increasingly predictable and determinant. In the context of emotion socialisation and the development of psychopathology, repeated cycles of unresponsive/insensitive parenting experiences may foster the emergence of other attractors that represent maladaptive coping or coregulation which continue to be maintained by maladaptive parenting cognitions (i.e., unbalanced mental representations of the child and the parent-child relationship). Understanding the relationship between these affective-cognitive structures and the dynamics of parent-child coregulatory processes, particularly dynamic indices of sensitive and responsive parenting, may prove key in not only accurately identifying the mechanisms of change in interventions aimed at parenting behaviour, but also provide further insight into how parenting cognitions shape interpersonal patterns in dyads with children with emerging psychopathology.

Studies have reported mixed findings of the effectiveness of family interventions. Huber et al (2020) reported improvements in both caregiving mental representations and parenting behaviour following an attachment-based family intervention (i.e., The Circle of Security Parenting Intervention) that were maintained at one-year follow up. Other research has reported stronger effects of attachment-based parenting programs on parenting behaviour than on cognitive processes (Smith et al., 2015). Video feedback interventions have also been

shown to reduce coercive parent-child exchanges and these changes were reported to be mediated by a reduction in parents' negative relational schemas (Smith et al., 2013). Bugental et al (2002) found that a cognitive appraisal-based family intervention with infants at risk of maltreatment reduced mothers' harsh parenting behaviours but positive changes in maternal cognitions did not mediate the effects of the intervention on maternal behaviour. These findings point to a lack of clarity on how parenting cognitions affect parenting behaviour. Moreover, most of these interventions were also aimed at the affective content of relational schemas, leaving the organisational features such as the 'coherence' of parent narratives less understood. While the affective content and cognitive structures of parenting behaviour may be linked, how the processes underlying them feed into one another needs to be further examined. Moreover, ascertaining associations between parental mental representations and real-time parenting behaviour could help us understand how and why interventions might exert effects on parenting behaviour before or without changing parenting cognitions. This has important implications for the development of effective intervention programs.

Purpose of the present study

The present study seeks to ascertain the relationship between maternal narrative coherence (as measured by FMSS-Coherence) and coregulatory patterns during mother-child interaction; examining whether a DS approach can demonstrate whether these mental representations are accessible and responsive to real-time feedback during ongoing mother-child interactions. This study tests the following predictions:

1. Higher levels of coherence will be associated with increased engagement in supportive coregulatory behaviour and decreased engagement in unsupportive coregulatory behaviour.
2. Higher levels of coherence will be associated with higher parental responsiveness (i.e., temporal contingency) to child positive and negative emotion displays.

3. Supportive coregulatory strategies will reinforce (i.e., upregulate) child positive emotion displays (i.e., autonomous behaviour) and resolve (i.e., downregulate) child negative emotion displays in children of more coherent parents.
4. Maternal psychopathology (symptoms of anxiety and depression) will moderate the relationship between maternal narrative coherence and mothers' engagement in supportive and unsupportive coregulatory strategies, such that there will be less recurrences of supportive coregulation and more recurrences of unsupportive coregulation in mothers with higher levels of psychopathology.
5. Child characteristics (i.e., effortful control and child emotion and emotional and behavioural difficulties) will moderate the relationship between maternal narrative coherence and mothers' engagement in supportive and unsupportive coregulatory strategies, such that there will be less recurrences of supportive coregulation and more recurrences of unsupportive coregulation in mothers with children with poorer effortful control and higher levels of emotional and behavioural difficulties.

4.3 Methodology

4.3.1 Ethical statement

The present study was approved by the School of Psychology Research Ethics Committee at Cardiff University (EC.16.10.11.4592GR). All parents provided signed, voluntary consent for themselves and their children to participate.

4.3.2 Participants

Mother-child social exchanges were observed in 100 mother-child dyads taking part in laboratory-based assessments at the Neurodevelopment Assessment Unit (NDAU). Families were recruited via referrals from teachers and Special Educational Needs Coordinators (SENCOs) at local schools in South Wales for emotional and behavioural problems. At the time of their participation, children's mean age was 75 months (6.22 years; range = 51 – 117

months) and 29% of the children were female. Fifteen percent of the children came from households with incomes below £10,000, 32% between £10,000 and £20,000. According to UK household income poverty definitions, which is estimated as income below the threshold of £17,760 (60% of median UK income of £29,600) (Office for National Statistics, 2019), it is estimated that around 40% of families were living within poverty. Full demographic details can be found in Table 1.3.

4.3.3 Procedure

During a 3-hour laboratory visit, children completed a battery of computerised and non-computerised tasks while mothers completed questionnaires on their child's emotional and behavioural functioning as part of the wider Neurodevelopment Assessment Unit (NDAU) project. For the current study, data from a novel interaction with an unfamiliar researcher (adapted from Lab-TAB the "Stranger Approach" episode to include the presence of the mother) were used. Mother and child displays of emotion and behaviour during the task were video recorded for later analysis. Time codes (i.e., onsets and offsets of emotion displays and behaviour) were extracted via Mangold INTERACT 18.1 (Mangold, 2017).

4.3.4 Measures

Mother-child interaction

Laboratory temperament assessment battery (Lab-TAB) 'Stranger Approach' episode (Goldsmith et al., 1993).

Laboratory measures of children's regulation abilities in the context of stress have the advantage of using standardised procedures that can be controlled by the experimenter to elicit specific emotions or behaviours of interest (Majdandzic & van den Boom, 2007; Zeman et al., 2007). Observational measures in particular utilise objective criteria to code observed emotions and behaviour which precludes bias often found in parents' interpretations of child behaviour. In the present study, the child's social approach to a novel experimenter during introduction to the lab setting was observed. While seated with their mother, children were

approached and greeted by this unfamiliar person. The stranger attempted to interact with the child, asking a set of questions (full details and examples can be found in Appendix 7).

Child negative and positive emotion and mother’s coregulatory behaviours were recorded for 3 minutes enabling observation of social communication processes based on facial expressions and verbal and non-verbal behaviour. Interactions were coded based on the procedures of Kochanska (1995) and Deater-Deckard et al (1997). The occurrence (i.e., onset and offset) of mother and child behaviour was denoted by mutually exclusive and exhaustive coding categories in real-time over the course of the interaction. Coders were trained extensively to a criterion of 80% agreement before proceeding onto observation recordings derived from the participants in the current study. Weekly meetings were undertaken to minimize observer drift. Disagreements were discussed at the weekly meetings and where needed, recordings were reviewed by both coders and subsequently recoded so that sufficient agreement was attained. Two members of the coding team independently coded 10% of the video recordings to assess coder agreement and were blind to which recordings were used to assess reliability. Time-unit kappa was used to examine inter-rater agreement between pairs of time units in the GSEQ program (GSEQ5.1 program; Bakeman & Quera, 2011). A 3-second time tolerance was used, thus agreement occurred if a code was assigned by the first coder 3 seconds before or after the same code was assigned by the second coder. Reliability analyses indicated good agreement (ranging from 77-78%) with time-unit kappa’s ranging from 0.73 and 0.75.

Table 4.1 Description of adapted Lab-TAB “Stranger Approach” episode.

| Lab-TAB episode | Description | Child expressive behaviours | Child coping behaviours |
|-------------------|---|---|------------------------------|
| Stranger Approach | Elicits fear-related stress through an encounter with an unfamiliar adult | Negative emotions (e.g., fear, anger) Positive emotion (e.g., sociability) | Active and social engagement |

Note: Based on Provenzi et al (2017)

Table 4.2 Coding scheme for adapted Lab-TAB “Stranger Approach” episode.

| Behavioural code | Examples |
|--|--|
| Child | |
| <u>Negative emotion</u> | |
| Expressions of fear, anger/frustration | Facial and vocal expressions of negative emotion (e.g., screaming, crying, whining, |
| Social withdrawal | Orienting away from stranger or mother with body movements, averting gaze |
| Disruptiveness | Acts to disrupt or avoid interaction (e.g., deliberately refusing to speak; noncompliance with mother's requests) |
| <u>Positive emotion</u> | |
| Independent social engagement (autonomy) | Vocalisations to stranger (e.g., initiations, responses) |
| Mother | |
| <u>Supportive coregulatory behaviour</u> | |
| Physical comfort | Initiates physical contact (e.g., hugging, stroking) |
| Autonomy support | Facilitative behaviours that foster child's autonomy (e.g., gestures such as nodding when child initiates engagement with stranger, elaborating on child's vocalisations, verbal acknowledgement of child's emotion display, attempts to reframe negative emotion expressions) |
| Positive directives | Attempts to refocus child's attention, instructive behaviours (e.g., verbal prompts to respond to stranger's questions, leading interaction through asking child specific questions) |
| <u>Unsupportive coregulatory behaviour</u> | |
| Negative directives | Hostility: Criticisms of child (e.g., of child's emotion expression, behaviour or ability), shouting at child, eye rolling, physical aggression. Intrusiveness: Taking over interaction (e.g., interrupting child, speaking over child) |

Coded data extracted from Mangold INTERACT files were transformed to include a dichotomous variable which indicated whether the emotion or behaviour had or had not occurred during each second of the task. This data was then used to test the hazard models of child negative emotionality and adaptive social behaviour, and maternal co-regulation of child negative emotion displays and adaptive social behaviour.

Child emotion displays

Children's emotion displays were coded independently of mother's behaviours. Coders recorded instances where children engaged in each of the following behaviours both verbally and non-verbally: Negative emotion (i.e., anger, behavioural inhibition and irritability, and disruptiveness), positive emotion (i.e., autonomous interaction with the experimenter). Instances of social approach could be verbal (e.g., initiating conversation with the stranger or responding to the stranger's questions) or behavioural (e.g., approaching the stranger or orienting attention towards the stranger). Use of autonomy was coded when children independently persisted in the task without their mothers' prompting (e.g., independently interacting with the stranger, taking the lead in conversations). Negative emotion was coded when children exhibited anger/fear, became irritable or disruptive, or withdrew from the interaction.

Mother coregulatory strategies

Codes for mothers' coregulation strategies during the interaction task were based on investigations of scaffolding by Kochanska (1997) and Peterson et al (2008). Coders recorded instances where mothers engaged in each of the following behaviours both verbally and non-verbally: positive directives, autonomy supporting, hostility, and intrusion. Positive directives were coded when mothers used commands to elicit a specific response or behaviour. Autonomy support was coded when mothers used speech or gestures to support children's autonomy (independent initiations), or when mothers followed their child's lead. For example, complying with child's request or providing the child with opportunities to make choices. Hostility was coded when mothers criticised the child or displayed rejection. Lastly, intrusion was coded when mothers verbally or physically took over the interaction.

Child effortful control

Different instruments have been used to measure effortful control in early childhood, including parental report (e.g., the Children's Behaviour Questionnaire (CBQ; Rothbart et al., 2001) which provide global measures of children's self-regulation and laboratory tasks (e.g., Effortful Control Battery) (ECB; Kochanska et al., 2000) which provide more state-like indices of children's effortful control, but vary in terms of which aspects of effortful control they tap

into. From a DS perspective, the child's ongoing emotional state may be key, and the duration of a child's emotion display has been suggested to reflect the child's self-regulatory ability, i.e., the ability to inhibit (or down-regulate) an emotion once it is initiated and displayed, as well as how long this down-regulation lasts. On this basis, the more time and effort a child needs to down-regulate an emotion display, the shorter the length of time till the next recurrence of this display (Snyder et al., 2003; Gardner et al., 1993). For the purposes of this task, effortful control was indexed by the duration of each episode of negative emotion across the task period. More specifically, children's ability to resolve negative emotional states once they have been activated and sustain this downregulation over time. Longer durations indicated poor effortful control, illustrating a depletion of the children's regulatory capacity, resulting in regulatory failure.

Child autonomous motivation

A DS approach to children's motivation was used (Grolnick et al., 1991). Specifically, the duration of each episode of child autonomy across the task period was used to index this variable. Accordingly, increasingly longer durations over time indicated higher levels of autonomous motivation.

Child emotional and behaviour difficulties

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997)

The Strengths and Difficulties Questionnaire (SDQ) is a 25-item screening questionnaire for behavioural difficulties in children and young people aged 3-16 years. Mothers were instructed to rate their child's behaviour in the last 6 months across these items on a 3-point Likert scale (0 = not true; 1 = somewhat true; 2 = certainly true). The questionnaire consists of 5 subscales (emotional symptoms, hyperactivity/inattention, conduct problems, peer problems, and prosocial behaviour). A total difficulties score comprising the first four subscale scores was computed. This score indicates the extent of a child's socioemotional and behavioural difficulties. Additionally, a broader internalising subscale (combination of the emotional and peer problems subscales) and an externalising subscale (combination of the conduct problems and hyperactivity subscales) was created (Goodman et al., 2010). These

broader subscales were categorised according to cut-off points recommended by Goodman et al (2010) indicating a high/very high score (9 out of 20 for the internalising subscale and 12 out of 20 for the externalising subscale). In instances where there were missing items, scale means were calculated from the remaining valid items regardless of the proportion of missingness for the scale. Good discriminative validity has been reported in typical and high-risk children (Goodman, 1999; Mullick & Goodman, 2001) and the SDQ has been shown to be effective in screening for psychiatric disorders in community samples (Goodman, 2001).

Table 4.3 Prevalence of emotional and behavioural difficulties in the sample.

| | Low/average | High/elevated |
|----------------|-------------|---------------|
| Internalising | 66 | 34 |
| Externalising | 39 | 61 |
| Total problems | 41 | 59 |

Note: % of children.

Maternal psychopathology

Hospital Anxiety and Depression Scale (HADS, Zigmond & Snaith, 1983)

The Hospital Anxiety and Depression Scale is a 14-item brief screening measure designed to assess symptoms of anxiety and depression in non-psychiatric populations, identifying individuals at elevated risk for anxiety and depressive disorders. Scores range from 0-21, with scores from 8-10 indicating borderline or abnormal levels and scores from 11-21 indicating abnormal levels warranting clinical assessment. To address missing items, scale means were calculated from the remaining valid items. Data was considered missing in instances where data was missing for more than 20% of items. This measure has been shown to have sensitivities of 82% and 70%, and specificities of 94% and 68%, for depressive and anxiety disorders respectively (Barczak et al., 1988). A Cronbach's alpha of 0.83 for anxiety and 0.82 for depression has also been reported (Bjelland et al., 2002).

Maternal narrative coherence

The Five-Minute Speech Sample (FMSS-Coherence; Sher-Censor & Yates, 2010)

The Five-Minute Speech Sample (FMSS) is a recently developed attachment-based measure used to assess both expressed emotion (FMSS-EE; Magaña et al., 1986) and narrative coherence (FMSS-Coherence; Sher-Censor & Yates, 2010). The FMSS requires parents/caregivers to speak about their child and their relationship with their child for five minutes. This speech sample is then transcribed and coded using protocols that examine levels of expressed emotion or narrative coherence. The present study analysed mothers' speech samples using the FMSS-Coherence protocol. Analysis via FMSS-Coherence requires transcripts to be coded using six subscales: focus, elaboration, separateness, concern/worry, acceptance/warmth versus rejection, and complexity. Scores on subcomponents are used to indicate a final score of mothers' levels of coherence (See Appendix 8).

Transcripts were coded using a rating scale ranging from 1 to 7 for each subscale. "Focus" was indicative of the parent's ability to remain focused on the child and on their relationship, making them the central theme of their verbal narrative. "Elaboration" assessed how rich in detail the verbal narrative was, with the low end of the continuum consisting of verbal narratives lacking meaningful content. "Separateness" indicated the parent's ability to relate to the child as a separate person with their own needs and desires. Low separateness could also be accompanied by boundary dissolution, wherein the roles of the parent and child are equal or reversed (i.e., the child as the best friend, the caregiver, or the partner). "Concern/worry" referred to the extent to which the parent expressed concern or worry about the child or their parenting. "Acceptance/warmth versus rejection" indicated the degree of acceptance and warmth towards versus the rejection of the child. "Complexity" referred to how balanced and comprehensive the parent's narrative was- the extent to which the parent provided a multifaceted picture of the child. Lastly "Coherence" was denoted as the integration of the former subscales; the degree to which the narrative focused on the child, conveyed a consistent, well elaborated, complex and realistic picture of the child, without overwhelming concern or significant problems with separateness. A narrative was classified as coherent when it received a score of 4 or above on the Coherence subscale.

Mothers were instructed to speak generally about their child and their relationship with them and encouraged not to focus on the reasons for the referral for assessment at the NDAU. The experimenter used the below instructions, also giving the mother the opportunity to ask any

questions. Mothers were also told that in the event of pauses they could wait and continue when they were ready. In line with Caspi et al (2004), in the event of long pauses (i.e., pauses longer than 30 seconds), the experimenter used non-leading prompts such as “how would you describe [child’s name] personality?”. Audio-recordings of mothers’ speech samples were transcribed by undergraduate psychology students who were part of the NDAU research team. Transcripts were coded by a second researcher who was blind to the aims of the study and was not involved in data collection. A third researcher coded 12% of the transcripts to assess reliability resulting in a total agreement of 70.95% across all subscales, with intraclass correlation coefficients found to range from 0.72 - 0.92; and an ICC of 0.96 for the final coherence score.

Excerpt from FMSS instructions:

“Now I’d like you to speak about [child’s name] for five minutes without any interruptions from me. While you do this, I will record what you say.”

“Can you tell me in your own words what kind of person [child’s name] is and how you get along?”

4.3.5 Data analysis

Before examining associations between the aggregated variables (frequencies and durations of real-time emotion and behaviour) and risk factors, the distributions of the variables were explored. Variables indicating durations of mother unsupportive coregulatory behaviour (i.e., hostility and intrusiveness), and child negative emotion were found to be skewed and so were transformed. Correlation analysis was used to establish associations between macro-level indices of emotion and behaviour and child and parent risk factors. The results can be seen in Table A3.1 (Appendix 3).

Statistical modelling of mother-child coregulation

Statistical analyses were conducted in *R* (R Core Team, 2019) based on methods used by Snyder et al (2003). Multilevel survival analysis (MSA) was used to analyse mother’s use of

coregulatory behaviours and children's displays of negative and positive emotion in real time (i.e., second-by-second). Full procedural details can be found in Chapter 2.

In the current study, mother and child risk factors theorised to influence mothers' socialisation behaviours and narrative coherence were used as time-invariant covariates and child positive and negative emotion displays were used as time-varying covariates (predictors) to assess their moment-to-moment influence on the timing of mother coregulatory strategies. Specifically, state changes in these covariates were hypothesised to affect the hazard of mother supportive and unsupportive coregulation, either increasing or decreasing the time until the next occurrence. The data were also checked for right censoring for mothers who did not display any coregulatory behaviours and children who did not display any instances of positive or negative emotion. The end of the task period (i.e., duration of task – 200 seconds) was used as the time to event for censored dyads.

Separate models were used to test the hypotheses. Hazard rates were used as individual parameters and converted (exponentiated) into hazard ratios for ease of interpretation. This indicated the ratio of the hazard rate for a one-unit increase of the covariate relative to the hazard rate without that increase (i.e., the likelihood relative to a constant value of 1). A value of more than 1 indicated the event was more likely to occur, and a value of less than 1 indicated the event was less likely to occur.

These models examined:

1. The association between mother and child risk factors and the time until recurrent displays of mother supportive and unsupportive coregulatory strategies.
2. Interactions between time-varying (i.e., child positive and negative emotion) and time-invariant predictors (i.e., mother and child risk factors) in predicting the time until recurrent displays of mother supportive coregulatory strategies. Specifically, the moderating effect of mother and child risk factors on the relationship between child emotion displays and the timing of mothers' supportive coregulatory strategies.

3. Interactions between time-varying (i.e., mother supportive and unsupportive coregulatory strategies) and time-invariant predictors (i.e., mother and child risk factors) in predicting the time until recurrent displays of child positive emotion. Specifically, the moderating effect of mother and child risk factors on the relationship between mothers' supportive and unsupportive coregulatory strategies and the timing of children's positive emotion displays.

3. Interactions between time-varying (i.e., mother supportive and unsupportive coregulatory strategies) and time-invariant predictors (i.e., mother and child risk factors) in predicting the time until recurrent displays of child negative emotion. Specifically, the moderating effect of mother and child risk factors on the relationship between mothers' supportive and unsupportive coregulatory strategies and the timing of children's negative emotion displays.

4.4 Results

The findings are presented in several sections. First, descriptive details of mother and child emotion and behaviour and risk factors are provided. The second section describes the influence of maternal narrative coherence (and combined influence with mother and child characteristics) on the recurrence of mother supportive and unsupportive coregulatory strategies. Next, the influence of maternal narrative coherence on maternal responsiveness (i.e., temporal contingency between child positive emotion and mother supportive coregulatory strategies) is summarised. Lastly, the influence of maternal narrative coherence on the upregulating and downregulating effect of mother supportive coregulatory strategies on recurrence of child positive and negative emotion is detailed.

Descriptive Statistics

Mother and child emotion and behaviour

Before reporting the results of the recurrent-events Cox regression models for the timing of mother coregulatory behaviour, descriptive statistics on the key variables were examined. The average durations at which mother-child dyads displayed specific positive and negative emotions and behaviour are displayed in Tables 4.5 and 4.6.

Table 4.4 Means and standard deviations for risk child and parent risk factors.

| | M | SD | Range |
|---------------------------------|-------|------|-------|
| FMSS-Coherence score | 3.69 | 0.91 | 2-6 |
| % Coherent mothers | 46 | | |
| Child total difficulties | 19.18 | 6.71 | 4-36 |
| Child internalising problems | 6.86 | 4.08 | 0-17 |
| Child externalising problems | 12.28 | 4.32 | 3-20 |
| Maternal symptoms of anxiety | 6.68 | 3.65 | 0-17 |
| Maternal symptoms of depression | 4.45 | 3.30 | 0-11 |

Note: FMSS-Coherence: Five-Minute Speech Sample coded using the 'Narrative Coherence' protocol. % of mothers with a 'Coherence' score of 4 or above. Child total difficulties: SDQ, Child internalising problems (Emotional and Peer problems subscales), Child externalising problems (Conduct and Hyperactivity subscales). Maternal symptoms of anxiety and Maternal symptoms of depression (HADS)- Normal (0-7), Borderline (8-10), Abnormal (11-21).

Table 4.5 Descriptive statistics for child emotion displays.

| | Mean duration (SD) | Number of episodes | | |
|----------------------|--------------------|--------------------|---------|---------|
| | | Mean (SD) | Minimum | Maximum |
| Child emotion | | | | |
| Negative emotion | 49.82 (43.57) | 7.23 (3.45) | 1 | 16 |
| Positive emotion | 44.76 (31.84) | 12.21 (5.89) | 1 | 24 |

Note: SD: Standard deviation. No significant effect of gender on child positive and negative emotion displays. Significant correlation between age and child positive emotion displays ($r = .248, p = .018$).

Table 4.6 Descriptive statistics for mother coregulatory strategies.

| | Mean duration (SD) | Number of episodes | | |
|--|--------------------|--------------------|---------|---------|
| | | Mean (SD) | Minimum | Maximum |

| | | | | |
|----------------------------------|------------------|-----------------|---|----|
| Supportive coregulation | | 14.18 (5.73) | 2 | 26 |
| Autonomy support | 19.18 (12.16) | | | |
| Positive directives | 21.20 (13.32) | | | |
| Unsupportive coregulation | | 3.60 (2.45) | 1 | 11 |
| Hostility | 3.14 (2.45) | | | |
| Intrusiveness | 9.41 (18.14) | | | |

Note: SD: Standard deviation. No significant effect of gender or age on supportive or unsupportive coregulation.

Bivariate correlations

Significant associations were found between maternal narrative coherence and duration of mother supportive coregulation ($r = .230, p = .040$) and between maternal narrative coherence and total SDQ difficulties ($r = -.262, p = .019$). Duration of mother supportive coregulation was also significantly associated with total SDQ difficulties ($r = -.225, p = .035$). No significant associations were found between duration of child positive or negative emotion or mother unsupportive coregulatory strategies and any of the child and mother risk factors.

Primary Analyses

Effect of narrative coherence on timing of mothers' supportive coregulatory strategies

Cox Regression models revealed a significant association maternal narrative coherence and the timing of mothers' supportive coregulatory behaviour (hazard rate = 0.12, standard error (SE) = 0.06, $p = .028$, hazard ratio = 1.13) indicating shorter latencies until displays of supportive coregulatory strategies in more coherent mothers.

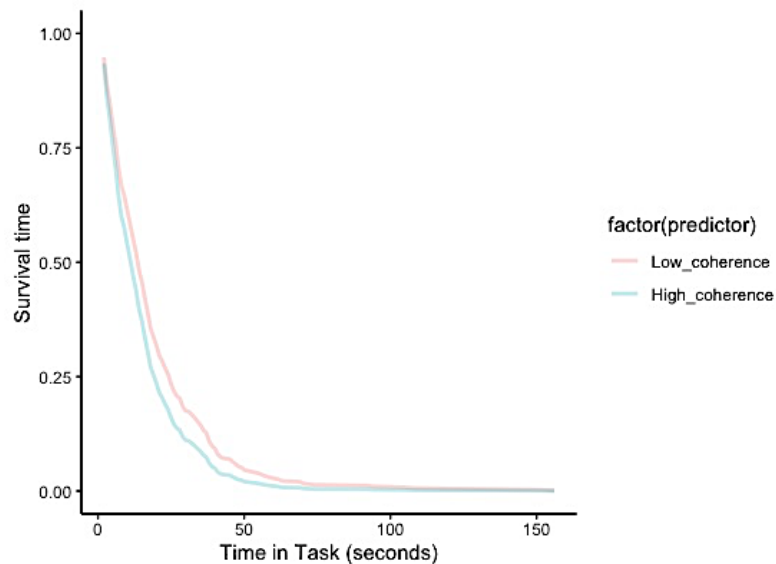


Figure 4.1 Plot of time to displays of supportive coregulatory strategies. Higher values indicate longer latencies.

Effect of narrative coherence on timing of mothers' unsupportive coregulatory strategies

There was no significant association between maternal narrative coherence and the timing of mothers' unsupportive coregulatory behaviour (hazard rate = -0.10, standard error (SE) = 0.11, $p = .320$).

Influence of coherence of contingencies between maternal supportive coregulation and child positive and negative emotion displays

Next, Cox Regression models were used to test whether mother's narrative coherence influenced the timing of their supportive coregulatory strategies when children made positive and negative displays of emotion; specifically, whether use of supportive coregulatory strategies was (1) more likely in the seconds children made positive emotion displays compared to the seconds they did not, (2) more likely in the seconds children made negative displays of emotion compared to the seconds they did not.

The results are displayed in Table 4.7. Recurrence of mother's overall use of supportive coregulatory strategies in the seconds children displayed negative emotion was not significant (hazard rate = -0.11, standard error (SE) = 0.13, $p = .420$). However, a trend towards increased

recurrence of supportive coregulation in mothers at higher levels of narrative coherence was found for child positive emotion (hazard rate = 0.15, standard error (SE) = 0.10, $p = .150$), indicating that contingent responsiveness of mother's supportive coregulatory strategies to child displays of positive emotion were associated with higher levels of narrative coherence. In other words, more coherent mothers were more likely to be supportive in the seconds their child made positive emotion displays (i.e., displayed autonomy).

Table 4.7 Hazard rate estimates for maternal supportive coregulatory strategies following child emotion displays.

| Predictor | Estimate | Standard Error | p | Hazard Ratio | 95%CI of Hazard Ratio |
|------------------------------------|----------|----------------|------|--------------|-----------------------|
| Coherence x Child positive emotion | 0.15 | 0.10 | .150 | 1.16 | [0.95, 1.42] |
| Coherence x Child negative emotion | -0.11 | 0.13 | .420 | 0.90 | [0.70, 1.16] |

Note: Estimate: Hazard rate. Autonomy support: Coherence x Child PE (Hazard rate = 0.18, standard error (SE) = 0.12, $p = .140$, hazard ratio = 1.19, 95%CI[0.94, 1.51]. PE: positive emotion displays.

Interactive effects between narrative coherence, maternal psychopathology, child emotional and behavioural difficulties, and child effortful control on timing of mothers' supportive coregulatory strategies

The interaction between maternal narrative coherence and child emotional and behavioural difficulties was not significant (hazard rate = -0.01, standard error (SE) = 0.01, $p = .940$). No interactive effects were found between child effortful control and narrative coherence on the timing of mothers' supportive coregulatory strategies (hazard rate = 0.02, standard error (SE) = 0.19, $p = .900$). There were also no significant interactive effects between maternal narrative coherence and maternal anxiety (hazard rate = -0.03, standard error (SE) = 0.02, $p = .230$) and between maternal narrative coherence and maternal depression (hazard rate = 0.04, standard error (SE) = 0.03, $p = .260$) on the recurrence of maternal supportive coregulatory strategies.

Table 4.8 Hazard rate estimates for maternal supportive coregulatory strategies.

| Predictor | Estimate | Standard Error | p | Hazard Ratio | 95%CI of Hazard Ratio |
|------------------------------------|----------|----------------|------|--------------|-----------------------|
| Coherence | 0.12 | 0.06 | .028 | 1.13 | [1.01, 1.26] |
| Total SDQ difficulties | -0.01 | 0.01 | .270 | 0.99 | [0.97, 1.01] |
| Maternal anxiety | 0.01 | 0.02 | .670 | 1.01 | [0.96, 1.06] |
| Maternal depression | -0.01 | 0.03 | .750 | 0.99 | [0.94, 1.05] |
| Effortful control | 0.22 | 0.18 | .220 | 1.24 | [0.88, 1.77] |
| Coherence x total SDQ difficulties | -.001 | 0.01 | .940 | 1.00 | [0.98, 1.02] |
| Coherence x maternal anxiety | -0.03 | 0.02 | .230 | 0.97 | [0.93, 1.02] |
| Coherence x maternal depression | 0.04 | 0.03 | .260 | 1.04 | [0.97, 1.10] |
| Coherence x Effortful control | 0.02 | 0.19 | .900 | 1.02 | [0.70, 1.49] |

Note: Estimate: Hazard rate. Autonomy support: Coherence x maternal anxiety (Hazard rate = -0.02, standard error (SE) = 0.03, p = .450, hazard ratio = 0.98, 95%CI[0.92, 1.04].

Interactive effects between narrative coherence, maternal psychopathology, child emotional and behavioural difficulties, and child effortful control on timing of mothers' unsupportive coregulatory strategies

The influence of the interaction between maternal narrative coherence and child effortful control on the timing of mothers' unsupportive coregulatory strategies was marginally significant (hazard rate = -1.42, standard error (SE) = 0.78, p = .070, hazard ratio = 0.24). Hence, more coherent mothers were less likely to engage in unsupportive coregulatory strategies over time when children had poorer effortful control (i.e., were less easily soothed). No significant interactive effects were found between narrative coherence and child emotional and behavioural difficulties (hazard rate = 0.01, standard error (SE) = 0.02, p = .550). The interactions between narrative coherence and both maternal anxiety (hazard rate = -0.06, standard error (SE) = 0.05, p = .240) and maternal depression (hazard rate = 0.01, standard error (SE) = 0.06, p = .880) were also not significant.

Table 4.9 Hazard rate estimates for maternal unsupportive coregulatory strategies.

| Predictor | Estimate | Standard Error | <i>p</i> | Hazard Ratio | 95%CI of Hazard Ratio |
|------------------------------------|----------|----------------|----------|--------------|-----------------------|
| Coherence | -0.10 | 0.11 | .320 | 0.90 | [0.73, 1.11] |
| Total SDQ difficulties | -0.02 | 0.02 | .350 | 0.98 | [0.94, 1.02] |
| Effortful control | 0.85 | 0.51 | .094 | 2.34 | [0.86, 6.32] |
| Maternal anxiety | 0.02 | 0.04 | .600 | 1.06 | [0.94, 1.11] |
| Maternal depression | 0.06 | 0.05 | .200 | 1.02 | [0.97, 1.16] |
| Coherence x total SDQ difficulties | 0.01 | 0.02 | .550 | 1.01 | [0.98, 1.04] |
| Coherence x maternal anxiety | -0.06 | 0.05 | .240 | 0.95 | [0.86, 1.04] |
| Coherence x maternal depression | 0.01 | 0.06 | .880 | 1.01 | [0.89, 1.14] |
| Coherence x Effortful control | -1.42 | 0.78 | .070 | 0.24 | [0.05, 1.12] |

Note: Estimate: Hazard rate.

Interactive effects between narrative coherence and mothers' supportive coregulatory strategies on the timing of child positive and negative emotion displays

Lastly, Cox Regression models were used to test whether narrative coherence influenced the timing of children's recurring positive and negative emotion displays when mothers used supportive coregulatory strategies; specifically, whether child positive emotion was more likely in the seconds mothers were autonomy-supportive or used positive structuring compared to the seconds they were not, and whether child negative emotion was less likely in the seconds mothers were autonomy-supportive or used positive structuring compared to the seconds they were not.

The results are displayed in Table 4.10. A marginally significant interaction between maternal narrative coherence and mothers' overall use of supportive coregulatory strategies revealed reduced recurrence of child positive emotion. However, a marginally significant interactive effect between maternal narrative coherence and mothers' autonomy support (hazard rate = 0.24, standard error (SE) = 0.14, *p* = .082), indicated that children of more coherent mothers were more likely to display positive emotion over time in the seconds mothers used autonomy support specifically. No significant interactive effect between maternal narrative coherence and mothers' supportive coregulatory strategies on child negative emotion displays was found (hazard rate = -0.19, standard error (SE) = 0.20, *p* = .340).

Table 4.10 Hazard rate estimates for child positive and negative emotion displays following maternal supportive coregulatory strategies.

| Predictor | Estimate | Standard Error | <i>p</i> | Hazard Ratio | 95%CI of Hazard Ratio |
|--|----------|----------------|----------|--------------|-----------------------|
| Predicting recurrence of child positive emotion | | | | | |
| Coherence x maternal supportive coregulation | <-0.001 | 0.10 | .100 | 1.00 | [0.82, 1.22] |
| Predicting recurrence of Child negative emotion | | | | | |
| Coherence x maternal supportive coregulation | -0.19 | 0.20 | .340 | 0.83 | [0.56, 1.23] |

Note: Estimate: Hazard rate. Child positive emotion: Coherence x autonomy support (Hazard rate = 0.24, standard error (SE) = 0.14, *p* = .082, hazard ratio = 0.98, 95%CI[0.97, 1.66].

4.5 Discussion

Parents' narratives about their child and their relationship with their child reveal parenting-related mental representations which are thought to guide the affective quality of the parent-child relationship and shape the emergence and maintenance of child psychopathology (Caspi et al., 2004; Oppenheim, 2006). Proponents of attachment theory have pointed to the "coherence" of these mental representations as a major contributor to maladaptive interaction patterns and child outcomes. Despite a body of research (i.e., FMSS-Coherence studies) evidencing associations between the coherence of parents' schematic cognitions, parenting, and relationship quality, further research is needed to capture the interconnectedness of the underlying mechanisms and processes (i.e., dynamic coupling of the emotion and cognitive systems). The current study set out to examine the influence of levels of coherence on the dynamics of parent-child coregulatory patterns in an interactive task designed to elicit mild distress.

Using Multilevel Survival Analysis, this study, (1) tested whether narrative coherence influenced the timing of mothers' use of supportive and unsupportive coregulatory strategies, (2) examined the influence of narrative coherence on the temporal contingencies between maternal supportive and unsupportive coregulatory strategies and children's positive (i.e.,

adaptive social behaviour) and negative emotion displays, (3) examined whether more adaptive coregulatory patterns (i.e., supportive coregulatory behaviours upregulating child positive emotion and downregulating child negative emotion) would be found in dyads with more coherent mothers, and (4), examined interactive effects between coherence and maternal psychopathology (i.e., symptoms of anxiety and depression) and between coherence and child characteristics (i.e., child effortful control and child emotional and behavioural difficulties) on mothers' subsequent use of supportive and unsupportive coregulatory strategies.

Initial bivariate correlations revealed significant associations between parent-reported child emotional and behavioural difficulties and low levels of maternal narrative coherence, supporting previous FMSS-Coherence studies (Sher-Censor & Yates, 2015). Duration of mothers' supportive coregulatory strategies was also associated with higher levels of maternal narrative coherence and lower child emotional and behavioural difficulties, supporting the role of parental sensitivity and responsiveness in socialisation practices and child adjustment (Sher-Censor & Yates, 2015).

Interdyadic (between-dyad) social processes

The present study found that higher levels of narrative coherence were associated (i.e., predicted) the recurrence of mothers' supportive coregulatory behaviours. Thus, more coherent mothers became increasingly more autonomy-supportive and provided more positive structuring of their child's emotions and behaviour over time. No significant association was found between maternal narrative coherence and the timing of mothers' unsupportive coregulatory behaviours, pointing to the particular role of coherence in enhancing socialisation practices involving the accurate interpretation of the child's goals and desires and understanding of the child's need for agency. Unbalanced, one-dimensional (i.e., incoherent) parental narratives are said to reflect distorted thought processes, such as inaccurate information-processing or attributions of the child's emotions and behaviour. These maladaptive cognitive processes can lead to parents responding more insensitively to the child or being less responsive to their child's signals in time of distress. In this sense, low narrative coherence may serve as a marker for problematic information processing that

prevents parents from acting in supportive ways in emotionally arousing situations that trigger the child's need for sensitive parenting (Benoit et al., 1997; Slade, 2005; Zeanah & Benoit, 1995). Children of less coherent parents may internalise these coregulatory patterns, learning to avoid emotion-eliciting situations or exaggerate their emotional expressions due to insufficient modelling of appropriate coping behaviour (Cassidy, 1994; Feeney & Cassidy, 2008). Furthermore, in the context of dynamic coupling of the emotion and cognitive systems denoted by dynamic systems theory and differential emotions theory, these findings demonstrate how affective-cognitive structures feed into real-time monitoring and timely and appropriate maternal responding. This may then facilitate recursive feedback loops that foster adaptive coregulatory patterns in parent-child interaction by pulling the dyadic system back into positivity.

Intradynamic (within-dyad) social processes

Coherent parents are thought to be more flexible in their thinking about their child, seeing their child as a multifaceted individual with unique goals and desires that are separate from their own. Accordingly, coherent parents have been found to respond sensitively to their child and are attuned to their child's signals. The current study found that higher levels of maternal narrative coherence were marginally associated with increased moment-to-moment responsiveness to children's positive emotion displays such that mothers with higher levels of coherence were more likely to use supportive coregulatory behaviour in the seconds children exhibited positive emotionality. Thus, coherent mothers demonstrated more attunement and contingent responsiveness to their child's positive emotion displays, further supporting previous findings (e.g., Sher-Censor et al., 2013; Sher-Censor & Yates, 2015).

Supportive coregulatory strategies (i.e., socialisation practices) such as autonomy support have been associated with positive child outcomes (Joussemet et al., 2008). The present study found some evidence of reciprocal effects between supportive coregulatory behaviour and children's positive emotion displays that appeared enhanced by levels of maternal narrative coherence. Recurrence of child positive emotion displays when mothers used autonomy support was more likely in dyads with mothers at higher levels of narrative coherence. Whilst not statistically significant, the direction of results (i.e., hazard ratio below 1) showed that

recurrence of child negative emotion displays, when mothers used supportive coregulatory strategies, was less likely in mothers with higher levels of narrative coherence. This not only suggests that coherence enhances the effectiveness of mothers' regulatory efforts, but also demonstrates the importance of coherence in consistent parenting. More coherent parents were better able to maintain their sensitivity and responsiveness to enhance their child's positive emotion. Previous research has found higher variability (inconsistency) in parenting behaviour in response to child misbehaviour in high-risk dyads (i.e., maladjusted children and high parental psychopathology) (Lunkenheimer et al., 2016). Thus, coherence may serve as a protective factor, fostering emotional availability and a sense of security in the parent-child relationship.

Coupled with the above findings of increased temporal contingencies between maternal supportive coregulation and child positive emotion displays, these findings provide further evidence of the validity of the FMSS-Coherence as an effective attachment-related measure of parenting cognitions. They also illustrate more directly how parenting cognitions map onto parenting behaviour. Decreased engagement in supportive coregulatory strategies may reflect inflexible and distorted thinking about children's abilities to cope in emotion-eliciting situations and misinterpretation of their emotion displays (Oppenheim, 2006; Sturge-Apple et al., 2006).

Combined risk and evocative effects

The current study also examined interactive effects between levels of coherence and poor effortful control (i.e., difficulty in sustaining downregulation of negative emotion over time) on mothers' supportive and unsupportive coregulatory strategies. More coherent mothers were less likely to engage in unsupportive coregulatory strategies with children with less effective effortful control. This suggests that mothers with higher levels of narrative coherence were more attuned to their child's signals of distress and were less likely to interpret their child's distress signals in negative way. These parents may have been able to maintain a balanced view of their child's strengths and difficulties. In light of the above, rather than enhancing socialisation practices geared towards promoting positive emotionality, coherence in mothers of particularly difficult children may play a bigger role in preventing

insensitive or hostile responses to their child's difficulties thus preventing engagement in coercive interactions or instances of negative reciprocity which maintain problem behaviour. These findings provide much needed insight into associations between FMSS-Coherence and parent-child interaction patterns, particularly in at-risk children, as most studies on FMSS-Coherence have used community samples (Sher-Censor et al., 2016).

Research has evidenced the role of maternal psychopathology in mother-child relationships and maternal responding and has also reported some links between maternal personality characteristics and narrative coherence (Sher-Censor et al., 2013). Parents' awareness of their own emotions as well as their attitudes and beliefs about emotions, which all contribute to how they regulate their emotions, may also contribute to their mental representation of the child and their relationship with the child. Katz and Hunter (2007) found lower depressive symptoms, higher self-esteem and less internalising and externalising problems in adolescents of mothers who were more accepting of and expressed their own emotions. Yap et al (2010) also found that mothers who reported more emotion regulation problems and depressive symptoms were more negative towards their child and exhibited more dysregulated behaviour. Interestingly, the current study did not find a significant interactive effect between levels of narrative coherence and maternal anxiety or depression on mothers' use of supportive or unsupportive coregulation. This could be attributed to the low mean scores which predominantly fell within the normal range and the use of a brief screening tool. Accordingly, a more in-depth assessment monitoring symptoms of maternal depression over longer periods might help clarify these findings.

Clinical implications

To the author's knowledge, this is the first study to examine FMSS-Coherence alongside the interpersonal dynamics of mother-child interaction; in particular, it is the first to find associations between narrative coherence and mothers' moment-to-moment engagement in supportive coregulatory strategies reflected in socialisation practices. This study demonstrates that mother-child interactive patterns arise from real-time exchanges of emotion and behaviour that recur over time. Additionally, narrative coherence predicting the timing of mothers' supportive and unsupportive coregulatory behaviour further supports the

notion that increased coupling (and self-organisation) of the emotion and cognitive systems create affective-cognitive structures that serve as attractors that pull the mother-child dyadic system toward or away from adaptive and maladaptive coregulatory patterns. Crucially, this developmental period represents the crystallisation of the child's emotional and cognitive capacities; consequently, examining these attractors as they stabilise and become more predictable may make it easier to identify targets for early intervention.

The findings also illustrate the complexity of the sensitivity construct, pointing to a better conceptualisation of "sensitivity" as patterns of maternal responding rather than a global parenting quality. They also indicate (as also argued in the previous chapter of this thesis), that we must broaden the study of sensitivity to incorporate the temporal organisation of parent-child social exchanges through the application of DS principles. In doing so, conceptualisations of sensitive responding can be extended to examination in both real-time and on a developmental scale.

Furthermore, the findings have implications for intervention efforts aimed at parenting behaviour and parent-child interaction. Studies have revealed reductions in negative relational schemas following a video feedback intervention for parents, which mediated reductions in observed parent-child coercive interactions 2 years later (Smith et al., 2013). Yet, many of these intervention efforts have been focused on the affective content of parents' cognitions. The findings point to the importance of the organisational features of relational schemas, such as clarity, balance and consistency as these patterns of thinking and feeling underlie automatic response tendencies that may be particularly difficult to alter clinically. Studies have reported mixed findings of the effectiveness of family interventions. Bugental et al (2002) found that traditional cognition-based family interventions with infants at risk of maltreatment reduced mothers' harsh parenting behaviours but positive changes in maternal cognitions did not mediate the effects of the intervention on maternal behaviour. Moreover, research has reported stronger effects of attachment-based parenting programs on parenting behaviour than on cognitive processes (Smith et al., 2015). Associations between parenting cognitions assessed by the FMSS-Coherence and increases in mothers' moment-to-moment use of supportive socialisation strategies, as well as facilitation of adaptive coregulation (i.e., upregulation) of positive emotionality in children may serve as mechanisms of change for

intervention efforts aimed at altering parental attitudes and schematic cognitions. For example, in interventions aimed at increasing parental sensitivity, alongside video-based feedback and evaluation of parenting behaviour, clinicians could use mentalisation-based methods to target unbalanced and distorted thoughts about the child or encourage a more multidimensional perspective of the child to increase attunement and aid the parent in making more accurate interpretations of the child's needs and goals (Sharp & Fonagy, 2008).

Study limitations and suggestions for future research

While this study has a number of strengths such as its use of more fine-grained micro-analytical measures of parent-child interaction and use of statistical tools that capture the temporal dimensions of dyadic emotion and behaviour; the study has a number of limitations. While maternal narrative coherence and maternal psychopathology impact parent-child interaction patterns, other factors such as age and the situational context may also play a role. In this study, child age was associated with overall duration of child positive emotion displays which indicated that older children engaged in more positive emotion overall. Though a wide age range was used in this study to aid sample size, future research could more directly ascertain developmental differences in child displays of emotion and behaviour in the context of dynamic processes. Further, as children get older, their cognitive and self-regulatory abilities become more refined, meaning they gradually require less coaching and have a higher need for emotional and behavioural independence. This highlights the need for longitudinal studies of FMSS-Coherence and observed coregulatory patterns to identify crucial periods of development wherein the emotion and cognitive systems may reorganise to create new emergent patterns (i.e., attractors) or produce changes in current ones. For example, future research could explore the extent to which parents' levels of coherence change over time and the implications of improvements or deterioration in parents' levels of coherence for socialisation practices and coregulatory patterns over the course of childhood and adolescence.

Future research could also explore the generality of parents' narrative coherence, whether the influence of narrative coherence on real-time sensitivity and responsiveness is specific to the situational context. Play interactions involving cooperation and turn-taking also facilitate

mutual reciprocity, which is also key in sensitivity and responsiveness. Kochanska (1997) earlier suggested that mutual responsiveness and shared goals predict child cooperation and compliance. Further, Gardner et al's (2003) study showed that children in dyads that engaged in cooperative mother-child play had fewer conduct problems 1 year later. Mutual reciprocity is also a key facet of parent-child coregulation and reflects the parent's contingent and timely responsiveness to the child. Examining levels of parental narrative coherence alongside coregulatory patterns when the child is not in distress could broaden our understanding of parental sensitivity. Responsiveness to distress fosters children's abilities to regulate negative emotion and accurately interpret emotions in others (Fabes et al., 2002), whereas play interactions more directly elicit both parental responsiveness to the child and child responsiveness to the parent through emotional and behavioural reciprocity (i.e., matched affect and turn-taking).

Conclusions

The present study sought to ascertain the relationship between the coherence of mothers' narratives about their child and their relationship with their child and mother-child coregulatory processes. The study particularly focused on dynamic indices of sensitive and responsive parenting and found that higher levels of narrative coherence increased mother's engagement in supportive socialisation practices (i.e., autonomy support), and was associated with marginally higher levels of contingent responsiveness with children's displays of positive emotion (i.e., social adaptiveness). Furthermore, the findings revealed that maternal narrative coherence fostered adaptive coregulation between mother and child such that an increase in positive emotion displays following mother supportive coregulation was found in children of more coherent mothers. Maternal narrative coherence also reduced mothers' engagement in unsupportive coregulation with children who had less effective effortful control in downregulating negative emotion. These findings not only provide support to previous studies of FMSS-Coherence and parenting, but also point to effective methods of accurately identifying mechanisms of change in interventions. Helping the parent reframe their beliefs regarding the intentions and motivations behind their child's emotion and behaviour and altering rigid and distorted portrayals may prevent reliance on overlearned relational patterns of thinking that negatively impact the parent-child relationship.

Chapter 5
General Discussion

Chapter overview

This chapter first provides a summary of the three studies detailed in chapters 2 to 4 in section 5.2. It then provides a discussion of the findings from the three studies in section 5.3. Focusing on the main aims of the thesis, it reflects on its contribution to research efforts in applying dynamic systems methods to the study of within-child and social factors implicated in the etiology and maintenance of child psychopathology, to the empirical literature on parenting and socialisation, and insights into potential markers of change for intervention research. This chapter then considers strengths and implications of the thesis sections 5.4 and 5.5. The chapter then concludes with a discussion of the limitations of the thesis and recommendations for future research in section 5.6 and provides its final conclusions in section 5.7.

5.1 Introduction

Developmental researchers are often concerned with how things change, the processes by which novel structures (e.g., abstract thought) and skill (e.g., self-regulation, language) emerge. Emotions, considered to function as temporal interpersonal systems (Butler, 2011), evolve dynamically over time and extend beyond the individual. Developmental changes in the experience and display of emotion are said to arise from transactional and reciprocal influences of not only genetic-maturational processes, but also crucially, social experience (Cole et al., 1994; Davidson et al., 2000). This thesis sought to examine the dynamic nature of children's regulation of emotion and behaviour and mother-child coregulation processes in the context of emotional stress by employing micro-analytical methods. In using an at-risk sample of primary school-aged children with emerging psychological difficulties, the thesis points to how temporal features of emotional responding may play a role in pathways to neurodevelopmental disorders. Following a thorough review of relevant literature and theoretical frameworks in Chapter 1, the thesis examined the temporal dynamics of emotion and emotion regulation in 100 mother-child dyads in three empirical studies presented in Chapters 2-4.

5.2 Summary of the findings

Chapter 2 aimed to ascertain whether micro-analytical methods (using timing as an index of micromomentary changes in emotion) could capture temporal contingencies between children's negative emotion displays and their regulatory strategies during a frustrative nonreward task. It found that activation of avoidance-based strategies (i.e., behavioural avoidance) was associated with a reduced recurrence of negative emotion, particularly in children at higher levels of externalising difficulties. Cognitive-behavioural strategies (i.e., self-resignation) were also associated with an increased recurrence of negative emotion. Lastly, higher goal orientation (indexed as longer latencies to non-goal directed strategies of regulation) was associated with reduced recurrence of negative emotion.

The thesis then sought to understand the relevance of children's socialisation experiences to their emotional tendencies (i.e., emotion displays and social approach). Chapter 3 aimed to examine coregulatory patterns during mother-child interaction, ascertaining temporal relationships between children's emotion displays and mother's coregulatory strategies based on socialisation practices associated with children's coping and adaptive behaviour. It found recurrent displays of negative emotion (i.e., inhibition and anger) in high internalising children when interacting with an unfamiliar adult during the "Stranger Approach" Lab-TAB episode. It also found that supportive coregulatory strategies resolved/downregulated children's displays of negative emotion, but not in high internalising children- instead upregulating negative emotion when mothers used positive directives. Further, poorer child effortful control and maternal depression were associated with decreases in child positive emotion displays over time. Unsupportive coregulatory strategies (i.e., intrusiveness) also led to reduced recurrence of positive emotion, particularly in children with higher internalising difficulties. Lastly, Chapter 4 aimed to examine the relationship between broad meta-theoretical constructs of attachment and dynamic coregulatory processes, specifically focusing on narrative coherence (i.e., mothers' internal representations of the child and the parent-child relationship). It found that supportive coregulatory strategies were more contingent with children's positive emotion displays in more coherent mothers and led to increased recurrence of positive emotion displays. Narrative coherence also predicted

decreases in recurrence of mothers' unsupportive coregulatory strategies when children had poorer effortful control.

Developmental changes in the experience and display of emotion are said to arise from transactional and reciprocal influences of social experience. In this thesis, I have demonstrated that regulatory processes shape children's emotional experiences, but crucially, these experiences and processes are best understood in a relational context which comprises the co-construction of emotional states in real-time. Children with emotional and behavioural difficulties demonstrated a reflexive use of avoidance-based coping in response to an emotional stressor independently of their mother, and they were less receptive to positive socialisation practices (i.e., positive directives) when their mother was present. This is suggestive of the negative impact of parent-child interactive contexts that do not foster appropriate regulation abilities in children, particularly children with emerging psychological problems. However, when mothers are able to think about their child and their relationship in a positive and well-balanced way that communicates understanding of the child and their difficulties (i.e., are more coherent in their thinking), this can foster positive regulation experiences that equip the child to exhibit positive emotion even in the face of challenges.

5.3 Discussion of the findings

5.3.1 Can micro-analytical methods capture the dynamics of emotion and the regulation of emotion?

Emotional development is said to occur through recurrent real-time emotional experiences, wherein everyday interactions with the emotion-eliciting environment trigger the modulation of emotional arousal across seconds, minutes, days, months and years (Hollenstein, 2015). Thus begs the question, how do these moment-to-moment emotional processes become stable practices and patterns over time? While a comprehensive answer requires examination of the dynamics of emotion at multiple time scales, this thesis focuses on micromomentary (i.e., second-by-second) changes in emotion and emotion regulation. Daily encounters with emotion-evoking experiences are often in the context of tantrums with parents following the blockage of goals/desires, momentary conflict with peers, and expectations of compliance

and cooperation with nonfamilial adults (i.e., teachers). Children's expressive behaviour during such situations continuously fluctuate, ranging from immediate and reflexive reactions to sustained perseveration in specific affective states.

Central to this thesis is the notion that rather than static qualities of internal experiences, emotions emerge, evolve and dissolve across time. This thesis applied micro-analytical methods (i.e., molecular coding of observed behaviour and time-series statistical modelling-Multilevel Survival Analysis) to two experimental paradigms from the Lab-TAB battery: a frustrative nonreward situation (the "Impossibly Perfect (Blue) Circles" task) and the "Stranger Approach" situation (adapted to include the presence of the mother and age-appropriate questions from the "Stranger"). Chapter 2 found contingent moment-to-moment patterns of movement into and out of states of anger/frustration that depended on the type of regulatory strategy the child employed. Few studies have directly assessed children's emotion regulation as it occurs, and even fewer have included a broad range of regulatory strategies. There is an implicit assumption in traditional models of emotion regulation that a regulation strategy influences the "survival" of an emotion, yet this has seldom been tested empirically (Sheppes, 2020). Modulation of anger, for example, is typically assessed in terms of anger intensity and total duration, and most assessments have focused on observation of children's use of distraction in situations requiring children to wait for a desirable object (Neubauer et al., 2012; Dennis et al., 2009). However, as children often become angry during a long wait for a desirable object or are tasked with overcoming anger to persist when goals are blocked, fluctuations in the temporal aspects of anger serve as more sensitive indices of regulation (Thompson, 1994); and these time-related features may prove effective in capturing key developmental changes. To the author's knowledge, the study presented in Chapter 2 is the first to examine real-time activation of regulatory strategies that are avoidance-based, cognitive-based, and approach-oriented in primary school-aged children, and particularly in primary school-aged children with emerging emotional and behavioural difficulties. The applicability of micro-analytical methods to studying emotion regulation was also demonstrated in Chapter 3 which found contingent moment-to-moment patterns of coordination between child positive and negative emotion and maternal socialisation practices such that depending on whether the socialisation behaviour was supportive or unsupportive, the mother-child dyad was able to shift into mutually adaptive states. This not

only further demonstrates the utility of micro-analytical methods in capturing interactional dynamics in a social context, but also demonstrates how, unlike traditional global methods, micro-analytical methods reflect partners' emotional behaviour becoming predictably sequenced in time. With global methods the relation between one partner's behaviour to another's communicative act is implied in qualitative ratings or descriptions, but not objectively measured. The micro-analytical methods used in this thesis have elucidated objective indicators of coordination that are statistically predictable over even small-time units (i.e., seconds).

5.3.2 Are there temporal contingencies between children's emotional experiences and their regulatory responses to emotion-eliciting situations?

The ability to manage negative emotions is considered to be a key adaptive skill, particularly as children begin formal schooling and must learn to manage their emotions independently. Social interactions represent contexts in which every day social demands may elicit displays of negative reactivity in children (e.g., where the child is provoked, feels threatened, or required to wait). Children's regulatory abilities arise early in infancy, becoming more refined during childhood through early interactions with caregivers. Well-regulated children are considered to be more adept in social situations, more able to persist at difficult tasks, internalise social rules, and appropriately modulate their emotions when exposed to negative emotional stimuli (Bandura, 1977; Kochanska, 1993). Given the evidenced impairment in emotion regulation in children with emerging emotional and behavioural difficulties (Cisler et al., 2010; Mazefsky et al., 2013; Wyman et al., 2010), this thesis was critical in identifying predictable patterns of emotional responding that occur on a moment-to-moment basis in such children's daily interactions with emotion-eliciting environments and other people. Procedures from the Lab-TAB (Goldsmith et al., 1993) have been commonly used in studies of emotion regulation. Comprising of measures designed to elicit fearfulness, anger, frustration and disappointment, this battery of tasks was effective in illustrating the dynamics of emotion and emotion regulation in children. Quantifying regulatory ability by how much negative emotion children display does not necessarily address whether children who display less negative emotion are better able to regulate their reactions or are less reactive to task challenges. Thus, examining strategy use serves as a more direct approach to assessing

emotion regulation. This thesis is one of the very few empirical efforts to apply micro-analytic methods to the Lab-TAB paradigms (Provenzi et al., 2017).

Early studies demonstrated that toddlers have some capacity to regulate emotion. Calkins & Johnson (1998) found reduced engagement in regulatory strategies in toddlers experiencing longer and more intense anger. Buss & Goldsmith (1998) also found that use of focused distraction and approach in the moments following the display of anger led to reductions in anger in the subsequent moments. Chapter 2 demonstrated that other types of regulatory strategies, i.e., avoidance-based and cognitive-based behaviours, can predictably influence the “ebb and flow” (i.e., dynamics) of anger and frustration over the course of an experimental situation. Yet, unlike the aforementioned studies, it found that successful modulation of negative emotional states can also involve the recruitment of regulatory strategies that are oriented away from appropriate goals (i.e., persistence in a task). Crucially, Chapter 2 also addresses the paucity of research in school-aged children.

Chapter 2 found contingent moment-to-moment patterns of movement into and out of states of anger/frustration that depended on the type of regulatory strategy the child employed. While it was unexpected that children’s avoidance-based strategies would lead to reductions in recurrent negative emotion, further analyses revealed that this pattern was found in children higher in both internalising and externalising difficulties. This showed that in situations where more goal-related behaviour is required to help children persist in the face of negative feedback (triggering sensitivities to social judgement or disapproval), children with emerging emotional and behavioural problems demonstrate a tendency towards reliance on avoidance-based behaviours to downregulate negative emotional experiences. This further indicates that emotional responses and associated behavioural tendencies are not always optimally adaptive to the emotion-evoking context or socially appropriate. They also corroborate the arguments of Cole et al (2004); that simple distinctions between the experience and management of an emotion are not possible- confirming both Thompson’s definition of emotion regulation as comprising the evaluation and management of one’s emotional experience (Thompson, 1994; Thompson & Calkins, 1996), and Saarni’s (1999) definition; the ability to manage the subjective experience of an emotion (i.e., its intensity

and duration) and strategically manage the expression of an emotion in communicative contexts.

While research has shown that diverting attention away from emotion-arousing stimuli can decrease negative emotional arousal (Eisenberg et al., 1996; Rothbart et al., 2011), as children's cognitive capacities become more refined, they increasingly become more able to intentionally focus attention on distressing stimuli or events to understand the source of distress and use these situations as opportunities for mastery (Gilliom et al., 2002). However, in this study, children with emotional and behavioural problems contingently employed regulatory behaviours that facilitated the avoidance of emotion-arousing stimuli (i.e., negative feedback). Coupled with the higher recurrences of negative emotion in high externalising children overall, and the low levels of approach-based regulatory behaviour (i.e., help-seeking), this study points to specific patterns of emotional responding that can be targeted in interventions. Repeated and persistent experiences of frustration and simultaneous activation of less adaptive coping behaviours may lead to affective biases that coordinate and organise maladaptive behavioural responses in other contexts wherein children are faced with social challenges, such as peer conflicts. These patterns of emotional responding may foster hostile attributions for frustrative nonreward situations and positive evaluation of disengagement from situations that do not align with the child's desires.

As expected, cognitive-behavioural strategies (i.e., self-resignation/helplessness) led to increases in second-by-second displays of negative emotion. Although studies have examined instrumental helplessness in escape and avoidance situations (Miller & Tarpy, 1991), particularly in externalising children (Quartier et al., 2017), there is a paucity of research on children's self-resignation behaviours/helplessness in school-aged children. This is the first study to examine the micromomentary activation of cognitive-behavioural based strategies such as helplessness, and it is the first to empirically demonstrate the temporal relationship between the activation of this coping behaviour and the upregulation of negative emotion (i.e., anger and frustration).

5.3.3 Are temporal patterns of interdependency between child emotion and maternal socialisation practices indicative of supportive and unsupportive coregulation?

Another aspect related to the dynamic nature of emotion and emotion regulation is the notion that emotions depend upon and oscillate through interpersonal contexts, leading to the co-construction of relational meaning and fostering the interdependence of social partners. In other words, emotions can be managed by the self as well as others. Theoretical positions (e.g., Attachment theory and DS theory) have long pointed to the extrinsic influences involved in the regulation of emotion and behaviour. Right from infancy we see the majority of children's emotion regulation experiences occurring in a dyadic context, particularly between the child and their caregiver. Hence, in addition to the regulatory behaviours and strategies the child employs to manage their emotional experiences, we must consider the external influences that come into play. Much empirical effort from both attachment research and research on bidirectional processes has been geared towards the study of dyadic emotion regulation (Alink et al., 2009; Cole et al., 1994) and have pointed to the enduring influences of socialisation experiences in parenting contexts on children's emotion regulation capacities. Chapter 2 showed that when maladjusted children encounter challenges, they often experience recurrent negative emotions and engage in non-goal-oriented behaviours that have been shown to reduce persistence (Medeiros et al., 2016). This is a key finding as such children's reflexive use or reliance on inappropriate ways of coping with stress has the potential to reinforce emotional and behavioural difficulties, making them deeply entrenched and resistant to change. Accordingly, we also know from the literature that associations between negative emotions like anger and task engagement or performance also depend on motivational tendencies and internalised patterns of emotional responding from socialisation experiences.

In an attempt to address the paucity of research on parenting behaviour in real time, and in the context of child and parent risk, Chapter 3 illustrated the interconnectedness of emotion dynamics and relationship quality. It stressed the notion that while emotions are shaped by relationships and social interactions, emotions themselves also shape relationships. This study revealed interdependency between mother and child emotional behaviour that

signified the key role of supportive coregulation for the downregulation of child negative emotion. This micro-analytical approach also confirmed that the dynamics of coregulation can be operationalised as both coordinated communicative acts between a mother and child and the negotiation of actions to achieve mutual adaption (i.e., supportive socialisation behaviours predictably decreasing negative states and sustaining this decrease). DS theory tells us that social partners may come to act as stimuli for one another such that one partner's emotions elicit an emotional response in the other (Lorber & Smith, 2005). Social partners may also actively attempt to manage or regulate each other's emotional behaviour during distress or conflict (Diamond & Aspinwall, 2003; Zaki & Williams, 2013). This reflects the coupling of each partner's fluctuating emotions (i.e., the dynamics of one partner's emotions influencing the dynamics of the other partner's emotions). This study has then successfully shown that temporal patterns between mother and child emotions and behaviour reveal patterns that may be overlooked by traditional global methods. To accurately identify the underlying emotional processes in interpersonal contexts, methods of measuring and analysing observed behaviours must be process-oriented. Specifically, if researchers seek to examine how partners may be pulled in to or out of mutual adaptiveness, and whether their regulatory attempts have a mutually dampening or amplifying effect on one another's emotions and behaviour, our methods must reflect the key role of real-time dynamics.

In its use of methodologies appropriate for capturing temporal relations between observed regulatory behaviours and subsequent emotional expressions, this chapter makes great strides in filling the gap in research examining coregulatory processes. It also illustrates how mother-child dyads effectively resolving negative emotional experiences reflects the transmission of adaptive coping behaviour. Identifying predictable temporal changes from a maladaptive state to an adaptive state over the course of seconds could be extended to temporal changes over longer time periods (e.g., days, weeks, months). Research in developmental psychology has long held the view that children's self-regulation abilities develop through early responsive caregiving from parents (Feldman, 2015; Crowell et al., 2014; Lunkenheimer et al., 2015). While sensitive and responsive parenting has been securely established as a key contributing factor to emotional development (Thomas et al., 2017), many researchers have pointed to a bidirectional relationship (i.e., child-to-parent and parent-to-child), making examinations of both self- and co-regulation even more pertinent.

Fostering child coping behaviour through socialisation

Studies have shown that regulatory strategies such as self-soothing, help-seeking and active distraction help children manage early frustration and anger, and that failure to acquire the skills needed to employ adaptive strategies to modulate emotional arousal may lead to difficulties in social interaction and maladjustment (Calkins, 1994; Cicchetti et al., 1995; Eisenberg et al., 1993, 1994; Rubin et al., 1995). Children who employ such strategies are considered to display more positive social behaviour (e.g., turn-taking in conversations and joint action during social play), while less proficient children may be more likely to engage in conflict behaviour with their peers. Chapter 2 showed us that while strategies related to avoidance of an arousing stimulus may be useful in resolving anger in some situations (Eisenberg et al., 1993;1994), children with emotional problems contingently use such strategies in the face of emotion-eliciting situations that fall within the normal realms of their day-to-day experiences.

Chapter 3 pointed to the role of parents and the parent-child relationship in children's internalisation of coping. Attachment security is said to be key in the child's internalisation of values as it leads to increased trust in the parent and the expectation of their needs being met, particularly when parents are responsive in times of distress. When parents socialise children to feel secure in the face of distressing situations by responding sensitively and appropriately to the child's distress signals, they foster children's abilities to regulate negative emotional experiences and see distressing situations as opportunities for mastery and to achieve goals. Research has suggested that children's appraisals of situations as threatening or rewarding may determine tendencies toward approach or avoidance (Greenaway et al., 2015; Roth & Kubal, 1975). Decreases in negative emotion following the use of avoidance-based strategies during frustrating situations, as well as recurrent negative emotion when faced with novel situations in high internalising children, suggests that such children may be particularly sensitive to cues of threat and thus be motivated towards avoidance of emotion-eliciting situations. Children who see interactions with unfamiliar others as threatening, developing a pattern of withdrawal from (or low approach towards) stimuli or situations that arouse these regulatory responses, may go on to display such tendencies in other social situations such as play, leading to an overreliance on ineffective regulatory behaviours

(Thompson & Calkins, 1996). Equally, appraisals of situations as threatening -in the context of social judgement, a threat to one's self-efficacy may determine tendencies towards helplessness.

One study showed that adolescent's secure attachment representations were associated with less maladjustment and adaptive coping behaviour (Scott et al., 2011; Moretti & Peled, 2004). In Chapter 3 we saw temporally contingent decreases in child negative emotion in the seconds mothers enacted supportive coregulatory strategies. Thus, mothers who scaffolded their child's emotions and behaviour through supportive strategies that nurtured the child's autonomy, facilitated the downregulation of negative emotion in their children. This demonstrates how appropriate timing of mothers' supportive behaviours can foster children's adaptive regulatory skills. We also saw that overcontrol, particularly intrusiveness, but also crucially, overuse of positive directives appeared to hinder children's social adaptiveness and instead exacerbated children's negative emotion displays. Taken together with the findings from chapter 2, mothers' overcontrol could be said to limit opportunities for modelling of adaptive regulatory behaviour, leading to ineffective self-regulation and less approach-orientation (Neitzel & Stright, 2004). Hence, children's capacities for adaptive social behaviour in challenging situations may be impeded by maladaptive coregulatory patterns that involve contingent overcontrol. Responding to dysregulated child emotion and behaviour then necessitates the use of structural guidance and support in a manner that does not amplify negative emotionality. Furthermore, these findings indicate that responsiveness in interpersonal contexts reflects an accommodation of the mother and child to one another. In keeping with the bidirectional perspectives of the parent-child relationship, low receptiveness or responsiveness to supportive regulatory efforts may reflect a lack of mutuality or disengagement in the relationship.

The findings of contingent patterns involving maternal autonomy support also have potential implications for clinical practice. These patterns give us insight into how coping behaviour may be transmitted through children's perceptions of their parent's emotional availability and beliefs about self-efficacy in managing emotion-evoking situations. Brenning et al (2015) found longitudinal associations between adolescent's perceptions of their mothers' autonomy-supportive parenting and their use of emotional integration, suppressive

strategies and dysregulation, as well as changes in adjustment. They found that perceived maternal autonomy support predicted increases in adolescents' adaptive regulation (i.e., emotional integration) and reductions in maladaptive regulation (i.e., suppressive strategies). Emotion dysregulation also predicted decreases in adolescents' perceptions of their mother's autonomy supportive parenting. This further points to the importance of supportive coregulation experiences in fostering adaptive regulation and behaviour. While this thesis was able to address the gap in research assessing real-time use of socialisation practices such as autonomy support in primary-school aged children, longitudinal examinations could reveal whether temporal contingencies between moment-to-moment autonomy support and child emotion map onto developmental changes in emotion regulation skills across childhood and adolescence.

5.3.4 Is there a link between broad metatheoretical constructs of attachment and dynamic coregulatory processes?

If we are to understand the dynamics of social and emotional development, we must consider the feedback loops amongst subcomponents of emotion such as affective-cognitive structures which provide important insights into how relationship-centred cognitions might shape moment-to-moment emotional behaviour. By modelling interpersonal emotion dynamics in the context of parenting cognitions, Chapter 4 identified interactive patterns or dyadic attractors that mothers and children were prone to enter into which could serve as potential targets for intervention. Through the identification of effective perturbations to destabilise maladaptive interactive dynamics, we can pinpoint key mechanisms that can be utilised to trigger shifts from less optimal to more constructive attractors. Maternal narrative coherence is one malleable mechanism. Chapter 4 enabled us to ascertain whether particular parents struggle to interpret their child's signals, influencing the adaptiveness of their coregulatory behaviour. Specifically, it sought to understand whether the way in which parents think about their child and the relationship influenced children's coregulatory experiences.

Research has shown that children who were better equipped to cope with distress in an adaptive manner had mothers who responded sensitively to their signals and were

knowledgeable about what distressed them (Vinik, 2011). In the final study detailed in Chapter 4, mother's narratives about their child and their relationship with their child were analysed using the FMSS-Coherence protocol to indicate the coherence (i.e., balance and consistency) of their mental representations. Individual differences in narrative coherence were then used to predict mothers' engagement in supportive and unsupportive coregulatory strategies, and whether, in reflecting the organisational features of parenting cognitions, narrative coherence would map onto temporal aspects of coregulation. It was found that the coherence of mothers' mental representations of the child and the parent-child relationship was associated with increased engagement in supportive coregulatory strategies (i.e., autonomy support) and higher levels of contingent responsiveness with children's socially adaptive behaviour (i.e., positive emotion displays). Coherence also appeared to be associated with the effectiveness of mothers' supportive coregulatory behaviour in increasing the recurrence of children's socially adaptive behaviour. Finally, coherence appeared to reduce the evocative effect of children's poor regulatory abilities on maternal coregulatory behaviour. The findings thus highlight the potential for therapeutic techniques such as cognitive reframing to be effective in altering less optimal parenting practices (Robins et al., 1996). Coherence may also serve as a protective factor, fostering emotional availability and a sense of security in the parent-child relationship. With its demonstration that these attributions are accessible and responsive to real-time feedback during parent-child interactions, facilitating contingent maternal responding, the findings provide insights previous studies that have predominantly used macro-level analyses of observed maternal responding (Lohaus et al., 2001; Mesman, 2010) have been unable to do. It is thus the first study to incorporate the FMSS-Coherence into the dynamics of parent-child coregulation.

Maternal mental representations provided a lens through which we can see the role played by mothers' beliefs about the intentions and motivations behind their child's emotional responding in their responsiveness to their child's signals. Accordingly, increasing flexible thinking about the child and the parent-child relationship could be a potential focus for clinicians concerned with altering rigid maladaptive interactions between parents and their children. If clinicians can utilise methods to prevent reliance on overlearned relational patterns of thinking in parents, intervention effects could be sustained in the long-term. Importantly, this developmental period represents the crystallisation of the child's emotional

and cognitive capacities; consequently, examining these patterns as they stabilise and become more predictable may make earlier identification of difficulties and targeting these mechanisms much easier.

Children's internalisation of incoherent representations may foster reliance on inappropriate regulatory strategies, exaggeration of emotional expressions, and thus maintain emotional and behavioural difficulties (Oppenheim, 2006; Sher-Censor et al., 2018). For example, emotion schema that foster the adaptive regulation and utilisation of the motivational properties of emotional arousal may be more likely to be found in children who make more accurate appraisals of an emotion-eliciting situation, and who are more proficient in recognising their own and others' emotions. As this thesis highlights, sub-optimal attachment processes and socialisation experiences in interactions with significant others may play a key role in the development of maladaptive emotion schemas and facilitate negative internal working models of the self in relation to others and the environment (Pietromonaco & Barrett, 2000) that may contribute to enduring emotional and behavioural difficulties.

5.4 Strengths and implications of the thesis

5.4.1 Micro-analytical methods

This thesis has promising implications for the field, particularly in terms of the adoption of more advanced statistical methods of examining intraindividual emotional processes and interpersonal processes in parent-child interaction. The successful application of multilevel modelling methods such as MSA demonstrates the utility of going beyond aggregated counts of emotion and behaviour to directly examining the temporal influence of emotional/behavioural responses on real-time changes in emotion and behaviour, and the interdependence of social partners' emotional responses in real-time. While the combination of questionnaire-based (global descriptors) and observation-based data was useful in capturing within-child and dyadic interactive profiles; the micro-analytical methods employed in this thesis have made significant contributions to the field. Thus, the three studies fill a salient gap in the literature regarding the relevance of these key processes. This thesis has also demonstrated how DS methods can be used to drive forward empirical efforts to refine

conceptualisations of socialisation, in particular, parental sensitivity. It was additionally successful in illustrating the role of emotion dynamics in the socialisation of children's emotion regulation tendencies and pointed to predictable temporal patterns that could be targeted in interventions (i.e., reflexive activation of avoidance-based regulatory strategies, and interdependency of supportive coregulatory strategies with sustained micromomentary reductions in child negative emotion).

5.4.2 The link between children's emotion regulation abilities and their motivational tendencies

This thesis pointed to patterns of emotional responding in children with emerging psychological problems that warrants further investigation. Avoidance-based strategies may be useful for some children in temporarily coping with intense emotional experiences and these children may also struggle to employ a goal-induced approach to maintain appropriate task-focused persistence. We also saw that self-resignation worked to maintain negativity, pointing to the inability of some children to contain negative emotions and a tendency to become overwhelmed. Such children are likely to exhibit mood swings and tantrums with parents and in school with peers and teachers. Taken together, this points to a lack of approach-motivation in children who struggle to downregulate negative emotional experiences and rely on avoidance-based strategies to cope with distress. It also shows that children's emotion regulation tendencies are interlinked with their motivational systems. The reflexive use of avoidance-based coping in internalising and externalising children and generally low activation of approach-related coping strategies (i.e., help-seeking) could serve as a potential intervention target.

5.4.3 Bidirectionality and broadening conceptualisations of sensitive parenting

This thesis has also reaffirmed why the literature should be cautious in conceptualising socialisation as a unidirectional process (i.e., parent-to-child). Bidirectional perspectives of child development argue that children's actions and responses are both shaped by and shape their environments (Sameroff, 2010). Children can also socialise their parents by modifying their beliefs and values as they move through different stages of development and their

cognitive and self-regulatory capacities become more refined. The argument for broadening conceptualisations of parental sensitivity was supported by the individual differences in the organisational/structural aspects of parenting behaviour such that even at high levels of mothers' responsive use of positive structuring and guidance (i.e., autonomy support and positive directives), contingencies with negative emotion and reduced positive emotion could be identified. A better conceptualisation of "sensitivity" may then be patterns of maternal responding that also comprise of patterns of thinking and feeling that underlie automatic response tendencies (i.e., the organisational features of relational schemas, such as clarity, balance and consistency), rather than simply a global parenting quality.

5.4.4 Maternal psychopathology

Previous research has shown differences in interaction patterns in dyads with parents with psychological difficulties. For example, Van Bommel et al (2018) found that despite there being no differences in reciprocated negativity between low internalising and high internalising mothers, adolescents with low internalising mothers were more likely to reciprocate their mothers' positivity in comparison to adolescents with high internalising mothers, pointing to differences in receptiveness and attunement. Consideration of maternal psychopathology in the presented studies revealed that recurrence of child negative emotion was higher in children of mothers high in depressive symptoms in Chapter 2, and children of mothers high in depressive symptoms also displayed less positive emotion in Chapter 3. These findings support notions of the influence of parental psychological functioning on interactive patterns. For example, the higher recurrence of child negative emotion in response to frustrative nonreward situations and reduced recurrence of child positive emotion in response to novelty in children with mothers with higher depressive symptoms, points to inadequate modelling of effective coping with emotional stress and an inability to mobilise positive emotions (Goodman & Gotlib, 1999; Compas et al., 2002). This also demonstrates that the influence of parent's own psychological difficulties can be illustrated by predictable temporal patterns of emotional responding.

5.5 Implications for clinical practice and intervention

The thesis confirmed the positive effect of supportive socialisation practices such as positive structuring (directives) and autonomy support on children's emotion and behaviour, but also extended our current understanding by showing that *how* these strategies are employed is crucial. The temporal contingencies between mothers' use of these socialisation practices and decreases in children's negative emotional behaviour (particularly for children at higher levels of externalising difficulties) reflects an adaptive interactional process that could serve as a source of protection or resilience. This has implications for the efficacy of parenting interventions aimed at increasing parental attunement to children's needs and goals (Denham et al., 2000). Scaffolding behaviours that are not only geared towards acceptance and understanding of child emotion but are also timely and contingent with the child's emotional responses are effective in helping children cope with emotional arousal; and they also buffer against maladaptive tendencies.

Associations between parenting cognitions assessed by FMSS-Coherence and increases in mothers' moment-to-moment use of supportive socialisation strategies, as well as facilitation of adaptive coregulation (i.e., upregulation) of positive emotionality in children may also serve as mechanisms of change for intervention efforts aimed at altering parental attitudes and schematic cognitions. For example, in interventions aimed at increasing parental sensitivity, alongside video-based feedback and evaluation of parenting behaviour, clinicians could use mentalisation-based methods to target unbalanced and distorted thoughts about the child or encourage a more multidimensional perspective to increase attunement and aid the parent in making more accurate interpretations of the child's needs and goals (Sharp & Fonagy, 2008). Further, a molecular approach to intervention efforts could also be adopted by enacting repeated sequencing of adaptive mother and child behaviours this thesis has shown to be key (i.e., maternal autonomy support and child autonomy) over days and weeks to create new interactional patterns.

5.6 Limitations and future directions

5.6.1 Alternative moderators and mediators of coregulation

Whilst not the focus of the thesis, future research could examine the influence of child gender more directly. There is evidence of gendertypic socialisation of emotional behaviour in children. For example, early research found that parents tend to reinforce displays of sadness in girls and anger in boys (Eisenberg et al., 1998). It has also been shown that emotion socialisation with girls tends to be centred on relationship-oriented strategies, whereas for boys, emotion socialisation is geared towards more active and instrumental strategies (i.e., problem-solving) (Sheeber et al., 2002). Interestingly, no effects of gender on mothers' engagement in coregulatory strategies were found in this thesis, future research could potentially look at a wider range of socialisation practices. The influence of parent gender must also not be overlooked. There is a paucity of research on parent-child interaction that includes fathers, even though studies have shown that fathers' active involvement promotes positive development and outcomes for children (Adamsons & Johnson, 2013).

While age did not have a significant effect on the key findings, it is noteworthy that there were associations between age and child displays of positive emotion in the 'Stranger Approach' task which indicated that older children engaged in more positive emotion overall. Though a wide age range was used in this thesis to aid sample size, future research could more directly ascertain developmental differences in child displays of emotion and behaviour in the context of dynamic processes. Moreover, cultural influences on parenting and the parent-child relationship must also be taken into account (Henderson, 2013). There is variation in what is considered normative in different cultures; thus, we must also situate our understanding of interactive processes in a broader sociocultural context. In doing so, research could identify unique features that extend beyond traditional notions of relationship quality (Bornstein, 2013).

Though subjective reports of internal experiences are often criticised for bias and may not provide a full picture of regulatory experiences, they could reveal key information on how appraisals of emotionally arousing stimuli shape children's regulatory attempts and motivational tendencies. Incorporating additional response channels such as expressive physiology may also prove to be a more comprehensive approach to studying emotion regulation in children (Sloan et al., 2004) and directly tap into the dynamics of other transdiagnostic processes such as positive and negative valence systems and systems for

arousal (Casey et al., 2014). Further, in terms of systems for socio-cognitive processes in the RDoC, self-awareness and particular cognitive or language skills may be required to be able to conceptualise and verbalise about coping with emotional experiences. Research is yet to ascertain how well children understand how emotions are regulated and what strategies they should use. Identifying one's own emotional state is also considered to be a key aspect of emotion regulation (Zeman et al., 2006). Research has suggested that low emotion understanding, or awareness may lead to inaccurate interpretations or appraisals of internal and external emotional cues (Lemerise & Arsenio, 2000). Thus, individual differences in emotion recognition and emotion understanding may also be influential sources of risk for impairment in emotion regulation (Halberstadt et al., 2002; Saarni, 1999).

Moreover, while the findings help move forward our understanding of dynamic processes in both children's emotion regulation tendencies and parent-child interaction, sample size was a concern. A number of the findings across the studies were indicative of trends in the data but were not statistically significant, and effect sizes (indicated by hazard ratios) ranged from small to medium. Small sample sizes can decrease the ability to detect significant effects even when the hypothesised relations or associations are present, thus future work could use larger samples to increase power to detect effects. Nevertheless, this thesis was able to successfully illustrate unique patterns of emotional responding in an at-risk sample, making its empirical efforts stand out in a body of literature that has largely focused on community samples.

5.6.2 The trajectory of intrapersonal and interpersonal emotion dynamics

The present study was able to examine temporarily contingent patterns of emotion expression and emotion regulation in a cohort of high-risk children experiencing emotional and behavioural difficulties. However, given that the dynamic processes underlying emotion expression and emotion regulation occur not only over the course of seconds, but also days, weeks, months and years, we cannot infer longitudinal changes in the emotion dynamics detailed in the three studies; it is clear there is still more work to be done. There is little we know about how emotion regulation changes with age, and even less about changes in dynamic processes. Thus, the next step is to undertake longitudinal examinations to increase

understanding of these processes throughout development. For example, we do not yet know whether improvements in emotion regulation reflect changes in the temporal influences of adaptive regulation strategies, or what dynamic changes in emotion processes signify increased skill in maintaining the effect of successful regulatory attempts over longer periods. We also do not know how the dynamics of dyadic coregulatory processes change over developmental time. For example, Snyder et al (2003) found that macro-level indices of parents' sensitive and constructive responses to their child's emotion displays were related to the growth of antisocial behaviour but micro-level indices were not. Such investigations could have interesting implications for our understanding of resilience in children and the trajectories of emotional development in at-risk children. Additionally, these methods could be used to assess the dynamics of other related aspects of child development such as verbal ability and language over longer time scales (e.g., months), and also examine the emergence of multiple domains simultaneously; enabling temporal associations to be used as both outcomes and predictors (Lougheed et al., 2019).

5.6.3 The influence of context

The structural organisation of parent-child relationships is also not limited to its temporal features. The dynamics of intra- and interpersonal emotional processes may depend on the social goals and contexts that organise interactions between a child and their environment and between a child and parent. This thesis focused on paradigms eliciting frustration/anger (and sensitivity to social judgement) and low social approach; however, it may be useful to examine intrapersonal and interpersonal dynamics in other contexts. Coregulation has been studied in a range of parent-child interactive contexts, such as conversations about emotions and structured play. Lindsey et al (2010) observed parent-child mutuality during a caregiving task (i.e., eating a snack) and social play, and found context-dependent patterns of mutuality. They suggested that play interactions represent an egalitarian relationship wherein parent and child act as "mutual play partners", and the focus is more on shared goals than on discipline and instruction (Lindsey et al., 2010). Hollenstein et al (2004) also found that parent-child dyads with children with early onset aggression and antisocial behaviour demonstrated more rigid interaction patterns and were less able to adapt to changes in interactional context (i.e., teaching task, game-playing, sharing a snack) regardless of the

content of their behavioural patterns. Other studies have shown that socioemotional flexibility of the parent-child dyadic system in early childhood is inversely related to longitudinal increases in externalising behaviour (Lunkenheimer et al., 2011). The ability to transition from one task to another and exhibit a broad range of emotional states demonstrates an ability to regulate emotional experiences as the emotion-eliciting context changes. This may also serve as a key adaptive coregulatory process. In addition, examining levels of parental narrative coherence alongside coregulatory patterns when the child is not in distress could further improve conceptualisations of parental sensitivity. Accordingly, MSA could be extended to compare coregulatory processes across contexts, for example, using competing hazard models (Lougheed et al., 2019).

5.7 Final conclusions

These three studies have shown that emotions oscillate in the context of individual goals and contextual demands, supporting the notion of emotion regulation as a dynamic process (Cole et al., 1994). Hence, the thesis has successfully argued that the methodological approaches we employ should also be sensitive enough to detect regulatory change in emotion and behaviour. The paradigms used have enabled examination of both individual and dyadic regulation (i.e., the effect of a stressor on parent and child emotion and behaviour) and show that DS frameworks for understanding emotion regulation can be applied to these paradigms to demonstrate how emotions and behaviours are coordinated and co-constructed to achieve individual or dyadic goals (Lazarus, 1991). Importantly, they provide much needed evidence of micro-analytical methods that objectively show how emotions organise into predictable patterns that give rise to individual and between-dyad differences in emotional functioning.

References

- Ackerman, P. T., Newton, J. E., McPherson, W. B., Jones, J. G., & Dykman, R. A. (1998). Prevalence of post traumatic stress disorder and other psychiatric diagnoses in three groups of abused children (sexual, physical, and both). *Child abuse & Neglect*, 22(8), 759-774. [https://doi.org/10.1016/S0145-2134\(98\)00062-3](https://doi.org/10.1016/S0145-2134(98)00062-3)
- Adamsons, K., & Johnson, S. K. (2013). An updated and expanded meta-analysis of nonresident fathering and child well-being. *Journal of Family Psychology*, 27(4), 589. <https://doi.org/10.1037/a0033786>
- Ainsworth, M. D. S., & Bell, S. M. (1970). Attachment, exploration, and separation: Illustrated by the behavior of one-year-olds in a strange situation. *Child Development*, 41(1), 49-67.
- Ainsworth, M. D. S., Bell, S. M., & Stayton, D. F. (1974). Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In M. P. M. Richards (Ed.). *The integration of a child into a social world* (pp. 99–135). Cambridge University Press.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. N. (2015). *Patterns of attachment: A psychological study of the strange situation*. Psychology Press.
- Aksan, N., Kochanska, G., & Ortmann, M. R. (2006). Mutually responsive orientation between parents and their young children: Toward methodological advances in the science of relationships. *Developmental Psychology*, 42(5), 833. <https://doi.org/10.1037/0012-1649.42.5.833>
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, 30(2), 217-237. <https://doi.org/10.1016/j.cpr.2009.11.004>
- Aldao, A., & Nolen-Hoeksema, S. (2010). Specificity of cognitive emotion regulation strategies: A transdiagnostic examination. *Behaviour Research and Therapy*, 48(10), 974-983. <https://doi.org/10.1016/j.brat.2010.06.002>
- Aldao, A., & Nolen-Hoeksema, S. (2012). When are adaptive strategies most predictive of psychopathology? *Journal of Abnormal Psychology*, 121(1), 276. <https://doi.org/10.1037/a0023598>
- Alink, L. R., Cicchetti, D., Kim, J., & Rogosch, F. A. (2009). Mediating and moderating processes in the relation between maltreatment and psychopathology: Mother-child relationship quality and emotion regulation. *Journal of Abnormal Child Psychology*, 37(6), 831-843. <https://doi.org/10.1007/s10802-009-9314-4>
- Allison, P. D. (1984). *Event history analysis: Regression for longitudinal event data* (No. 46). SAGE Publications Ltd.

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Association.
<https://doi.org/10.1176/appi.books.9780890425596>
- Andreadakis, E., Joussemet, M., & Mageau, G. A. (2019). How to support toddlers' autonomy: Socialization practices reported by parents. *Early Education and Development, 30*(3), 297-314. <https://doi.org/10.1080/10409289.2018.1548811>
- Angold, A., Costello, E. J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry, 40*(1), 57-87. <https://doi.org/10.1111/1469-7610.00424>
- Aoki, Y., Zeanah, C. H., Heller, S. S., & Bakshi, S. (2002). Parent–infant relationship global assessment scale: A study of its predictive validity. *Psychiatry and Clinical Neurosciences, 56*(5), 493-497. <https://doi.org/10.1046/j.1440-1819.2002.01044.x>
- Asarnow, J. R., Lewis, J. M., Doane, J. A., Goldstein, M. J., & Rodnick, E. H. (1982). Family interaction and the course of adolescent psychopathology: An analysis of adolescent and parent effects. *Journal of Abnormal Child Psychology, 10*(3), 427-441.
<https://doi.org/10.1007/BF00912331>
- Asendorpf, J. B. (1990). Beyond social withdrawal: Shyness, unsociability, and peer avoidance. *Human Development, 33*(4-5), 250–259.
<https://doi.org/10.1159/000276522>
- Aspland, H., & Gardner, F. (2003). Observational measures of parent-child interaction: An introductory review. *Child and Adolescent Mental Health, 8*(3), 136-143.
<https://doi.org/10.1111/1475-3588.00061>
- Aunola, K., Nurmi, J. E., Lerkkanen, M. K., & Rasku-Puttonen, H. (2003). The roles of achievement-related behaviours and parental beliefs in children's mathematical performance. *Educational Psychology, 23*(4), 403-421.
<https://doi.org/10.1080/01443410303212>
- Axelson, D. A., & Birmaher, B. (2001). Relation between anxiety and depressive disorders in childhood and adolescence. *Depression and Anxiety, 14*(2), 67-78.
<https://doi.org/10.1002/da.1048>
- Bakeman, R., & Quera, V. (2011). *Sequential analysis and observational methods for the behavioral sciences*. Cambridge University Press.
- Baker, J. K., Fenning, R. M., Crnic, K. A., Baker, B. L., & Blacher, J. (2007). Prediction of social skills in 6-year-old children with and without developmental delays: Contributions of early regulation and maternal scaffolding. *American Journal on Mental Retardation, 112*(5), 375-391. [https://doi.org/10.1352/0895-8017\(2007\)112\[0375:POSSIY\]2.0.CO;2](https://doi.org/10.1352/0895-8017(2007)112[0375:POSSIY]2.0.CO;2)
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191. <https://doi.org/10.1037/0033-295X.84.2.191>

- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52(1), 1-26. <https://doi.org/10.1111/1467-839X.00024>
- Bandura, A., Ross, D., & Ross, S. A. (1963). Vicarious reinforcement and imitative learning. *Journal of Abnormal and Social Psychology*, 67(6), 601. <https://doi.org/10.1037/h0045550>
- Banich, M. T. (2009). Executive function: The search for an integrated account. *Current Directions in Psychological Science*, 18(2), 89-94. <https://doi.org/10.1111/j.1467-8721.2009.01615.x>
- Barber, B. K. (Ed.) (2002). *Intrusive parenting: How psychological control affects children and adolescents*. Washington, DC: American Psychological Association. <https://doi.org/10.1037/10422-000>
- Barber, B. K. (Ed.) (2002). Reintroducing parental psychological control. In B. K. Barber (Ed.). *Intrusive parenting: How psychological control affects children and adolescents* (pp. 3–13). Washington, DC: American Psychological Association. <https://doi.org/10.1037/10422-001>
- Barber, B. K., & Harmon, E. L. (2002). Violating the self: Parental psychological control of children and adolescents. In B. K. Barber (Ed.). *Intrusive parenting* (pp. 15 – 52). Washington, DC: American Psychological Association. <https://doi.org/10.1037/10422-002>
- Barczak, P., Kane, N., Andrews, S., Congdon, A. M., Clay, J. C., & Betts, T. (1988). Patterns of psychiatric morbidity in a genito-urinary clinic: a validation of the Hospital Anxiety Depression scale (HAD). *The British Journal of Psychiatry*, 152(5), 698-700. <https://doi.org/10.1192/bjp.152.5.698>
- Bardack, S., Herbers, J. E., & Obradović, J. (2017). Unique contributions of dynamic versus global measures of parent–child interaction quality in predicting school adjustment. *Journal of Family Psychology*, 31(6), 649. <https://doi.org/10.1037/fam0000296>
- Bariola, E., Hughes, E. K., & Gullone, E. (2012). Relationships between parent and child emotion regulation strategy use: A brief report. *Journal of Child and Family Studies*, 21(3), 443-448. <https://doi.org/10.1007/s10826-011-9497-5>
- Baumrind, D. (1971). Current patterns of parental authority. *Developmental Psychology Monographs*, 4(1, Pt.2), 1–103. <https://doi.org/10.1037/h0030372>
- Beauchaine, T. (2001). Vagal tone, development, and Gray's motivational theory: Toward an integrated model of autonomic nervous system functioning in psychopathology. *Development and Psychopathology*, 13(2), 183-214. <https://doi.org/10.1017/s0954579401002012>
- Beauchaine, T. P., Klein, D. N., Crowell, S. E., Derbidge, C., & Gatzke-Kopp, L. (2009). Multifinality in the development of personality disorders: A Biology × Sex × Environment interaction

- model of antisocial and borderline traits. *Development and Psychopathology*, 21(3), 735. <https://doi.org/10.1017/S0954579409000418>
- Beebe, B., & Lachmann, F. M. (1998). Co-constructing inner and relational processes: Self-and mutual regulation in infant research and adult treatment. *Psychoanalytic Psychology*, 15(4), 480. <https://doi.org/10.1037/0736-9735.15.4.480>
- Beebe, B., Jaffe, J., Markese, S., Buck, K., Chen, H., Cohen, P., Bahrisk, L., Andrews, H., & Feldstein, S. (2010). The origins of 12-month attachment: A microanalysis of 4-month mother–infant interaction. *Attachment & Human Development*, 12(1-2), 3-141. <https://doi.org/10.1080/14616730903338985>
- Beeghly, M., & Tronick, E. (2011). Early resilience in the context of parent–infant relationships: A social developmental perspective. *Current Problems in Pediatric and Adolescent Health Care*, 41(7), 197-201. <https://doi.org/10.1016/j.cppeds.2011.02.005>
- Bell, R. Q. (1968). A reinterpretation of the direction of effects in studies of socialization. *Psychological Review*, 75(2), 81. <https://doi.org/10.1037/h0025583>
- Bell, M. A., & Wolfe, C. D. (2004). Emotion and cognition: An intricately bound developmental process. *Child Development*, 75(2), 366-370. <https://doi.org/10.1111/j.1467-8624.2004.00679.x>
- Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, 55(1), 83-96. <https://doi.org/10.2307/1129836>
- Benoit, D., Parker, K. and Zeanah, C. H. (1997). Mothers representations of their infants assessed prenatally: Stability and association with their infants' attachment classifications. *Journal of Child Psychology and Psychiatry*, 38, 307–313. <https://doi.org/10.1111/j.1469-7610.1997.tb01515.x>
- Berlin, L. J., & Cassidy, J. (2003). Mothers' self-reported control of their preschool children's emotional expressiveness: A longitudinal study of associations with infant–mother attachment and children's emotion regulation. *Social Development*, 12(4), 477-495. <https://doi.org/10.1111/1467-9507.00244>
- Biederman, J., Faraone, S., Milberger, S., Guite, J., Mick, E., Chen, L., Mennin, D., Marris, A., Ouellette, C., Moore, P., Spencer, T., Norman, D., Wilens, T., Kraus, I., & Perrin, J. (1996). A prospective 4-year follow-up study of attention-deficit hyperactivity and related disorders. *Archives of General Psychiatry*, 53(5), 437-446. <https://doi.org/10.1001/archpsyc.1996.01830050073012>
- Biederman, J., Petty, C. R., Day, H., Goldin, R. L., Spencer, T., Faraone, S. V., Surman, C. B. H., & Wozniak, J. (2012). Severity of the aggression/anxiety-depression/attention (AAA) CBCL profile discriminates between different levels of deficits in emotional regulation in youth with ADHD. *Journal of Developmental and Behavioral Pediatrics*, 33(3), 236. <https://doi.org/10.1097/DBP.0b013e3182475267>

- Biringen, Z., Emde, R. N., & Pipp-Siegel, S. (1997). Dyssynchrony, conflict, and resolution: Positive contributions to infant development. *American Journal of Orthopsychiatry*, 67(1), 4-19. <https://doi.org/10.1037/h0080207>
- Biringen, Z. (2008). The Emotional Availability (EA) Scales, 4th ed. Infancy/Early Childhood Version (child age: 0–5 years). Retrieved from <https://www.emotionalavailability.com>.
- Bjelland, I., Dahl, A. A., Haug, T. T., & Neckelmann, D. (2002). The validity of the Hospital Anxiety and Depression Scale: an updated literature review. *Journal of Psychosomatic Research*, 52(2), 69-77. [https://doi.org/10.1016/s0022-3999\(01\)00296-3](https://doi.org/10.1016/s0022-3999(01)00296-3)
- Blair, C., Peters, R., & Granger, D. (2004). Physiological and neuropsychological correlates of approach/withdrawal tendencies in preschool: Further examination of the behavioral inhibition system/behavioral activation system scales for young children. *Developmental Psychobiology*, 45(3), 113-124. <https://doi.org/10.1002/dev.20022>
- Bögels, S., & Brechman-Toussaint, M. (2006). Family issues in child anxiety: Attachment, family functioning, parental rearing and beliefs. *Clinical Psychology Review*, 26, 834–856. <https://doi.org/10.1007/s10567-014-0170-6>
- Bornstein, M. H., & Manian, N. (2013). Maternal responsiveness and sensitivity re-considered: Some is more. *Development and Psychopathology*, 25(401). <https://doi.org/10.1017/S0954579413000308>
- Borelli, J. L., Sbarra, D. A., Snavely, J. E., McMakin, D. L., Coffey, J. K., Ruiz, S. K., Wang, B. A., & Chung, S. Y. (2014). With or without you: Preliminary evidence that attachment avoidance predicts nondeployed spouses' reactions to relationship challenges during deployment. *Professional Psychology: Research and Practice*, 45(6), 478–487. <https://doi.org/10.1037/a0037780>
- Bornstein, M. H., Tamis-LeMonda, C. S., Hahn, C. S., & Haynes, O. M. (2008). Maternal responsiveness to young children at three ages: Longitudinal analysis of a multidimensional, modular, and specific parenting construct. *Developmental Psychology*, 44(3), 867. <https://doi.org/10.1037/0012-1649.44.3.867>
- Bowlby, J. (1969). Attachment and loss v. 3 (Vol. 1). Random House. Furman, W., & Buhrmester, D.(2009). Methods and measures: The network of relationships inventory: Behavioral systems version. *International Journal of Behavioral Development*, 33, 470-478.
- Bowlby, J. (1978). Attachment theory and its therapeutic implications. *Adolescent Psychiatry*, 6, 5–33.
- Bowlby, J. (1982). Attachment and loss: retrospect and prospect. *American Journal of Orthopsychiatry*, 52(4), 664. <https://doi.org/10.1111/j.1939-0025.1982.tb01456.x>
- Bowlby, J. (1988). *A Secure Base*. New York. NY: Basic Books.

- Bowlby, J. (1989). The role of attachment in personality development and psychopathology. In S. I. Greenspan & G. H. Pollock (Eds.). *The course of life, Vol. 1. Infancy* (pp. 229–270). International Universities Press, Inc.
- Brennan, K. A., & Shaver, P. R. (1995). Dimensions of adult attachment, affect regulation, and romantic relationship functioning. *Personality and Social Psychology Bulletin*, *21*(3), 267-283. <https://doi.org/10.1177/0146167295213008>
- Bretherton, I., Fritz, J., Zahn-Waxler, C., & Ridgeway, D. (1986). Learning to talk about emotions: A functionalist perspective. *Child Development*, *57*(3), 529-548. <https://doi.org/10.2307/1130334>
- Bretherton, I. (1990). Communication patterns, internal working models, and the intergenerational transmission of attachment relationships. *Infant Mental Health Journal*, *11*(3), 237-252. [https://doi.org/10.1002/1097-0355\(199023\)11:3<237::AID-IMHJ2280110306>3.0.CO;2-X](https://doi.org/10.1002/1097-0355(199023)11:3<237::AID-IMHJ2280110306>3.0.CO;2-X)
- Bridges, L. J., Denham, S. A., & Ganiban, J. M. (2004). Definitional issues in emotion regulation research. *Child Development*, *75*(2), 340-345. <https://doi.org/10.1111/j.1467-8624.2004.00675.x>
- Bridgett, D. J., Oddi, K. B., Laake, L. M., Murdock, K. W., & Bachmann, M. N. (2013). Integrating and differentiating aspects of self-regulation: Effortful control, executive functioning, and links to negative affectivity. *Emotion*, *13*(1), 47–63. <https://doi.org/10.1037/a0029536>
- Boker, S. M., & Laurenceau, J. P. (2007). Coupled dynamics and mutually adaptive context. In T. D. Little, J. A. Bovaird, & N. A. Card (Eds.). *Modeling contextual effects in longitudinal studies* (pp. 299–324). Lawrence Erlbaum Associates Publishers.
- Bornstein, M. H. (2013). Parenting and child mental health: a cross-cultural perspective. *World Psychiatry*, *12*(3), 258-265. <https://doi.org/10.1002/wps.20071>
- Boschloo, L., Van Borkulo, C. D., Rhemtulla, M., Keyes, K. M., Borsboom, D., & Schoevers, R. A. (2015). The network structure of symptoms of the diagnostic and statistical manual of mental disorders. *PloS One*, *10*(9), e0137621. <https://doi.org/10.1371/journal.pone.0137621>
- Brenning, K., Soenens, B., Van Petegem, S., & Vansteenkiste, M. (2015). Perceived maternal autonomy support and early adolescent emotion regulation: A longitudinal study. *Social Development*, *24*(3), 561-578. <https://doi.org/10.1111/sode.12107>
- Bretherton, I., & Munholland, K. A. (2008), “Models in attachment relationships: elaborating a central construct in attachment theory”. In J. Cassidy & P. R. Shaver (Eds.). *Handbook of Attachment: Theory, Research, and Clinical Applications* (2nd ed., pp. 102-30). New York, NY: Guilford Press.
- Brocki, K. C., Forslund, T., Frick, M., & Bohlin, G. (2019). Do individual differences in early affective and cognitive self-regulation predict developmental change in ADHD

symptoms from preschool to adolescence? *Journal of Attention Disorders*, 23(13), 1656-1666. <https://doi.org/10.1177/1087054717693372>

- Brophy, M., & Dunn, J. (2002). What did mummy say? Dyadic interactions between young “hard to manage” children and their mothers. *Journal of Abnormal Child Psychology*, 30(2), 103-112. <https://doi.org/10.1023/A:1014705314406>
- Buckholdt, K. E., Parra, G. R., Anestis, M. D., Lavender, J. M., Jobe-Shields, L. E., Tull, M. T., & Gratz, K. L. (2015). Emotion regulation difficulties and maladaptive behaviors: Examination of deliberate self-harm, disordered eating, and substance misuse in two samples. *Cognitive Therapy and Research*, 39(2), 140-152. <https://doi.org/10.1007/s10608-014-9655-3>
- Bugental, D. B., Ellerson, P. C., Lin, E. K., Rainey, B., Kokotovic, A., & O'Hara, N. (2002). A cognitive approach to child abuse prevention. *Journal of Family Psychology*, 16(3), 243. <https://doi.org/10.1037/0893-3200.16.3.243>
- Bugental, D. B., Olster, D. H., & Martorell, G. A. (2003). A developmental neuroscience perspective on the dynamics of parenting. In L. Kuczynski (Ed.). *Handbook of dynamics in parent-child relations* (pp. 25–48). Thousand Oaks, CA: Sage.
- Bullock, B. M., & Dishion, T. J. (2007). Family processes and adolescent problem behavior: Integrating relationship narratives into understanding development and change. *Journal of the American Academy of Child & Adolescent Psychiatry*, 46(3), 396-407. <https://doi.org/10.1097/chi.0b013e31802d0b27>
- Bunford, N., Evans, S. W., Zoccola, P. M., Owens, J. S., Flory, K., & Speil, C. F. (2016). Correspondence between heart rate variability and emotion dysregulation in children, including children with ADHD. *Journal of Abnormal Child Psychology*, 45(7), 1325-1337. <https://doi.org/10.1007/s10802-016-0257-2>
- Bus, A. G., & Van IJzendoorn, M. H. (1992). Patterns of attachment in frequently and infrequently reading mother—child dyads. *The Journal of Genetic Psychology*, 153(4), 395-403. <https://doi.org/10.1080/00221325.1992.10753735>
- Buss, K. A., & Goldsmith, H. H. (1998). Fear and anger regulation in infancy: Effects on the temporal dynamics of affective expression. *Child Development*, 69(2), 359-374. <https://doi.org/10.2307/1132171>
- Butler, E. A., & Gross, J. J. (2009). Emotion and emotion regulation: Integrating individual and social levels of analysis. *Emotion Review*, 1(1), 86-87. <https://doi.org/10.1177/1754073908099131>
- Buss, K. A., & Kiel, E. J. (2011). Do maternal protective behaviors alleviate toddlers' fearful distress? *International Journal of Behavioral Development*, 35(2), 136-143. <https://doi.org/10.1177/0165025410375922>

- Butler, E. A. (2011). Temporal interpersonal emotion systems: The “TIES” that form relationships. *Personality and Social Psychology Review*, 15(4), 367-393. <https://doi.org/10.1177/1088868311411164>
- Butler, E. A. (2015). Interpersonal affect dynamics: It takes two (and time) to tango. *Emotion Review*, 7(4), 336-341. <https://doi.org/10.1177/1754073915590622>
- Butler, E. A., & Randall, A. K. (2013). Emotional coregulation in close relationships. *Emotion Review*, 5(2), 202-210. <https://doi.org/10.1177/1754073912451630>
- Butner, J., Amazeen, P. G., & Mulvey, G. M. (2005). Multilevel Modeling of Two Cyclical Processes: Extending Differential Structural Equation Modeling to Nonlinear Coupled Systems. *Psychological Methods*, 10(2), 159-177. <https://doi.org/10.1037/1082-989X.10.2.159>
- Calkins, S. D. (1994). Origins and outcomes of individual differences in emotion regulation. *Monographs of the Society for Research in Child Development*, 53-72. <https://doi.org/10.2307/1166138>
- Calkins, S. D. (2011). Caregiving as coregulation: Psychobiological processes and child functioning. In A. Booth, S. McHale, & N. Landale (eds.), *Biosocial Foundations of Family Processes. National Symposium on Family Issues*. New York, NY: Springer. https://doi.org/10.1007/978-1-4419-7361-0_3
- Calkins, S. D., & Bell, K. L. (1999). Developmental transitions as windows to parental socialization of emotion. *Psychological Inquiry*, 10(4), 368-372.
- Calkins, S. D., & Johnson, M. C. (1998). Toddler regulation of distress to frustrating events: Temperamental and maternal correlates. *Infant Behavior and Development*, 21(3), 379-395. [https://doi.org/10.1016/S0163-6383\(98\)90015-7](https://doi.org/10.1016/S0163-6383(98)90015-7)
- Calkins, S. D., & Keane, S. P. (2009). Developmental origins of early antisocial behavior. *Development and Psychopathology*, 21(4), 1095. <https://doi.org/10.1017/S095457940999006X>
- Calkins, S. D., & Mackler, J. S. (2011). Temperament, emotion regulation, and social development. In M. K. Underwood & L. H. Rosen (Eds.), *Social development: Relationships in infancy, childhood, and adolescence* (pp. 44–70). Guilford Press.
- Campbell, S. B., Shaw, D. S., & Gilliom, M. (2000). Early externalizing behaviour problems: Toddlers and preschoolers at risk for later maladjustment. *Development and Psychopathology*, 12(3), 467–488. <https://doi.org/10.1017/S0954579400003114>
- Campos, J. J., Walle, E. A., Dahl, A., & Main, A. (2011). Reconceptualizing emotion regulation. *Emotion Review*, 3(1), 26-35. <https://doi.org/10.1177/1754073910380975>
- Card, N. A., Selig, J. P., & Little, T. (Eds.). (2011). *Modeling dyadic and interdependent data in the developmental and behavioral sciences*. Routledge.

- Carlson, G. A., Danzig, A. P., Dougherty, L. R., Bufferd, S. J., & Klein, D. N. (2016). Loss of temper and irritability: The relationship to tantrums in a community and clinical sample. *Journal of Child and Adolescent Psychopharmacology*, *26*(2), 114-122. <https://doi.org/10.1089/cap.2015.0072>
- Carlson, E. A., & Sroufe, L. A. (1995). Contribution of attachment theory to developmental psychopathology. In D. Cicchetti & D. J. Cohen (Eds.), *Wiley series on personality processes. Developmental Psychopathology, Vol. 1. Theory and methods* (pp. 581–617). John Wiley & Sons.
- Carlson, S. M., & Wang, T. S. (2007). Inhibitory control and emotion regulation in preschool children. *Cognitive Development*, *22*(4), 489-510. <https://doi.org/10.1016/j.cogdev.2013.09.001>
- Carr, M., Borkowski, J. G., & Maxwell, S. E. (1991). Motivational components of underachievement. *Developmental Psychology*, *27*(1), 108. <https://doi.org/10.1037/0012-1649.27.1.108>
- Carver, C. (2003). Pleasure as a sign you can attend to something else: Placing positive feelings within a general model of affect. *Cognition and Emotion*, *17*(2), 241-261. <https://doi.org/10.1080/02699930302294>
- Carver, C. S., Johnson, S. L., & Joormann, J. (2008). Serotonergic function, two-mode models of self-regulation, and vulnerability to depression: what depression has in common with impulsive aggression. *Psychological Bulletin*, *134*(6), 912-943. <https://doi.org/10.1037/a0013740>
- Carver, C. S., & Harmon-Jones, E. (2009). Anger is an approach-related affect: evidence and implications. *Psychological Bulletin*, *135*(2), 183-204. <https://doi.org/10.1037/a0013965>
- Casey, B. J., Oliveri, M. E., & Insel, T. (2014). A neurodevelopmental perspective on the research domain criteria (RDoC) framework. *Biological Psychiatry*, *76*(5), 350-353. <https://doi.org/10.1016/j.biopsych.2014.01.006>
- Caspi, A., Moffitt, T. E., Morgan, J., Rutter, M., Taylor, A., Arseneault, L., Tully, L., Jacobs, L., Kim-Cohen, C., & Polo-Tomas, M. (2004). Maternal expressed emotion predicts children's antisocial behavior problems: using monozygotic-twin differences to identify environmental effects on behavioral development. *Developmental Psychology*, *40*(2), 149-161. <https://doi.org/10.1037/0012-1649.40.2.149>
- Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. *Monographs of the Society for Research in Child Development*, *59*(2-3), 228-249. <https://doi.org/10.1111/j.1540-5834.1994.tb01287.x>
- Censullo, M., Bowler, R., Lester, B., & Brazelton, T. B. (1987). An instrument for the measurement of infant-adult synchrony. *Nursing Research*, *36*(4), 244–248. <https://doi.org/10.1097/00006199-198707000-00015>

- Censullo, M. (1991). *Dyadic Mutuality Code manual*. Wellesley, MA: Wellesley College Center for Research on Women. <https://doi.org/10.1177/1078390305278788>
- Chaplin, T. M., Casey, J., Sinha, R., & Mayes, L. C. (2010). Gender differences in caregiver emotion socialization of low-income toddlers. *New Directions for Child and Adolescent Development*, 2010(128), 11-27. <https://doi.org/10.1002/cd.266>
- Chavira, D. A., Stein, M. B., Bailey, K., & Stein, M. T. (2004). Child anxiety in primary care: Prevalent but untreated. *Depression and Anxiety*, 20(4), 155-164. <https://doi.org/10.1002/da.20039>
- Chorpita, B. F., Albano, A. M., & Barlow, D. H. (1998). The structure of negative emotions in a clinical sample of children and adolescents. *Journal of Abnormal Psychology*, 107(1), 74-85. <https://doi.org/10.1037/0021-843X.107.1.74>
- Chow, S. M., Ram, N., Boker, S. M., Fujita, F., & Clore, G. (2005). Emotion as a thermostat: representing emotion regulation using a damped oscillator model. *Emotion*, 5(2), 208-225. <https://doi.org/10.1037/1528-3542.5.2.208>
- Cicchetti, D., Ackerman, B. P., & Izard, C. E. (1995). Emotions and emotion regulation in developmental psychopathology. *Development and Psychopathology*, 7, 1-10. <https://doi.org/10.1017/S0954579400006301>
- Cisler, J. M., Olatunji, B. O., Feldner, M. T., & Forsyth, J. P. (2010). Emotion regulation and the anxiety disorders: An integrative review. *Journal of psychopathology and Behavioral Assessment*, 32(1), 68-82. <https://doi.org/10.1007/s10862-009-9161-1>
- Clark, R. (1985). *The parent-child early relational assessment*. Madison, WI: Department of Psychiatry, University of Wisconsin Medical School.
- Coburn, S. S., Crnic, K. A., & Ross, E. K. (2015). Mother–infant dyadic state behaviour: Dynamic systems in the context of risk. *Infant and Child Development*, 24(3), 274-297. <https://doi.org/10.1002/icd.1913>
- Cole, P. M., Armstrong, L. M., & Pemberton, C. K. (2010). The role of language in the development of emotion regulation. In S. D. Calkins & M. A. Bell (Eds.), *Human brain development. Child development at the intersection of emotion and cognition* (pp. 59–77). American Psychological Association. <https://doi.org/10.1037/12059-004>
- Cole, S. W. (2014). Human social genomics. *PLOS Genetics*, 10, e1004601. <https://doi.org/10.1371/journal.pgen.1004601>
- Cole, P. M., Michel, M. K., & Teti, L. O. D. (1994). The development of emotion regulation and dysregulation: A clinical perspective. *Monographs of the Society for Research in Child Development*, 59(2-3), 73-100.
- Cole, P. M., Bendezú, J. J., Ram, N., & Chow, S. M. (2017). Dynamical systems modeling of early childhood self-regulation. *Emotion*, 17(4), 684-699. <https://doi.org/10.1037/emo0000268>

- Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development, 75*(2), 317–333. <https://doi.org/10.1111/j.1467-8624.2004.00673.x>
- Cole, P. M., Loughheed, J. P., Chow, S. M., & Ram, N. (2020). Development of Emotion Regulation Dynamics Across Early Childhood: A Multiple Time-Scale Approach. *Affective Science, 1*(1), 28-41. <https://doi.org/10.1007/s42761-020-00004-y>
- Cole, P. M., Teti, L. O., & Zahn-Waxler, C. (2003). Mutual emotion regulation and the stability of conduct problems between preschool and early school age. *Development and Psychopathology, 15*(1), 1–18.
- Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: problems, progress, and potential in theory and research. *Psychological Bulletin, 127*(1), 87. <https://doi.org/10.1037/0033-2909.127.1.87>
- Compas, B. E., Connor-Smith, J., & Jaser, S. S. (2004). Temperament, stress reactivity, and coping: Implications for depression in childhood and adolescence. *Journal of Clinical Child and Adolescent Psychology, 33*(1), 21-31. https://doi.org/10.1207/S15374424JCCP3301_3
- Compas, B. E., Desjardins, L., Vannatta, K., Young-Saleme, T., Rodriguez, E. M., Dunn, M., Bemis, H., Snyder, S., & Gerhardt, C. A. (2014). Children and adolescents coping with cancer: Self- and parent reports of coping and anxiety/depression. *Health Psychology, 33*(8), 853–861. <https://doi.org/10.1037/hea0000083>
- Compas, B. E., Langrock, A. M., Keller, G., Merchant, M. J., & Copeland, M. E. (2002). Children coping with parental depression: Processes of adaptation to family stress. In S. H. Goodman & I. H. Gotlib (Eds.). *Children of depressed parents: Mechanisms of risk and implications for treatment* (pp. 227–252). American Psychological Association. <https://doi.org/10.1037/10449-009>
- Compas, B. E., Jaser, S. S., Bettis, A. H., Watson, K. H., Gruhn, M. A., Dunbar, J. P., Williams, E., & Thigpen, J. C. (2017). Coping, emotion regulation, and psychopathology in childhood and adolescence: A meta-analysis and narrative review. *Psychological Bulletin, 143*(9), 939–991. <https://doi.org/10.1037/bul0000110>
- Cooper, M. L., Talley, A. E., Sheldon, M. S., Levitt, A., & Barber, L. L. (2008). A dyadic perspective on approach and avoidance motives for sexual behavior. In A. J. Elliot (Ed.). *Handbook of approach and avoidance motivation* (pp. 615-632). New York, NY: Psychology Press.
- Coplan, R. J., Wilson, J., Frohlick, S. L., & Zelenski, J. (2006). A person-oriented analysis of behavioral inhibition and behavioral activation in children. *Personality and Individual Differences, 41*(5), 917-927. <https://doi.org/10.1016/j.paid.2006.02.019>
- Costello, E. J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and development of psychiatric disorders in childhood and adolescence. *Archives of General Psychiatry, 60*(8), 837-844. <https://doi.org/10.1001/archpsyc.60.8.837>

- Cox, D. R. (1972). Regression models and life-tables. *Journal of the Royal Statistical Society: Series B (Methodological)*, 34(2), 187-202. <https://doi.org/10.1111/j.2517-6161.1972.tb00899.x>
- Cox, D. & Oakes, D. (1984). *Analysis of Survival Data*. London: Chapman & Hall. <https://doi.org/10.1002/bimj.4710290119>
- Cox, M. J., & Paley, B. (2003). Understanding families as systems. *Current Directions in Psychological Science*, 12(5), 193-196. <https://doi.org/10.1111/1467-8721.01259>
- Criss, M. M., Shaw, D. S., & Ingoldsby, E. M. (2003). Mother–son positive synchrony in middle childhood: Relation to antisocial behavior. *Social Development*, 12(3), 379-400. <https://doi.org/10.1111/1467-9507.00239>
- Crittenden, P. M., & Claussen, A. H. (Eds.) (2000). *Adaptation to varied environments. The organization of attachment relationships: Maturation, culture and context*. Cambridge University Press.
- Crowell, S. E., Baucom, B. R., Yaptangco, M., Bride, D., Hsiao, R., McCauley, E., & Beauchaine, T. P. (2014). Emotion dysregulation and dyadic conflict in depressed and typical adolescents: Evaluating concordance across psychophysiological and observational measures. *Biological Psychology*, 98, 50-58. <https://doi.org/10.1016/j.biopsycho.2014.02.009>
- Crundwell, R. M. A. (2005). An initial investigation of the impact of self-regulation and emotionality on behavior problems in children with ADHD. *Canadian Journal of School Psychology*, 20(1-2), 62-74. <https://doi.org/10.1177/0829573506295458>
- Cumberland-Li, A., Eisenberg, N., Champion, C., Gershoff, E., & Fabes, R. A. (2003). The relation of parental emotionality and related dispositional traits to parental expression of emotion and children's social functioning. *Motivation and Emotion*, 27(1), 27-56. <https://doi.org/10.1023/A:1023674308969>
- Cummings, E. M., & Davies, P. (1996). Emotional security as a regulatory process in normal development and the development of psychopathology. *Development and Psychopathology*, 8(1), 123-139. <https://doi.org/10.1017/S0954579400007008>
- Cuthbert, B. N. (2014). The RDoC framework: facilitating transition from ICD/DSM to dimensional approaches that integrate neuroscience and psychopathology. *World Psychiatry*, 13(1), 28-35. <https://doi.org/10.1002/wps.20087>
- Cuthbert, B. N., & Insel, T. R. (2013). Toward the future of psychiatric diagnosis: the seven pillars of RDoC. *BMC Medicine*, 11(1), 126. <https://doi.org/10.1186/1741-7015-11-126>
- Dagne, G. A., & Snyder, J. (2011). Relationship of maternal negative moods to child emotion regulation during family interaction. *Development and Psychopathology*, 23(1), 211. <https://doi.org/10.1017/S095457941000074X>

- Davidson, R. J., Jackson, D. C., & Kalin, N. H. (2000). Emotion, plasticity, context, and regulation: perspectives from affective neuroscience. *Psychological Bulletin*, *126*(6), 890. <https://doi.org/10.1037/0033-2909.126.6.890>
- Davidov, M., & Grusec, J. E. (2006). Untangling the links of parental responsiveness to distress and warmth to child outcomes. *Child Development*, *77*(1), 44-58. <https://doi.org/10.1111/j.1467-8624.2006.00855.x>
- Davidov, M., & Grusec, J. E. (2007). Socialization in the family: The roles of parents. In J. E. Grusec & P. D. Hastings (Eds.). *Handbook of socialization: Theory and research* (pp. 284–308). Guilford Press.
- DiCorcia, J. A., Sravish, A. V., & Tronick, E. (2013). The everyday stress resilience hypothesis: Unfolding resilience from a perspective of everyday stress and coping. In G. Laviola & S. Macrì. (eds.). *Adaptive and maladaptive aspects of developmental stress. Current Topics in Neurotoxicity, vol 3*. (pp. 67-93). New York, NY: Springer. https://doi.org/10.1007/978-1-4614-5605-6_4
- De Mendonça, J. S., Cossette, L., Strayer, F. F., & Gravel, F. (2011). Mother-child and father-child interactional synchrony in dyadic and triadic interactions. *Sex Roles*, *64*(1-2), 132-142. <https://doi.org/10.1007/s11199-010-9875-2>
- De Ruiter, N. M. (2019). The nature of adolescents' real-time self-esteem from a Dynamic Systems perspective: The Socially Embedded Self-Esteem model. In E. S. Kunnen, N. M. P. de Ruiter, B. F. Jeronimus, & M. A. E. van der Gaag (Eds.). *Psychosocial Development in Adolescence: Insights from the Dynamic Systems Approach (Studies in Adolescent Development)*. Routledge.
- De Ruiter, N. M., Van Geert, P. L., & Kunnen, E. S. (2017). Explaining the “How” of self-esteem development: the self-organizing self-esteem model. *Review of General Psychology*, *21*(1), 49-68. <https://doi.org/10.1037/gpr0000099>
- Deater-Deckard, K., Atzaba-Poria, N., & Pike, A. (2004). Mother—and father—child mutuality in Anglo and Indian British families: A link with lower externalizing problems. *Journal of Abnormal Child Psychology*, *32*(6), 609-620.
- Deater-Deckard, K., & Petrill, S. A. (2004). Parent–child dyadic mutuality and child behavior problems: An investigation of gene–environment processes. *Journal of Child Psychology and Psychiatry*, *45*(6), 1171-1179. <https://doi.org/10.1111/j.1469-7610.2004.00309.x>
- Deater-Deckard, K., Pylas, M. V., & Petrill, S. A. (1997). *The parent-child interaction system (PARCHISY)*. London, England: Institute of Psychiatry.
- Deater-Deckard, K., & O'Connor, T. G. (2000). Parent–child mutuality in early childhood: Two behavioral genetic studies. *Developmental Psychology*, *36*(5), 561. <https://doi.org/10.1037/0012-1649.36.5.561>

- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality, 62*(1), 119-142. <https://doi.org/10.1111/j.1467-6494.1994.tb00797.x>
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01
- Deković, M., & Janssens, J. M. (1992). Parents' child-rearing style and child's sociometric status. *Developmental Psychology, 28*(5), 925. <https://doi.org/10.1037/0012-1649.28.5.925>
- Delaherche, E., Chetouani, M., Mahdhaoui, A., Saint-Georges, C., Viaux, S., & Cohen, D. (2012). Interpersonal synchrony: A survey of evaluation methods across disciplines. *IEEE Transactions on Affective Computing, 3*(3), 349-365. <https://doi.org/10.1109/T-AFFC.2012.12>
- Del Vecchio, T., & Rhoades, K. A. (2010). Bidirectional influences in mother–toddler dyads: an examination of the relative influence of mothers' and children's behaviours. *Infant and Child Development, 19*(5), 516-529.
- Denham, S. A. (2007). Dealing with feelings: How children negotiate the worlds of emotions and social relationships. *Cognition, Brain, Behavior, 11*(1), 1- 48.
- Denham, S. A., Workman, E., Cole, P. M., Weissbrod, C., Kendziora, K. T., & Zahn–Waxler, C. (2000). Prediction of externalizing behavior problems from early to middle childhood: The role of parental socialization and emotion expression. *Development and Psychopathology, 12*(1), 23-45. <https://doi.org/10.1017/s0954579400001024>
- Dennis, T. A., Cole, P. M., Wiggins, C. N., Cohen, L. H., & Zalewski, M. (2009). The functional organization of preschool-age children's emotion expressions and actions in challenging situations. *Emotion, 9*(4), 520–530. <https://doi.org/10.1037/a0016514>
- Diamond, L. M., & Aspinwall, L. G. (2003). Integrating diverse developmental perspectives on emotion regulation. *Motivation and Emotion, 27*(1), 1-6. <https://doi.org/10.1023/A:1023670208060>
- Diener, M. L., & Mangelsdorf, S. C. (1999). "Behavioral strategies for emotion regulation in toddlers: Associations with maternal involvement and emotional expressions." *Infant Behavior and Development, 22*(4), 569-583. [https://doi.org/10.1016/S0163-6383\(00\)00012-6](https://doi.org/10.1016/S0163-6383(00)00012-6)
- Dishion, T. J., Mun, C. J., Tein, J. Y., Kim, H., Shaw, D. S., Gardner, F., Wilson, M. N., & Peterson, J. (2017). The validation of macro and micro observations of parent–child dynamics using the relationship affect coding system in early childhood. *Prevention Science, 18*(3), 268-280. <https://doi.org/10.1007/s11121-016-0697-5>

- Dishion, T. J., & Granic, I. (2004). Naturalistic observation of relationship processes. In S. N. Haynes & E. M. Heiby (Eds.). *Comprehensive handbook of psychological assessment, Vol. 3. Behavioral assessment* (pp. 143–161). John Wiley & Sons, Inc.
- Dix, T., Gershoff, E. T., Meunier, L. N., & Miller, P. C. (2004). The affective structure of supportive parenting: Depressive symptoms, immediate emotions, and child-oriented motivation. *Developmental Psychology, 40*(6), 1212. <https://doi.org/10.1037/0012-1649.40.6.1212>
- Dix, T., & Meunier, L. N. (2009). Depressive symptoms and parenting competence: An analysis of 13 regulatory processes. *Developmental Review, 29*(1), 45-68. <https://doi.org/10.1016/j.dr.2008.11.002>
- Dodge, K. A., Dishion, T. J., & Lansford, J. E. (2006). Deviant peer influences in intervention and public policy for youth. *Social Policy Report, 20*(1), 1-20.
- Dumas, J. E., Lemay, P., & Dauwalder, J. P. (2001). Dynamic analyses of mother–child interactions in functional and dysfunctional dyads: A synergetic approach. *Journal of Abnormal Child Psychology, 29*(4), 317-329. <https://doi.org/10.1023/A:1010309929116>
- Dvorsky, M. R., Girio-Herrera, E., & Owens, J. S. (2014). School-based screening for mental health in early childhood. In M. Weist, N. Lever, C. Bradshaw, & J. Owens. (Eds.). *Handbook of School Mental Health* (pp. 297-310). Boston, MA: Springer. https://doi.org/10.1007/978-1-4614-7624-5_22
- Dykas, M. J., Ehrlich, K. B., & Cassidy, J. (2011). Links between attachment and social information processing: examination of intergenerational processes. *Advances in Child Development and Behavior, 40*, 51-94. <https://doi.org/10.1016/b978-0-12-386491-8.00002-5>
- Egeland, B., Kalkoske, M., Gottesman, N., & Erickson, M. F. (1990). Preschool behavior problems: Stability and factors accounting for change. *Journal of Child Psychology and Psychiatry, 31*(6), 891-909. <https://doi.org/10.1111/j.1469-7610.1990.tb00832.x>
- Egger, H. L., & Angold, A. (2006). Common emotional and behavioral disorders in preschool children: presentation, nosology, and epidemiology. *Journal of Child Psychology and Psychiatry, 47*(3-4), 313-337. <https://doi.org/10.1111/j.1469-7610.2006.01618.x>
- Eisenberg, N., Fabes, R. A., Bernzweig, J., Karbon, M., Poulin, R., & Hanish, L. (1993). The relations of emotionality and regulation to preschoolers' social skills and sociometric status. *Child Development, 64*(5), 1418-1438. <https://doi.org/10.2307/1131543>
- Eisenberg, N., & Spinrad, T. L. (2004). Emotion-related regulation: Sharpening the definition. *Child Development, 75*(2), 334-339. <https://doi.org/10.1111/j.1467-8624.2004.00674.x>
- Eisenberg, N., Cumberland, A., & Spinrad, T. L. (1998). Parental socialization of emotion. *Psychological Inquiry, 9*(4), 241–273. https://doi.org/10.1207/s15327965pli0904_1

- Eisenberg, N., Fabes, R. A., & Murphy, B. C. (1996). Parents' reactions to children's negative emotions: Relations to children's social competence and comforting behavior. *Child Development, 67*(5), 2227-2247. <https://doi.org/10.2307/1131620>
- Eisenberg, N., Fabes, R. A., Nyman, M., Bernzweig, J., & Pinuelas, A. (1994). The relations of emotionality and regulation to children's anger-related reactions. *Child Development, 65*(1), 109-128. <https://doi.org/10.2307/1131369>
- Eisenberg, N., Fabes, R. A., Shepard, S. A., Guthrie, I. K., Murphy, B. C., & Reiser, M. (1999). Parental reactions to children's negative emotions: Longitudinal relations to quality of children's social functioning. *Child Development, 70*(2), 513-534. <https://doi.org/10.1111/1467-8624.00037>
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2000). Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78*(1), 136– 157. <https://doi.org/10.1037/0022-3514.78.1.136>
- Eisenberg, N., Gershoff, E. T., Fabes, R. A., Shepard, S. A., Cumberland, A. J., Losoya, S. H., Guthrie, I. K., & Murphy, B. C. (2001). Mother's emotional expressivity and children's behavior problems and social competence: Mediation through children's regulation. *Developmental Psychology, 37*(4), 475–490. <https://doi.org/10.1037/0012-1649.37.4.475>
- Eisenberg, N., Hofer, C., Spinrad, T. L., Gershoff, E. T., Valiente, C., Losoya, S. H., Zhou, Q., Cumberland, A., Liew, J., Reiser, M., & Maxon, E. (2008). Understanding mother-adolescent conflict discussions: concurrent and across-time prediction from youths' dispositions and parenting. *Monographs of the Society for Research in Child Development, 73*(2), 31-53. <https://doi.org/10.1111/j.1540-5834.2008.00472.x>
- Eisenberg, N., Spinrad, T. L., Fabes, R. A., Reiser, M., Cumberland, A., Shepard, S. A., Valiente, C., Losoya, S. H., Guthrie, I. K., & Thompson, M. (2004). The relations of effortful control and impulsivity to children's resiliency and adjustment. *Child Development, 75*(1), 25-46. <https://doi.org/10.1111/j.1467-8624.2004.00652.x>
- Eisenberg, N., Zhou, Q., Losoya, S. H., Fabes, R. A., Shepard, S. A., Murphy, B. C., Reiser, M., Guthrie, I. K., & Cumberland, A. (2003). The relations of parenting, effortful control, and ego control to children's emotional expressivity. *Child Development, 74*(3), 875-895. <https://doi.org/10.1111/1467-8624.00573>
- Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology, 6*, 495-525. <https://doi.org/10.1146/annurev.clinpsy.121208.131208>
- Eisenberg, N., Smith, C. L., & Spinrad, T. L. (2011). Effortful control: Relations with emotion regulation, adjustment, and socialization in childhood. In K. D. Vohs & R. F. Baumeister (Eds.). *Handbook of self-regulation: Research, theory, and applications* (pp. 263–283). Guilford Press.

- Elliott, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology*, 54(1), 5-12. <https://doi.org/10.1037/0022-3514.54.1.5>
- Elliot, A. J., McGeorge, H. A., Gable, S. (1991). Achievement goals, study strategies, and exam performance: A mediational analysis. *Journal of Educational Psychology*, 91(3), 549-563. <https://doi.org/10.1037/0022-0663.91.3.549>
- England-Mason, G., & Gonzalez, A. (2020). Intervening to shape children's emotion regulation: A review of emotion socialization parenting programs for young children. *Emotion*, 20(1), 98-104. <https://doi.org/10.1037/emo0000638>
- Erdley, C. A., Loomis, C. C., Cain, K. M., & Dumas-Hines, F. (1997). Relations among children's social goals, implicit personality theories, and responses to social failure. *Developmental Psychology*, 33(2), 263-272. <https://doi.org/10.1037/0012-1649.33.2.263>
- Erikson, E. H. (1963). *Childhood and Society* (2nd Ed). New York, NY: Norton.
- Eron, L. D., & Huesmann, L. R. (1990). The stability of aggressive behavior—even unto the third generation. In M. Lewis & S. M. Miller (Eds.). *Handbook of developmental psychopathology* (pp. 147-156). Boston, MA; Springer. https://doi.org/10.1007/978-1-4615-7142-1_12
- Fabes, R. A., Leonard, S. A., Kupanoff, K., & Martin, C. L. (2001). Parental coping with children's negative emotions: Relations with children's emotional and social responding. *Child Development*, 72(3), 907–920. <https://doi.org/10.1111/1467-8624.00323>
- Fabes, R. A., Poulin, R. E., Eisenberg, N., & Madden-Derdich, D. A. (2002). The Coping with Children's Negative Emotions Scale (CCNES): Psychometric properties and relations with children's emotional competence. *Marriage & Family Review*, 34(3-4), 285-310. https://doi.org/10.1300/J002v34n03_05
- Fearon, R. P., & Roisman, G. I. (2017). Attachment theory: progress and future directions. *Current Opinion in Psychology*, 15, 131-136. <https://doi.org/10.1016/j.copsy.2017.03.002>
- Feeney, J. A. (1995). Adult attachment and emotional control. *Personal Relationships*, 2(2), 143-159. <https://doi.org/10.1111/j.1475-6811.1995.tb00082.x>
- Feeney, B. C., Cassidy, J., & Ramos-Marcuse, F. (2008). The generalization of attachment representations to new social situations: Predicting behavior during initial interactions with strangers. *Journal of Personality and Social Psychology*, 95(6), 1481–1498. <https://doi.org/10.1037/a0012635>
- Feldman, R. (1998). *Coding Interactive Behavior Manual*. Unpublished manuscript, Bar Ilan University, Ramat-Gan, Israel.

- Feldman, R. (2003). Infant-mother and infant-father synchrony: The coregulation of positive arousal. *Infant Mental Health Journal*, *24*(1), 1–23. <https://doi.org/10.1002/imhj.10041>
- Feldman, R. (2007). On the origins of background emotions: From affect synchrony to symbolic expression. *Emotion*, *7*(3), 601–611. <https://doi.org/10.1037/1528-3542.7.3.601>
- Feldman, R. (2012). Bio-behavioral synchrony: A model for integrating biological and microsocial behavioral processes in the study of parenting. *Parenting*, *12*(2-3), 154-164. <https://doi.org/10.1080/15295192.2012.683342>
- Feldman, R. (2015). Mutual influences between child emotion regulation and parent–child reciprocity support development across the first 10 years of life: Implications for developmental psychopathology. *Developmental Psychopathology*, *27*(4pt1), 1007–1023. <https://doi.org/10.1017/S0954579415000656>
- Feldman, R. (2009). The development of regulatory functions from birth to 5 years: Insights from premature infants. *Child Development*, *80*(2), 544-561. <https://doi.org/10.1111/j.1467-8624.2009.01278.x>
- Feldman, R., Greenbaum, C. W., & Yirmiya, N. (1999). Mother–infant affect synchrony as an antecedent of the emergence of self-control. *Developmental Psychology*, *35*(1), 223-231. <https://doi.org/10.1037/0012-1649.35.1.223>
- Feldman, R., & Masalha, S. (2010). Parent–child and triadic antecedents of children’s social competence: Cultural specificity, shared process. *Developmental Psychology*, *46*(2), 455. <https://doi.org/10.1037/a0017415>
- Field, T., & Reite, M. (1984). Children's responses to separation from mother during the birth of another child. *Child Development*, *55*(4), 1308-1316. <https://doi.org/10.2307/1130000>
- Fogel, A. (1993b). Two principles of communication: Co-regulation and framing. In J. Nadel, & L. Camaioni (Eds.). *New perspectives in early communicative development* (pp. 9–22). New York, NY: Routledge.
- Fogel, A., & Garvey, A. (2007). Alive communication. *Infant Behavior and Development*, *30*(2), 251-257. <https://doi.org/10.1016/j.infbeh.2007.02.007>
- Fogel, A., Nwokah, E., Dedo, J. Y., & Messinger, D. (1992). Social process theory of emotion: A dynamic systems approach. *Social Development*, *1*(2), 122–142. <https://doi.org/10.1111/j.1467-9507.1992.tb00116.x>
- Fogel, A., De Koyer, I., Secrist, C., Sipherd, A., Hafen, T., & Fricke, M. (2003). *The revised relational coding system*. Unpublished manual. Department of Psychology, University of Utah, Salt Lake City.
- Fogel, A., Thelen, E. (1987). Development of early expressive and communicative action: Reinterpreting the evidence from a dynamic systems perspective. *Developmental Psychology*, *23*(6), 747–761. <https://doi.org/10.1037/0012-1649.23.6.747>

- Fonagy, P., & Target, M. (1997). Attachment and reflective function: Their role in self-organization. *Development and Psychopathology*, *9*(4), 679-700. <https://doi.org/10.1017/S0954579497001399>
- Fox, N. A., & Calkins, S. D. (2003). The development of self-control of emotion: Intrinsic and extrinsic influences. *Motivation and Emotion*, *27*(1), 7-26. <https://doi.org/10.1023/A:1023622324898>
- Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crisis? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology*, *84*(2), 365-376. <https://doi.org/10.1037/0022-3514.84.2.365>
- Frijda, N. H. (1994). Emotions are functional, most of the time. In *The nature of emotions: Fundamental questions*. New York, NY: Oxford University Press
- Gardner, W. (1993). Hierarchical continuous-time sequential analysis: A strategy for clinical research. *Journal of Consulting and Clinical Psychology*, *61*(6), 975-983. <https://doi.org/10.1037/0022-006X.61.6.975>
- Garner, P. W., & Hinton, T. S. (2010). Emotional display rules and emotion self-regulation: Associations with bullying and victimization in community-based after school programs. *Journal of Community & Applied Social Psychology*, *20*(6), 480-496. <https://doi.org/10.1002/casp.1057>
- Gardner, F., & Shaw, D. S. (2008). Behavioral problems of infancy and preschool children (0-5). In M. J. Rutter, D. Bishop, D. S. Pine, S. Scott, J. S. Stevenson, E. A. Taylor, A. Thapar (Eds.) *Rutter's Child and Adolescent Psychiatry* (5th Ed) (pp. 271-288). Chichester: Wiley-Blackwell.
- Gardner, F., Ward, S., Burton, J., & Wilson, C. (2003). The role of mother-child joint play in the early development of children's conduct problems: A longitudinal observational study. *Social Development*, *12*(3), 361-378. <https://doi.org/10.1111/1467-9507.00238>
- Gentzler, A. L., Contreras-Grau, J. M., Kerns, K. A., & Weimer, B. L. (2005). Parent-child emotional communication and children's coping in middle childhood. *Social Development*, *14*(4), 591-612. <https://doi.org/10.1111/j.1467-9507.2005.00319.x>
- George, C., & Solomon, J. (1996). Representational models of relationships: Links between caregiving and attachment. *Infant Mental Health Journal*, *17*(3), 198-216. [https://doi.org/10.1002/\(SICI\)1097-0355\(199623\)17:3<198::AID-IMHJ2>3.0.CO;2-L](https://doi.org/10.1002/(SICI)1097-0355(199623)17:3<198::AID-IMHJ2>3.0.CO;2-L)
- Gershoff, E. T. (2002). Corporal punishment by parents and associated child behaviors and experiences: a meta-analytic and theoretical review. *Psychological Bulletin*, *128*(4), 539-579. <https://doi.org/10.1037/0033-2909.128.4.539>
- Gianino, A., & Tronick, E. (1985). The Mutual Regulation Model: The infant's self and interactive regulation and coping defense capacities. In R. Field, P. McCabe, & N. Schneiderman (Eds.), *Stress and coping* (pp. 47-68). Hillsdale, NJ: Erlbaum.

- Gillet, N., Gagné, M., Sauvagère, S., & Fouquereau, E. (2013). The role of supervisor autonomy support, organizational support, and autonomous and controlled motivation in predicting employees' satisfaction and turnover intentions. *European Journal of Work and Organizational Psychology, 22*(4), 450-460. <https://doi.org/10.1080/1359432X.2012.665228>
- Gilliom, M., & Shaw, D. S. (2004). Codevelopment of externalizing and internalizing problems in early childhood. *Development and Psychopathology, 16*(2), 313-333. <https://doi.org/10.1017/s0954579404044530>
- Gilliom, M., Shaw, D. S., Beck, J. E., Schonberg, M. A., & Lukon, J. L. (2002). Anger regulation in disadvantaged preschool boys: Strategies, antecedents, and the development of self-control. *Developmental Psychology, 38*(2), 222-235. <https://doi.org/10.1037/0012-1649.38.2.222>
- Goldsmith, H. H., & Rothbart, M. K. (1996). *The Laboratory Temperament Assessment Battery (Lab-TAB): Locomotor version 3.0 Technical Manual*. Madison, WI: Department of Psychology, University of Wisconsin.
- Goldsmith, H. H., Reilly, J., Lemery, K. S., Longley, S., & Prescott, A. (1993). *Preliminary manual for the Preschool Laboratory Temperament Assessment Battery (Technical Report Version 1.0)*. Madison, WI: Department of Psychology, University of Wisconsin—Madison.
- Golombok, S., Cook, R., Bish, A., & Murray, C. (1995). Families created by the new reproductive technologies: quality of parenting and social and emotional development of the children. *Child Development, 66*(2), 285-298. <https://doi.org/10.2307/1131578>
- Goodman, R. (1997). The strengths and difficulties questionnaire: A research note. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 38*(5), 581-586. <https://doi.org/10.1111/j.1469-7610.1997.tb01545.x>
- Goodman, S. H., & Gotlib, I. H. (1999). Risk for psychopathology in the children of depressed mothers: a developmental model for understanding mechanisms of transmission. *Psychological Review, 106*(3), 458-490. <https://doi.org/10.1037/0033-295X.106.3.458>
- Goodman, A., Lamping, D. L., & Ploubidis, G. B. (2010). When to use broader internalising and externalising subscales instead of the hypothesised five subscales on the Strengths and Difficulties Questionnaire (SDQ): data from British parents, teachers and children. *Journal of Abnormal Child Psychology, 38*(8), 1179-1191. <https://doi.org/10.1007/s10802-010-9434-x>
- Gottman, J. M. (2001). Meta-emotion, children's emotional intelligence, and buffering children from marital conflict. In C. D. Ryff & B. H. Singer (Eds.). *Emotion, Social Relationships, and Health* (pp. 23-40). Oxford Scholarship Online. <https://doi.org/10.1093/acprof:oso/9780195145410.003.0002>

- Gottman, J. M., Katz, L. F., & Hooven, C. (1996). Parental meta-emotion philosophy and the emotional life of families: Theoretical models and preliminary data. *Journal of Family Psychology, 10*(3), 243-268. <https://doi.org/10.1037/0893-3200.10.3.243>
- Granic, I. (2005). Timing is everything: Developmental psychopathology from a dynamic systems perspective. *Developmental Review, 25*(3-4), 386-407. <https://doi.org/10.1016/j.dr.2005.10.005>
- Granic, I., Dishion, T. J. (2003). Deviant talk in adolescent friendships: A step toward measuring a pathogenic attractor process. *Social Development, 12*(3), 314-334. <https://doi.org/10.1111/1467-9507.00236>
- Granic, I., Lamey, A. V. (2002). Combining dynamic systems and multivariate analyses to compare the mother-child interactions of externalizing subtypes. *Journal of Abnormal Child Psychology, 30*, 265-297. <https://doi.org/10.1023/A:1015106913866>
- Granic, I., & Loughheed, J. P. (2016). The role of anxiety in coercive family processes with aggressive children. In T. J. Dishion & J. Snyder (Eds.). *The Oxford Handbook of Coercive Relationship Dynamics* (pp. 231-248). Oxford, England: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199324552.013.18>
- Granic, I., & Patterson, G. R. (2006). Toward a comprehensive model of antisocial development: A dynamic systems approach. *Psychological Review, 113*(1), 101-131. <https://doi.org/10.1037/0033-295X.113.1.101>
- Granic, I., Hollenstein, T., Dishion, T. J., Patterson, G. R. (2003). Longitudinal analysis of flexibility and reorganization in early adolescence: A dynamic systems study of family interactions. *Developmental Psychology, 39*(3), 606-617. <https://doi.org/10.1037/0012-1649.39.3.606>
- Granic, I., O'Hara, A., Peplar, D., Lewis, M. D. (2007). A dynamic systems analysis of parent-child changes associated with successful "real-world" interventions for aggressive children. *Journal of Abnormal Child Psychology, 35*, 845-857. <https://doi.org/10.1007/s10802-007-9133-4>
- Granic, I., Hollenstein, T., & Lichtwarck-Aschoff, A. (2016). A survey of dynamic systems methods for developmental psychopathology. *Developmental Psychopathology, 1*-43. <https://doi.org/10.1002/9781119125556.devpsy116>
- Gray, J. A. (1991). Neural systems of motivation, emotion and affect. *Neurobiology of Learning, Emotion and Affect, 30*(2011), 273-306.
- Graziano, P. A., & Garcia, A. (2016). Attention-deficit hyperactivity disorder and children's emotion dysregulation: A meta-analysis. *Clinical Psychology Review, 46*, 106-123. <https://doi.org/10.1016/j.cpr.2016.04.011>
- Graziano, P. A., Reavis, R. D., Keane, S. P., & Calkins, S. D. (2007). The role of emotion regulation in children's early academic success. *Journal of School Psychology, 45*(1), 3-19. <https://doi.org/10.1016/j.jsp.2006.09.002>

- Greenaway, K. H., Haslam, S. A., Cruwys, T., Branscombe, N. R., Ysseldyk, R., & Heldreth, C. (2015). From “we” to “me”: Group identification enhances perceived personal control with consequences for health and well-being. *Journal of Personality and Social Psychology, 109*(1), 53-74. <https://doi.org/10.1037/pspi0000019>
- Greene, R. W., Ablon, J. S., & Goring, J. C. (2003). A transactional model of oppositional behavior: Underpinnings of the Collaborative Problem Solving approach. *Journal of Psychosomatic Research, 55*(1), 67-75. [https://doi.org/10.1016/s0022-3999\(02\)00585-8](https://doi.org/10.1016/s0022-3999(02)00585-8)
- Grolnick, W. S. (2009). The role of parents in facilitating autonomous self-regulation for education. *Theory and Research in Education, 7*(2), 164-173. <https://doi.org/10.1177/1477878509104321>
- Grolnick, W. S., & Apostoleris, N. H. (2002). What makes parents controlling. In E. L. Deci & R. M. Ryan (Eds.). *Handbook of self-determination research* (pp. 161–181). University of Rochester Press.
- Grolnick, W. S., & Pomerantz, E. M. (2009). Issues and challenges in studying parental control: Toward a new conceptualization. *Child Development Perspectives, 3*(3), 165-170. <https://doi.org/10.1111/j.1750-8606.2009.00099.x>
- Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regulation and competence in school. *Journal of Educational Psychology, 81*(2), 143. <https://doi.org/10.1037/0022-0663.81.2.143>
- Grolnick, W. S., Ryan, R. M., & Deci, E. L. (1991). Inner resources for school achievement: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology, 83*(4), 508-517. <https://doi.org/10.1037/0022-0663.83.4.508>
- Grolnick, W. S., Deci, E. L., & Ryan, R. M. (1997). Internalization within the family: The self-determination theory perspective. In J. E. Grusec & L. Kuczynski (Eds.). *Parenting and children's internalization of values: A handbook of contemporary theory* (pp. 135–161). John Wiley & Sons Inc.
- Grolnick, W. S., Kurowski, C. O., Dunlap, K. G., & Hevey, C. (2000). Parental resources and the transition to junior high. *Journal of Research on Adolescence, 10*(4), 465-488. https://doi.org/10.1207/SJRA1004_05
- Grolnick, W. S., Raftery, J. N., Marbell-Pierre, K., Flamm, E. S., Cardemil, E. V., & Sanchez, M. (2012). *Parental provision of structure: Implementation, correlates, and outcomes in three domains*. Unpublished Manuscript. Clark University.
- Gross, J. J. (2008). Emotion regulation. *Handbook of Emotions, 3*(3), 497-513.
- Grusec, J. E. (2011). Socialization processes in the family: Social and emotional development. *Annual Review of Psychology, 62*, 243-269. <https://doi.org/10.1146/annurev.psych.121208.131650>

- Grusec, J. E., & Davidov, M. (2010). Integrating different perspectives on socialization theory and research: A domain-specific approach. *Child Development, 81*(3), 687-709. <https://doi.org/10.1111/j.1467-8624.2010.01426.x>
- Grusec, J. E., Goodnow, J. J., & Kuczynski, L. (2000). New directions in analyses of parenting contributions to children's acquisition of values. *Child Development, 71*(1), 205-211.
- Gunzenhauser, C., Fäsche, A., Friedlmeier, W., & Von Suchodoletz, A. (2014). Face it or hide it: Parental socialization of reappraisal and response suppression. *Frontiers in Psychology, 4*, 992. <https://doi.org/10.3389/fpsyg.2013.00992>
- Guo, Y., Garfin, D. R., Ly, A., & Goldberg, W. A. (2017). Emotion coregulation in mother-child dyads: A dynamic systems analysis of children with and without autism spectrum disorder. *Journal of Abnormal Child Psychology, 45*(7), 1369-1383. <https://doi.org/10.1007/s10802-016-0234-9>
- Hadwin, A., & Oshige, M. (2011). Socially shared regulation: Exploring perspectives of social in self-regulated learning theory. *Teachers College Record, 113*(2), 240-264.
- Halberstadt, A. G., & Eaton, K. L. (2002). A meta-analysis of family expressiveness and children's emotion expressiveness and understanding. *Marriage & Family Review, 34*(1-2), 35-62. https://doi.org/10.1300/J002v34n01_03
- Harper, L. V. (1971). The young as a source of stimuli controlling caretaker behavior. *Developmental Psychology, 4*(1p1), 73-88. <https://doi.org/10.1037/h0030335>
- Harrison, C., & Sofronoff, K. (2002). ADHD and parental psychological distress: Role of demographics, child behavioral characteristics, and parental cognitions. *Journal of the American Academy of Child & Adolescent Psychiatry, 41*(6), 703-711. <https://doi.org/10.1097/00004583-200206000-00010>
- Harrist, A. W., & Waugh, R. M. (2002). Dyadic synchrony: Its structure and function in children's development. *Developmental Review, 22*(4), 555-592. [https://doi.org/10.1016/S0273-2297\(02\)00500-2](https://doi.org/10.1016/S0273-2297(02)00500-2)
- Harrist, A. W., Pettit, G. S., Dodge, K. A., & Bates, J. E. (1994). Dyadic synchrony in mother-child interaction: Relation with children's subsequent kindergarten adjustment. *Family Relations, 43*(4), 417-424. <https://doi.org/10.2307/585373>
- Hastings, P., & Grusec, J. E. (1997). Conflict outcome as a function of parental accuracy in perceiving child cognitions and affect. *Social Development, 6*(1), 76-90. <https://doi.org/10.1111/j.1467-9507.1997.tb00095.x>
- Hay, D. F., Pawlby, S., Angold, A., Harold, G. T., & Sharp, D. (2003). Pathways to violence in the children of mothers who were depressed postpartum. *Developmental Psychology, 39*(6), 1083-1094. <https://doi.org/10.1037/0012-1649.39.6.1083>
- Hayes, S. C., Barnes-Holmes, D., & Roche, B. (eds.). (2001). *Relational Frame Theory - A Post-Skinnerian Account of Human Language and Cognition*. New York, NY: Plenum Press.

- Healey, D. M., Gopin, C. B., Grossman, B. R., Campbell, S. B., & Halperin, J. M. (2010). Mother–child dyadic synchrony is associated with better functioning in hyperactive/inattentive preschool children. *Journal of Child Psychology and Psychiatry*, *51*(9), 1058-1066. <https://doi.org/10.1111/j.1469-7610.2010.02220.x>
- Henderson, R. W. (Ed.). (2013). *Parent–Child interaction: Theory, research, and prospects*. Academic Press.
- Hesse, E. (2008). The Adult Attachment Interview: Protocol, method of analysis, and empirical studies. In J. Cassidy & P. R. Shaver (Eds.). *Handbook of attachment: Theory, research, and clinical applications* (pp. 552–598). Guilford Press.
- Hessler, D. M., & Fainsilber Katz, L. (2007). Children's emotion regulation: Self-report and physiological response to peer provocation. *Developmental Psychology*, *43*(1), 27-38. <https://doi.org/10.1037/0012-1649.43.1.27>
- Hessler, E. E., Finan, P. H., & Amazeen, P. G. (2013). Psychological Rhythmicities. In J. P. Strumberg & C. M. Martin (Eds.). *Handbook of Systems and Complexity in Health* (pp. 127-146). New York, NY: Springer. https://doi.org/10.1007/978-1-4614-4998-0_8
- Heym, N., Ferguson, E., & Lawrence, C. (2008). An evaluation of the relationship between Gray's revised RST and Eysenck's PEN: Distinguishing BIS and FFFS in Carver and White's BIS/BAS scales. *Personality and Individual Differences*, *45*(8), 709-715. <https://doi.org/10.1016/j.paid.2008.07.013>
- Hicks, B. M., & Patrick, C. J. (2006). Psychopathy and negative emotionality: analyses of suppressor effects reveal distinct relations with emotional distress, fearfulness, and anger-hostility. *Journal of Abnormal Psychology*, *115*(2), 276-287. <https://doi.org/10.1037/0021-843X.115.2.276>
- Hill, J. (2002). Biological, psychological and social processes in the conduct disorders. *Journal of Child Psychology and Psychiatry*, *43*(1), 133–164. <https://doi.org/10.1111/1469-7610.00007>
- Hill, E. L. (2004). Executive dysfunction in autism. *Trends in Cognitive Sciences*, *8*(1), 26–32. <https://doi.org/10.1016/j.tics.2003.11.003>
- Hollenstein, T. (2011). Twenty years of dynamic systems approaches to development: Significant contributions, challenges, and future directions. *Child Development Perspectives*, *5*(4), 256-259. <https://doi.org/10.1111/j.1750-8606.2011.00210.x>
- Hollenstein, T. (2015). This time, it's real: Affective flexibility, time scales, feedback loops, and the regulation of emotion. *Emotion Review*, *7*(4), 308-315. <https://doi.org/10.1177/1754073915590621>
- Hollenstein, T., & Lewis, M. D. (2006). A state space analysis of emotion and flexibility in parent-child interactions. *Emotion*, *6*(4), 656-662. <https://doi.org/10.1037/1528-3542.6.4.656>

- Hollenstein, T., Granic, I., Stoolmiller, M., & Snyder, J. (2004). Rigidity in parent—child interactions and the development of externalizing and internalizing behavior in early childhood. *Journal of Abnormal Child Psychology*, *32*(6), 595-607.
<https://doi.org/10.1023/B:JACP.0000047209.37650.41>
- Honeycutt, J. M., & Cantrill, J. G. (2001). LEA's series on personal relationships. In *Cognition, communication, and romantic relationships* (1st Ed). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Hooley, J. M. (2007). Expressed emotion and relapse of psychopathology. *Annual Review of Clinical Psychology*, *3*, 329-352.
<https://doi.org/10.1146/annurev.clinpsy.2.022305.095236>
- Horowitz, J. A., Bell, M., Trybulski, J., Munro, B. H., Moser, D., Hartz, S. A., McCordic, L., & Sokol, E. S. (2001). Promoting responsiveness between mothers with depressive symptoms and their infants. *Journal of Nursing Scholarship*, *33*(4), 323-329.
<https://doi.org/10.1111/j.1547-5069.2001.00323.x>
- Horwitz, B. N., & Neiderhiser, J. M. (2011). Gene—environment interplay, family relationships, and child adjustment. *Journal of Marriage and Family*, *73*(4), 804-816.
<https://doi.org/10.1111/j.1741-3737.2011.00846.x>
- Huber, A., Hicks, A. M., Ball, M., & McMahon, C. (2020). Postintervention and follow-up changes in caregiving behavior and representations after individually or group delivered hybrid Circle of Security-intensive intervention with New Zealand caregiver-child dyads. *Attachment and Human Development*, 1-22.
<https://doi.org/10.1080/14616734.2020.1809057>
- Hudson, J. L., & Rapee, R. M. (2001). Parent—child interactions and anxiety disorders: An observational study. *Behaviour Research and Therapy*, *39*(12), 1411-1427.
[https://doi.org/10.1016/s0005-7967\(00\)00107-8](https://doi.org/10.1016/s0005-7967(00)00107-8)
- Hudziak, J. J., Achenbach, T. M., Althoff, R. R., & Pine, D. S. (2007). A dimensional approach to developmental psychopathology. *International Journal of Methods in Psychiatric Research*, *16*(S1), S16-S23. <https://doi.org/10.1002/mpr.217>
- Hughes, S. O., Power, T. G., O'Connor, T. M., & Fisher, J. O. (2015). Executive functioning, emotion regulation, eating self-regulation, and weight status in low-income preschool children: How do they relate? *Appetite*, *89*, 1-9.
<https://doi.org/10.1016/j.appet.2015.01.009>
- Hurley, K. M., Black, M. M., Papas, M. A., & Caufield, L. E. (2008). Maternal symptoms of stress, depression, and anxiety are related to nonresponsive feeding styles in a statewide sample of WIC participants. *The Journal of Nutrition*, *138*(4), 799-805.
<https://doi.org/10.1093/jn/138.4.799>
- Insel, T., Cuthbert, B., Garvey, M., Heinssen, R., Pine, D. S., Quinn, K., Sanislow, C., & Wang, P. (2010). Research domain criteria (RDoC): toward a new classification framework for

research on mental disorders, *American Journal of Psychiatry*, 167(7), 748-751.
<https://doi.org/10.1176/appi.ajp.2010.09091379>

Isabella, R. A., & Belsky, J. (1991) Interactional synchrony and the origins of infant-mother attachment: A replication study. *Child Development*, 62(2), 373–384.
<https://doi.org/10.2307/1131010>

Ispa, J. M., Su-Russell, C., Palermo, F., & Carlo, G. (2017). The interplay of maternal sensitivity and toddler engagement of mother in predicting self-regulation. *Developmental Psychology*, 53(3), 425-435. <https://doi.org/10.1037/dev0000267>

Izard, C. E. (1971). *The face of emotion*. Appleton-Century-Crofts.

Izard, C., Stark, K., Trentacosta, C., & Schultz, D. (2008). Beyond emotion regulation: Emotion utilization and adaptive functioning. *Child Development Perspectives*, 2(3), 156-163.
<https://doi.org/10.1111/j.1750-8606.2008.00058.x>

Jack, G. (2010). Place matters: The significance of place attachments for children's well-being. *British Journal of Social Work*, 40(3), 755-771.
<https://doi.org/10.1093/bjsw/bcn142>

Jaffe, J., Beebe, B., Feldstein, S., Crown, C. L., Jasnow, M. D., Rochat, P., & Stern, D. N. (2001). Rhythms of dialogue in infancy: Coordinated timing in development. *Monographs of the Society for Research in Child Development*, 66(2), i-132.

Jaffe, M., Gullone, E., & Hughes, E. K. (2010). The roles of temperamental dispositions and perceived parenting behaviours in the use of two emotion regulation strategies in late childhood. *Journal of Applied Developmental Psychology*, 31(1), 47-59.
<https://doi.org/10.1016/j.appdev.2009.07.008>

Jahromi, L. B., & Stifter, C. A. (2008). Individual differences in preschoolers' self-regulation and theory of mind. *Merrill-Palmer Quarterly*, 54(1), 125-150.
<https://doi.org/10.1353/mpq.2008.0007>

Jahromi, L., Meek, S., & Ober-Reynolds, S. (2012). Emotion regulation in the context of frustration in children with high functioning autism and their typical peers. *Journal of Child Psychology and Psychiatry*, 53(12), 1250–1258. <https://doi.org/10.1111/j.1469-7610.2012.02560.x>

Joussemet, M., Landry, R., & Koestner, R. (2008). A self-determination theory perspective on parenting. *Canadian Psychology/Psychologie Canadienne*, 49(3), 194-200.
<https://doi.org/10.1037/a0012754>

Kahen, V., Katz, L. F., & Gottman, J. M. (1994). Linkages between parent—child interaction and conversations of friends. *Social Development*, 3(3), 238-254.
<https://doi.org/10.1111/j.1467-9507.1994.tb00043.x>

- Katz, L. F., & Hunter, E. C. (2007). Maternal meta-emotion philosophy and adolescent depressive symptomatology. *Social Development, 16*(2), 343-360. <https://doi.org/10.1111/j.1467-9507.2007.00388.x>
- Keenan, K., & Wakschlag, L. S. (2002). Can a valid diagnosis of disruptive behavior disorder be made in preschool children? *American Journal of Psychiatry, 159*(3), 351-358. <https://doi.org/10.1176/appi.ajp.159.3.351>
- Kendler, K. S., Gardner, C. O., & Lichtenstein, P. (2008). A developmental twin study of symptoms of anxiety and depression: evidence for genetic innovation and attenuation. *Psychological Medicine, 38*(11), 1567-1575. <https://doi.org/10.1017/S003329170800384X>
- Keown, L. J. (2012). Predictors of boys' ADHD symptoms from early to middle childhood: The role of father-child and mother-child interactions. *Journal of Abnormal Child Psychology, 40*(4), 569-581. <https://doi.org/10.1007/s10802-011-9586-3>
- Kessel, E. M., Meyer, A., Hajcak, G., Dougherty, L. R., Torpey-Newman, D. C., Carlson, G. A., & Klein, D. N. (2016). Transdiagnostic factors and pathways to multifinality: The error-related negativity predicts whether preschool irritability is associated with internalizing versus externalizing symptoms at age 9. *Development and Psychopathology, 28*(4pt1), 913-926. <https://doi.org/10.1017/S0954579416000626>
- Kiel, E. J., & Buss, K. A. (2010). Maternal accuracy and behavior in anticipating children's responses to novelty: Relations to fearful temperament and implications for anxiety development. *Social Development, 19*(2), 304-325. <https://doi.org/10.1111/j.1467-9507.2009.00538.x>
- Kim-Spoon, J., Cicchetti, D., & Rogosch, F. A. (2013). A longitudinal study of emotion regulation, emotion lability-negativity, and internalizing symptomatology in maltreated and nonmaltreated children. *Child Development, 84*(2), 512-527. <https://doi.org/10.1111/j.1467-8624.2012.01857.x>
- Klimes-Dougan, B., Brand, A. E., Zahn-Waxler, C., Usher, B., Hastings, P. D., Kendziora, K., & Garside, R. B. (2007). Parental emotion socialization in adolescence: Differences in sex, age and problem status. *Social Development, 16*(2), 326-342. <https://doi.org/10.1111/j.1467-9507.2007.00387.x>
- Kochanska, G. (1993). Toward a synthesis of parental socialization and child temperament in early development of conscience. *Child Development, 64*(2), 325-347. <https://doi.org/10.2307/1131254>
- Kochanska, G. (1995). Children's temperament, mothers' discipline, and security of attachment: Multiple pathways to emerging internalization. *Child Development, 66*(3), 597-615. <https://doi.org/10.2307/1131937>
- Kochanska, G. (1997). Mutually responsive orientation between mothers and their young children: Implications for early socialization. *Child Development, 68*(1), 94-112. <https://doi.org/10.2307/1131928>

- Kochanska, G., & Aksan, N. (2004). Development of mutual responsiveness between parents and their young children. *Child Development, 75*(6), 1657-1676. <https://doi.org/10.1111/j.1467-8624.2004.00808.x>
- Kochanska, G., & Murray, K. T. (2000). Mother–child mutually responsive orientation and conscience development: From toddler to early school age. *Child Development, 71*(2), 417-431. <https://doi.org/10.1111/1467-8624.00154>
- Kochanska, G. (2002). Mutually responsive orientation between mothers and their young children: A context for the early development of conscience. *Current Directions in Psychological Science, 11*(6), 191-195. <https://doi.org/10.1111/1467-8721.00198>
- Kochanska, G., Tjebkes, J. L., & Fortnan, D. R. (1998). Children's emerging regulation of conduct: Restraint, compliance, and internalization from infancy to the second year. *Child Development, 69*(5), 1378-1389.
- Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: continuity and change, antecedents, and implications for social development. *Developmental Psychology, 36*(2), 220-232. <https://doi.org/10.1037/0012-1649.36.2.220>
- Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The development of self-regulation in the first four years of life. *Child Development, 72*(4), 1091-1111. <https://doi.org/10.1111/1467-8624.00336>
- Kochanska, G., Aksan, N., & Carlson, J. J. (2005). Temperament, relationships, and young children's receptive cooperation with their parents. *Developmental Psychology, 41*(4), 648-660. <https://doi.org/10.1037/0012-1649.41.4.648>
- Kochanska, G., Aksan, N., Prisco, T. R., & Adams, E. E. (2008). Mother–child and father–child mutually responsive orientation in the first 2 years and children's outcomes at preschool age: Mechanisms of influence. *Child Development, 79*(1), 30-44. <https://doi.org/10.1111/j.1467-8624.2007.01109.x>
- Kochanska, G., Boldt, L. J., & Goffin, K. C. (2019). Early relational experience: A foundation for the unfolding dynamics of parent–child socialization. *Child Development perspectives, 13*(1), 41-47. <https://doi.org/10.1111/cdep.12308>
- Koegel, R. L., & Mentis, M. (1985). Motivation in childhood autism: Can they or won't they? *Journal of Child Psychology and Psychiatry, 26*(2), 185-191. <https://doi.org/10.1111/j.1469-7610.1985.tb02259.x>
- Koerner, A. F., & Fitzpatrick, M. A. (2002). Toward a theory of family communication. *Communication Theory, 12*(1), 70-91. <https://doi.org/10.1111/j.1468-2885.2002.tb00260.x>
- Kopp, C. B. (1982). Antecedents of self-regulation: a developmental perspective. *Developmental Psychology, 18*(2), 199-214. <https://doi.org/10.1037/0012-1649.18.2.199>

- Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology*, 25(3), 343-354. <https://doi.org/10.1037/0012-1649.25.3.343>
- Krattenmacher, T., Kühne, F., Führer, D., Beierlein, V., Brähler, E., Resch, F., Klitzing, K. V., Flechtner, H., Bergelt, C., Romer, G., & Möller, B. (2013). Coping skills and mental health status in adolescents when a parent has cancer: A multicenter and multi-perspective study. *Journal of Psychosomatic Research*, 74(3), 252-259. <https://doi.org/10.1007/s10597-017-0087-x>
- Kristensen, H. (2001). Multiple informants' report of emotional and behavioural problems in a nation-wide sample of selective mute children and controls. *European Child & Adolescent Psychiatry*, 10(2), 135-142. <https://doi.org/10.1007/s007870170037>
- Landy, S. (2009). *Pathways to competence: Encouraging healthy social and emotional development in young children*. Paul H Brookes Publishing.
- Landry, S. H., Smith, K. E., Swank, P. R., & Miller-Loncar, C. L. (2000). Early maternal and child influences on children's later independent cognitive and social functioning. *Child Development*, 71(2), 358-375. <https://doi.org/10.1111/1467-8624.00150>
- Lavallee, K., Schuck, K., Blatter-Meunier, J., & Schneider, S. (2019). Transgenerational improvements following child anxiety treatment: An exploratory examination. *PLoS One*, 14(2), e0212667. <https://doi.org/10.1371/journal.pone.0212667>
- Lazarus, R. S. (1991). Cognition and motivation in emotion. *American Psychologist*, 46(4), 352-367. <https://doi.org/10.1037/0003-066X.46.4.352>
- Lazarus, R. S., & Folkman, S. (1986). Cognitive theories of stress and the issue of circularity. In *Dynamics of stress* (pp. 63-80). Boston, MA: Springer.
- Leclère, C., Viaux, S., Avril, M., Achard, C., Chetouani, M., Missonnier, S., & Cohen, D. (2014). Why synchrony matters during mother-child interactions: a systematic review. *PLoS One*, 9(12), e11. <https://doi.org/10.1371/journal.pone.0113571>
- Leerkes, E. M. 2011. Maternal sensitivity during distressing tasks: A unique predictor of attachment security. *Infant Behavior & Development*, 34(3), 443-446. <https://doi.org/10.1016/j.infbeh.2011.04.006>
- Leerkes, E. M., Weaver, J. M., & O'Brien, M. (2012). Differentiating maternal sensitivity to infant distress and non-distress. *Parenting*, 12(2-3), 175-184. <https://doi.org/10.1080/15295192.2012.683353>
- Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development*, 71(1), 107-118. <https://doi.org/10.1111/1467-8624.00124>

- Lengua, L. J. (2006). Growth in temperament and parenting as predictors of adjustment during children's transition to adolescence. *Developmental Psychology, 42*(5), 819. <https://doi.org/10.1037/0012-1649.42.5.819>
- Letcher, P., Smart, D., Sanson, A., & Toumbourou, J. W. (2009). Psychosocial precursors and correlates of differing internalizing trajectories from 3 to 15 years 1. *Social Development, 18*(3), 618-646. <https://doi.org/10.1111/j.1467-9507.2008.00500.x>
- Lewis, M. D. (2000). The promise of dynamic systems approaches for an integrated account of human development. *Child Development, 71*(1), 36–43. <https://doi.org/10.1111/1467-8624.00116>
- Lewis, M., & Ramsay, D. (2005). Infant emotional and cortisol responses to goal blockage. *Child Development, 76*(2), 518-530. <https://doi.org/10.1111/j.1467-8624.2005.00860.x>
- Lewis, M., Sullivan, M. W., Ramsay, D. S., & Alessandri, S. M. (1992). Individual differences in anger and sad expressions during extinction: Antecedents and consequences. *Infant Behavior and Development, 15*(4), 443-452. [https://doi.org/10.1016/0163-6383\(92\)80012-J](https://doi.org/10.1016/0163-6383(92)80012-J)
- Lichtwarck-Aschoff, A., Kunnen, S. E., & Van Geert, P. L. (2009). Here we go again: A dynamic systems perspective on emotional rigidity across parent–adolescent conflicts. *Developmental Psychology, 45*(5), 1364-1375. <https://doi.org/10.1037/a0016713>
- Lindsey, E. W., Mize, J., & Pettit, G. S. (1997). Mutuality in parent-child play: Consequences for children's peer competence. *Journal of Social and Personal Relationships, 14*(4), 523-538. <https://doi.org/10.1177/0265407597144007>
- Lindsey, E. W., Cremeens, P. R., Colwell, M. J., & Caldera, Y. M. (2009). The structure of parent–child dyadic synchrony in toddlerhood and children's communication competence and self-control. *Social Development, 18*(2), 375-396. <https://doi.org/10.1111/j.1467-9507.2008.00489.x>
- Lindsey, E. W., Cremeens, P. R., & Caldera, Y. M. (2010). Mother–child and father–child mutuality in two contexts: Consequences for young children's peer relationships. *Infant and Child Development: An International Journal of Research and Practice, 19*(2), 142-160. <https://doi.org/10.1002/icd.645>
- Lindsey, E. W., & Mize, J. (2000). Parent-child physical and pretense play: Links to children's social competence. *Merrill-Palmer Quarterly, 46*(4), 565-591.
- Lohaus, A., Keller, H., Ball, J., Elben, C., & Voelker, S. (2001). Maternal sensitivity: Components and relations to warmth and contingency. *Parenting: Science and Practice, 1*(4), 267-284. https://doi.org/10.1207/S15327922PAR0104_1
- Long, E. C. (1990). Measuring dyadic perspective-taking: Two scales for assessing perspective-taking in marriage and similar dyads. *Educational and Psychological Measurement, 50*(1), 91-103. <https://doi.org/10.1177/0013164490501008>

- Lorber, M. F., & Smith Slep, A. M. (2005). Mothers' emotion dynamics and their relations with harsh and lax discipline: Microsocial time series analyses. *Journal of Clinical Child and Adolescent Psychology, 34*(3), 559-568. https://doi.org/10.1207/s15374424jccp3403_11
- Lotzin, A., Lu, X., Kriston, L., Schiborr, J., Musal, T., Romer, G., & Ramsauer, B. (2015). Observational tools for measuring parent–infant interaction: a systematic review. *Clinical Child and Family Psychology Review, 18*(2), 99-132. <https://doi.org/10.1007/s10567-015-0180-z>
- Lougheed, J. P., & Hollenstein, T. (2016). Socioemotional flexibility in mother-daughter dyads: Riding the emotional rollercoaster across positive and negative contexts. *Emotion, 16*(5), 620-633. <https://doi.org/10.1037/emo0000155>
- Lougheed, J. P., Craig, W. M., Pepler, D., Connolly, J., O'Hara, A., Granic, I., & Hollenstein, T. (2016). Maternal and peer regulation of adolescent emotion: Associations with depressive symptoms. *Journal of Abnormal Child Psychology, 44*(5), 963-974. <https://doi.org/10.1007/s10802-015-0084-x>
- Lougheed, J. P., Hollenstein, T., Lichtwarck-Aschoff, A., & Granic, I. (2015). Maternal regulation of child affect in externalizing and typically-developing children. *Journal of Family Psychology, 29*(1), 10–19. <https://doi.org/10.1037/a0038429>
- Lougheed, J. P., Benson, L., Cole, P. M., & Ram, N. (2019). Multilevel survival analysis: Studying the timing of children's recurring behaviors. *Developmental Psychology, 55*(1), 53-65. <https://doi.org/10.1037/dev0000619>
- Lougheed, J. P., Brinberg, M., Ram, N., & Hollenstein, T. (2020). Emotion socialization as a dynamic process across emotion contexts. *Developmental Psychology, 56*(3), 553-565. <https://doi.org/10.1037/dev0000801>
- Loulis, S., & Kuczynski, L. (1997). Beyond one hand clapping: Seeing bidirectionality in parent-child relations. *Journal of Social and Personal Relationships, 14*(4), 441-461. <https://doi.org/10.1177/0265407597144002>
- Luebke, A. M., Bump, K. A., Fussner, L. M., & Rulon, K. J. (2014). Perceived maternal and paternal psychological control: Relations to adolescent anxiety through deficits in emotion regulation. *Child Psychiatry & Human Development, 45*(5), 565-576. <https://doi.org/10.1007/s10578-013-0425-3>
- Lundell, L. J., Grusec, J. E., McShane, K. E., & Davidov, M. (2008). Mother–adolescent conflict: Adolescent goals, maternal perspective-taking, and conflict intensity. *Journal of Research on Adolescence, 18*(3), 555-571. <https://doi.org/10.1111/j.1532-7795.2008.00571.x>
- Lunkenheimer, E., Lichtwarck-Aschoff, A., Hollenstein, T., Kemp, C. J., & Granic, I. (2016). Breaking down the coercive cycle: How parent and child risk factors influence real-time variability in parental responses to child misbehavior. *Parenting, 16*(4), 237-256. <https://doi.org/10.1080/15295192.2016.1184925>

- Lunkenheimer, E. S., Shields, A. M., & Cortina, K. S. (2007). Parental emotion coaching and dismissing in family interaction. *Social Development, 16*(2), 232-248.
<https://doi.org/10.1111/j.1467-9507.2007.00382.x>
- Lunkenheimer, E. S., Olson, S. L., Hollenstein, T., Sameroff, A. J., & Winter, C. (2011). Dyadic flexibility and positive affect in parent–child coregulation and the development of child behavior problems. *Development and Psychopathology, 23*(2), 577-591.
<https://doi.org/10.1017/S095457941100006X>
- Lunkenheimer, E. S., Albrecht, E. C., & Kemp, C. J. (2013). Dyadic flexibility in early parent–child interactions: Relations with maternal depressive symptoms and child negativity and behaviour problems. *Infant and Child Development, 22*(3), 250-269.
<https://doi.org/10.1002/icd.1783>
- Lunkenheimer, E., Tiberio, S. S., Buss, K. A., Lucas-Thompson, R. G., Boker, S. M., & Timpe, Z. C. (2015). Coregulation of respiratory sinus arrhythmia between parents and preschoolers: Differences by children's externalizing problems. *Developmental Psychobiology, 57*(8), 994-1003. <https://doi.org/10.1002/dev.21323>
- Lunkenheimer, E., Hamby, C. M., Lobo, F. M., Cole, P. M., & Olson, S. L. (2020). The role of dynamic, dyadic parent–child processes in parental socialization of emotion. *Developmental Psychology, 56*(3), 566-577.
<https://doi.org/10.1037/dev0000808>
- Maccoby, E. E. (1980). *Social development: Psychological growth and the parent-child relationship*. New York, NY: Harcourt Brace Jovanovich.
- Maccoby, E. E. (2000). Parenting and its effects on children: On reading and misreading behavior genetics. *Annual Review of Psychology, 51*(1), 1-27.
<https://doi.org/10.1146/annurev.psych.51.1.1>
- Maccoby, E. E., & Martin, J. A., (1983). Socialization in the contest of the family: Parent–child interaction. In P. H. Mussen (Series Ed.), & E. M. Hetherington (Vol. Ed.). *Handbook of child psychology: Vol 4: Socialization, personality, and social development* (pp. 1–101). New York, NY: Wiley.
- Magaña, A. B., Goldstein, M. J., Karno, M., Miklowitz, D. J., Jenkins, J., & Falloon, I. R. (1986). A brief method for assessing expressed emotion in relatives of psychiatric patients. *Psychiatry Research, 17*(3), 203-212. [https://doi.org/10.1016/0165-1781\(86\)90049-1](https://doi.org/10.1016/0165-1781(86)90049-1)
- Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood, and adulthood: A move to the level of representation. *Monographs of the Society for Research in Child Development, 50*(1/2), 66-104. <https://doi.org/10.2307/3333827>
- Main, A., Paxton, A., & Dale, R. (2016). An exploratory analysis of emotion dynamics between mothers and adolescents during conflict discussions. *Emotion, 16*(6), 913-928.
<https://doi.org/10.1037/emo0000180>

- Mangold (2017): *INTERACT User Guide*. Mangold International GmbH (Ed.) Retrieved from <https://www.mangold-international.com>.
- Mares, S., & McMahon, C. (2020). Attachment security: influences on social and emotional competence, executive functioning and readiness for school. In R. Midford, G. Nutton, B. Hyndman, & S. Silburn (Eds.). *Health and education interdependence: thriving from birth to adulthood* (pp. 55-74). Singapore: Springer, Springer Nature. https://doi.org/10.1007/978-981-15-3959-6_4
- Mathews, G., & Wells, A. (1999). The cognitive science of attention and emotion. In T. Dalgleish & M. J. Power (Eds.). *Handbook of cognition and emotion* (pp. 171-192). New York, NY: John Wiley & Sons. <https://doi.org/10.1002/0470013494.ch9>
- Matte-Gagné, C., Bernier, A., & Gagné, C. (2013). Stability of maternal autonomy support between infancy and preschool age. *Social Development, 22*(3), 427-443. <https://doi.org/10.1111/j.1467-9507.2012.00667.x>
- Mazefsky, C. A., Herrington, J., Siegel, M., Scarpa, A., Maddox, B. B., Scahill, L., & White, S. W. (2013). The role of emotion regulation in autism spectrum disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 52*(7), 679-688. <https://doi.org/10.1016/j.jaac.2013.05.006>
- McElwain, N. L. and Booth-LaForce, C. 2006. Maternal sensitivity to infant distress and non-distress as predictors of infant-mother attachment security. *Journal of Family Psychology, 20*(2), 247–255. <https://doi.org/10.1037/0893-3200.20.2.247>
- McElwain, N. L., Halberstadt, A. G., & Volling, B. L. (2007). Mother-and father-reported reactions to children's negative emotions: Relations to young children's emotional understanding and friendship quality. *Child Development, 78*(5), 1407-1425. <https://doi.org/10.1111/j.1467-8624.2007.01074.x>
- McFarlane, W. R. (2006). Family expressed emotion prior to onset of psychosis. In S. R. H. Beach, M. Z. Wamboldt, & N. J. Kaslow (Eds.). *Relational processes and DSM-V: Neuroscience, assessment, prevention, and treatment* (pp. 77–87). Washington: American Psychiatric Association.
- McMahon, C. A., & Meins, E. (2012). Mind-mindedness, parenting stress, and emotional availability in mothers of preschoolers. *Early Childhood Research Quarterly, 27*(2), 245-252. <https://doi.org/10.1016/j.ecresq.2011.08.002>
- McMahon, C., & Newey, B. (2018). Non-Attuned Mind-Mindedness, Infant Negative Affect, and Emotional Availability: Assessing Mind-Mindedness during the Still-Face Paradigm. *Infancy, 23*(6), 873-892. <https://doi.org/10.1111/infa.12245>
- McKee, L. G., Parent, J., Zachary, C. R., & Forehand, R. (2018). Mindful parenting and emotion socialization practices: Concurrent and longitudinal associations. *Family Process, 57*(3), 752-766. <https://doi.org/10.1111/famp.12329>

- Medeiros, K. F., Cress, C. J., & Lambert, M. C. (2016). Mastery motivation in children with complex communication needs: longitudinal data analysis. *Augmentative and Alternative Communication, 32*(3), 208-218. <https://doi.org/10.1080/07434618.2016.1179789>
- Meinhardt, J., & Pekrun, R. (2003). Attentional resource allocation to emotional events: An ERP study. *Cognition and Emotion, 17*(3), 477-500. <https://doi.org/10.1080/02699930244000039>
- Melnick, S. M., & Hinshaw, S. P. (2000). Emotion regulation and parenting in AD/HD and comparison boys: Linkages with social behaviors and peer preference. *Journal of Abnormal Child Psychology, 28*(1), 73-86. <https://doi.org/10.1023/A:1005174102794>
- Mesman, J. (2010). Maternal responsiveness to infants: comparing micro-and macro-level measures. *Attachment & Human Development, 12*(1-2), 143-149. <https://doi.org/10.1080/14616730903484763>
- Mesman, J., Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2009). The many faces of the Still-Face Paradigm: A review and meta-analysis. *Developmental Review, 29*(2), 120-162. <https://doi.org/10.1016/j.dr.2009.02.001>
- Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment-related strategies. *Motivation and Emotion, 27*(2), 77-102. <https://doi.org/10.1023/A:1024515519160>
- Miller, A. D., & Tarpay, R. M. (1991). Effects of learned helplessness training on instrumental heart rate control in humans. *Learning and Motivation, 22*(4), 388-405. [https://doi.org/10.1016/0023-9690\(91\)90003-Q](https://doi.org/10.1016/0023-9690(91)90003-Q)
- Miller, C. L., Miceli, P. J., Whitman, T. L., & Borkowski, J. G. (1996). Cognitive readiness to parent and intellectual-emotional development in children of adolescent mothers. *Developmental Psychology, 32*(3), 533-541. <https://doi.org/10.1037/0012-1649.32.3.533>
- Miller, A. L., Gearhardt, A. N., Fredericks, E. M., Katz, B., Shapiro, L. F., Holden, K., Kaciroti, N., Gonzalez, R., Hunter, C., & Lumeng, J. C. (2018). Targeting self-regulation to promote health behaviors in children. *Behaviour Research and Therapy, 101*, 71-81. <https://doi.org/10.1016/j.brat.2017.09.008>
- Miller-Slough, R. L., Dunsmore, J. C., Ollendick, T. H., & Greene, R. W. (2016). Parent-child synchrony in children with oppositional defiant disorder: Associations with treatment outcomes. *Journal of Child and Family Studies, 25*(6), 1880-1888. <https://doi.org/10.1007/s10826-015-0356-7>
- Mize, J., & Pettit, G. S. (1997). Mothers' social coaching, mother-child relationship style, and children's peer competence: Is the medium the message?. *Child Development, 68*(2), 312-332. <https://doi.org/10.2307/1131852>

- Morelen, D., & Suveg, C. (2012). A real-time analysis of parent-child emotion discussions: The interaction is reciprocal. *Journal of Family Psychology, 26*(6), 998-1003.
<https://doi.org/10.1037/a0030148>
- Moretti, M. M., & Peled, M. (2004). Adolescent-parent attachment: Bonds that support healthy development. *Paediatrics & Child Health, 9*(8), 551-555.
<https://doi.org/10.1093/pch/9.8.551>
- Morris, A. S., Silk, J. S., Steinberg, L., Sessa, F. M., Avenevoli, S., & Essex, M. J. (2002). Temperamental vulnerability and negative parenting as interacting predictors of child adjustment. *Journal of Marriage and Family, 64*(2), 461-471.
<https://doi.org/10.1111/j.1741-3737.2002.00461.x>
- Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of the family context in the development of emotion regulation. *Social Development, 16*(2), 361-388. <https://doi.org/10.1111/j.1467-9507.2007.00389.x>
- Morris, A. S., Silk, J. S., Morris, M. D. S., Steinberg, L., Aucoin, K. J., & Keyes, A. W. (2011). The influence of mother-child emotion regulation strategies on children's expression of anger and sadness. *Developmental Psychology, 47*(1), 213-225.
<https://doi.org/10.1037/a0021021>
- Morris, A. S., Cui, L., Criss, M. M., & Simmons, W. K. (2018). Emotion Regulation Dynamics During Parent-Child Interactions. Implications for Research and Practice. In P. M. Cole & T. Hollenstein (Eds.). *Emotion regulation: A matter of time*. Routledge.
- Mullick, M. S. I., & Goodman, R. (2001). Questionnaire screening for mental health problems in Bangladeshi children: a preliminary study. *Social Psychiatry and Psychiatric Epidemiology, 36*(2), 94-99. <https://doi.org/10.1007/s001270050295>
- Neitzel, C., & Dopkins Stright, A. (2004). Parenting behaviours during child problem solving: The roles of child temperament, mother education and personality, and the problem-solving context. *International Journal of Behavioral Development, 28*(2), 166-179.
<https://doi.org/10.1080/01650250344000370>
- Nelson, L. J. (2000). *Social and nonsocial behaviors, and peer acceptance: A longitudinal model of the development of self-perceptions in children ages 4 to 7 years*. University of Maryland, College Park.
- Neubauer, A., Gawrilow, C., & Hasselhorn, M. (2012). The watch-and-wait task: On the reliability and validity of a new method of assessing self-control in preschool children. *Learning and Individual Differences, 22*(6), 770-777. <https://doi.org/10.1016/j.lindif.2012.05.006>
- Neumann, A., Van Lier, P. A., Gratz, K. L., & Koot, H. M. (2010). Multidimensional assessment of emotion regulation difficulties in adolescents using the difficulties in emotion regulation scale. *Assessment, 17*(1), 138-149.
<https://doi.org/10.1177/1073191109349579>

- Nievar, MA and Becker, BJ. 2007. Sensitivity as a privileged predictor of attachment: A second perspective on De Wolff and van IJzendoorn's meta-analysis. *Social Development*, 17(1), 102–114. <https://doi.org/10.1111/j.1467-9507.2007.00417.x>
- Nigg, J. T. (2000). On inhibition/disinhibition in developmental psychopathology: views from cognitive and personality psychology and a working inhibition taxonomy. *Psychological Bulletin*, 126(2), 220-246. <https://doi.org/10.1037/0033-2909.126.2.220>
- Nigg, J. T. (2006). Temperament and developmental psychopathology. *Journal of Child Psychology and Psychiatry*, 47(3-4), 395-422. <https://doi.org/10.1111/j.1469-7610.2006.01612.x>
- Nigg, J. T. (2017). Annual Research Review: On the relations among self-regulation, self-control, executive functioning, effortful control, cognitive control, impulsivity, risk-taking, and inhibition for developmental psychopathology. *Journal of Child Psychology and Psychiatry*, 58(4), 361-383. <https://doi.org/10.1111/jcpp.12675>
- Nigg, J. T., & Casey, B. J. (2005). An integrative theory of attention-deficit/hyperactivity disorder based on the cognitive and affective neurosciences. *Development and Psychopathology*, 17(3), 785-806. <https://doi.org/10.1017/S0954579405050376>
- Nock, M. K., Kazdin, A. E., Hiripi, E. V. A., & Kessler, R. C. (2006). Prevalence, subtypes, and correlates of DSM-IV conduct disorder in the National Comorbidity Survey Replication. *Psychological Medicine*, 36(5), 699-710. <https://doi.org/10.1017/S0033291706007082>
- O'Connor, T. G. (2002). Annotation: The effects of parenting reconsidered: findings, challenges, and applications. *Journal of Child Psychology and Psychiatry*, 43(5), 555-572. <https://doi.org/10.1111/1469-7610.00046>
- Office for National Statistics (2019). Average household income, UK: financial year ending 2019. Retrieved from: <https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/householddisposableincomeandinequality/financialyearending2019>
- Ogundele, M. O. (2018). Behavioural and emotional disorders in childhood: a brief overview for paediatricians. *World Journal of Clinical Pediatrics*, 7(1), 9-26. <https://doi.org/10.5409/wjcp.v7.i1.9>
- Oliver, B. R., Trzaskowski, M., & Plomin, R. (2014). Genetics of parenting: The power of the dark side. *Developmental Psychology*, 50(4), 1233-1240. <http://dx.doi.org/10.1037/a0035388>
- Oppenheim, D. (2006). Child, parent, and parent–child emotion narratives: Implications for developmental psychopathology. *Development and Psychopathology*, 18(3), 771-790. <https://doi.org/10.1017/S095457940606038X>

- Pardini, D. A. (2008). Novel insights into longstanding theories of bidirectional parent–child influences: Introduction to the special section. *Journal of Abnormal Child Psychology*, *36*(5), 627-631. <https://doi.org/10.1007/s10802-008-9231-y>
- Paschall, K. W., Gonzalez, H., Mortensen, J. A., Barnett, M. A., & Mastergeorge, A. M. (2015). Children's negative emotionality moderates influence of parenting styles on preschool classroom adjustment. *Journal of Applied Developmental Psychology*, *39*, 1-13. <https://doi.org/10.1016/j.appdev.2015.04.009>
- Pasalich, D. S., Dadds, M. R., Hawes, D. J., & Brennan, J. (2011). Assessing relational schemas in parents of children with externalizing behavior disorders: Reliability and validity of the Family Affective Attitude Rating Scale. *Psychiatry Research*, *185*(3), 438-443. <https://doi.org/10.1016/j.psychres.2010.07.034>
- Patterson, G. R. (1976). The aggressive child: Victim and architect of a coercive system. In E. J. Mash, L. A. Hamerlynck, & L. C. Handy (Eds.). *Behavior modification and families* (pp. 267–316). New York, NY: Brunner/Mazel.
- Patterson, G. R. (1982). *Coercive family process* (Vol. 3). Castalia Publishing Company.
- Patterson, G. R., Reid, J. B., & Dishion, T. (1992). *Antisocial boys: A social interactional approach* (Vol. 4). Eugene, OR: Castalia Publishing Company. <https://doi.org/10.2307/1131196>
- Pekrun, R., Elliot, A. J., & Maier, M. A. (2009). Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance. *Journal of Educational Psychology*, *101*(1), 115-135. <https://doi.org/10.1037/a0013383>
- Pellegrini, A. D. (2001). Practitioner review: The role of direct observation in the assessment of young children. *Journal of Child Psychology and Psychiatry*, *42*(7), 861-869. <https://doi.org/10.1111/1469-7610.00783>
- Peterson, J., Winter, C., Jabson, J., & Dishion, T. J. (2008). *The Relationship Affect Coding System (Coding manual)*. Unpublished coding manual. The Child and Family Center, 6217.
- Pettit, G. S., & Arsiwalla, D. D. (2008). Commentary on special section on “bidirectional parent–child relationships”: The continuing evolution of dynamic, transactional models of parenting and youth behavior problems. *Journal of Abnormal Child Psychology*, *36*(5), 711-718. <https://doi.org/10.1007/s10802-008-9242-8>
- Pietromonaco, P. R., & Barrett, L. F. (2000). The internal working models concept: What do we really know about the self in relation to others?. *Review of General Psychology*, *4*(2), 155-175. <https://doi.org/10.1037/1089-2680.4.2.155>
- Pomerantz, E. M., & Eaton, M. M. (2001). Maternal intrusive support in the academic context: transactional socialization processes. *Developmental Psychology*, *37*(2), 174-186. <https://doi.org/10.1037/0012-1649.37.2.174>

- Pomerantz, E. M., & Grolnick, W. S. (2017). The role of parenting in children's motivation and competence: What underlies facilitative parenting? In A. J. Elliot, C. S. Dweck, & D. S. Yeager (Eds.). *Handbook of competence and motivation: Theory and application* (p. 566–585). Guilford Press.
- Posner, M. I., & Rothbart, M. K. (2000). Developing mechanisms of self-regulation. *Development and Psychopathology, 12*(3), 427-441. <https://doi.org/10.1017/S0954579400003096>
- Posner, M. I., & Rothbart, M. K. (2007). Research on attention networks as a model for the integration of psychological science. *Annual Review of Psychology, 58*, 1-23. <https://doi.org/10.1146/annurev.psych.58.110405.085516>
- Poulou, M. S. (2015). Emotional and behavioural difficulties in preschool. *Journal of Child and Family Studies, 24*(2), 225-236. <https://doi.org/10.1007/s10826-013-9828-9>
- Prigogine, I., & Stengers, I. (2018). *Order out of chaos: Man's new dialogue with nature*. Verso Books.
- Provenzi, L., Giusti, L., & Montiroso, R. (2016). Do infants exhibit significant cortisol reactivity to the Face-to-Face Still-Face paradigm? A narrative review and meta-analysis. *Developmental Review, 42*, 34-55. <https://doi.org/10.1016/j.dr.2016.07.001>
- Provenzi, L., Cassiano, R. G., Scotto di Minico, G., Linhares, M., & Montiroso, R. (2017). Study protocol for the preschooler regulation of emotional stress (PRES) procedure. *Frontiers in Psychology, 8*, 1653. <https://doi.org/10.3389/fpsyg.2017.01653>
- Provenzi, L., Scotto di Minico, G., Giusti, L., Guida, E., & Müller, M. (2018). Disentangling the dyadic dance: theoretical, methodological and outcomes systematic review of mother-infant dyadic processes. *Frontiers in Psychology, 9*, 348. <https://doi.org/10.3389/fpsyg.2018.00348>
- Putnam, S. P., Gartstein, M. A., & Rothbart, M. K. (2006). Measurement of fine-grained aspects of toddler temperament: The Early Childhood Behavior Questionnaire. *Infant Behavior and Development, 29*(3), 386-401. <https://doi.org/10.1016/j.infbeh.2006.01.004>
- Quartier, V., Antonietti, J. P., & Nashat, S. (2017). Internalizing dimensions profiles of children referred for externalizing behaviours in school psychological services. *Romanian Journal of School Psychology, 10*(20), 13-34.
- R Coding Team. (2019). *R: A language and environment for statistical computing (version 3.1. 2)*. Vienna, Austria. R Foundation for Statistical Computing; 2014.
- Rafnsson, F. D., Jonsson, F. H., & Windle, M. (2006). Coping strategies, stressful life events, problem behaviors, and depressed affect. *Anxiety, Stress, and Coping, 19*(3), 241-257. <https://doi.org/10.1080/10615800600679111>
- Reck, C., Hunt, A., Fuchs, T., Weiss, R., Noon, A., Moehler, E., Downing, G., Tronick, E. Z. & Mundt, C. (2004). Interactive regulation of affect in postpartum depressed mothers

and their infants: an overview. *Psychopathology*, 37(6), 272-280.
<https://doi.org/10.1159/000081983>

- Reed, R. G., Barnard, K., & Butler, E. A. (2015). Distinguishing emotional coregulation from codysregulation: An investigation of emotional dynamics and body weight in romantic couples. *Emotion*, 15(1), 45-60. <https://doi.org/10.1037/a0038561>
- Rekart, K. N., Mineka, S., Zinbarg, R. E., & Griffith, J. W. (2007). Perceived family environment and symptoms of emotional disorders: The role of perceived control, attributional style, and attachment. *Cognitive Therapy and Research*, 31(4), 419-436.
<https://doi.org/10.1007/s10608-007-9131-4>
- Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: family social environments and the mental and physical health of offspring. *Psychological Bulletin*, 128(2), 330-366.
<https://doi.org/10.1037/0033-2909.128.2.330>
- Robbins, M. S., Alexander, J. F., Newell, R. M., & Turner, C. W. (1996). The immediate effect of reframing on client attitude in family therapy. *Journal of Family Psychology*, 10(1), 28-34. <https://doi.org/10.1037/0893-3200.10.1.28>
- Rocissano, L., & Yatchmink, Y. (1983). Language skill and interactive patterns in prematurely born toddlers. *Child Development*, 54(5), 1229-1241. <https://doi.org/10.2307/1129678>
- Rocissano, L., Slade, A., & Lynch, V. (1987). Dyadic synchrony and toddler compliance. *Developmental Psychology*, 23(5), 698-704. <https://doi.org/10.1037/0012-1649.23.5.698>
- Rolfe, S. A., & Emmett, S. (2010). Direct observation. *Doing Early Childhood Research*, 23(4), 309-327. <https://doi.org/10.1080/09669760.2015.1046158>
- Rosanbalm, K., & Murray, D. W. (2017). *Caregiver co-regulation across development: A practice brief* (No. 2017-80). OPRE Brief Report. Retrieved from:
<https://fpg.unc.edu/sites/fpg.unc.edu/files/resources/reports-and-policy-briefs/Co-RegulationFromBirthThroughYoungAdulthood.pdf>
- Roth, S., & Kubal, L. (1975). Effects of noncontingent reinforcement on tasks of differing importance: Facilitation and learned helplessness. *Journal of Personality and Social Psychology*, 32(4), 680-691. <https://doi.org/10.1037/0022-3514.32.4.680>
- Roth, G., Assor, A., Niemiec, C. P., Ryan, R. M., & Deci, E. L. (2009). The emotional and academic consequences of parental conditional regard: Comparing conditional positive regard, conditional negative regard, and autonomy support as parenting practices. *Developmental Psychology*, 45(4), 1119-1142.
<https://doi.org/10.1037/a0015272>
- Rothbart, M.K., Bates, J.E. (2006). Temperament. In Damon, W., Lerner, R., Eisenberg, N. (Eds.). *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (6th ed., pp. 99–166). New York, NY: Wiley. <https://doi.org/10.1111/j.1467-8721.2007.00505.x>

- Rothbart, M. K., & Posner, M. I. (1985). Temperament and the development of self-regulation. In *The neuropsychology of individual differences* (pp. 93-123). Boston, MA: Springer. https://doi.org/10.1007/978-1-4899-3484-0_5
- Rothbart, M. K., Ahadi, S. A., Hershey, K. L., & Fisher, P. (2001). Investigations of temperament at three to seven years: The Children's Behavior Questionnaire. *Child Development, 72*(5), 1394-1408. <https://doi.org/10.1111/1467-8624.00355>
- Rothbart, M. K. (2004). Temperament and the pursuit of an integrated developmental psychology. *Merrill-Palmer Quarterly, 50*(4), 492-505.
- Rothbart, M. K., Ellis, L. K., & Posner, M. I. (2011). Temperament and self-regulation. In K. D. Vohs & R. F. Baumeister (Eds.). *Handbook of self-regulation: Research, theory, and applications* (pp. 441-460). Guilford Press.
- Rubin, K. H., Coplan, R. J., Fox, N. A., & Calkins, S. D. (1995). Emotionality, emotion regulation, and preschoolers' social adaptation. *Development and Psychopathology, 7*(1), 49-62. <https://doi.org/10.1017/S0954579400006337>
- Rubin, K. H., Coplan, R. J., & Bowker, J. C. (2009). Social withdrawal in childhood. *Annual Review of Psychology, 60*, 141-171. <https://doi.org/10.1146/annurev.psych.60.110707.163642>
- Rudolph, K. D., Caldwell, M. S., & Conley, C. S. (2005). Need for approval and children's well-being. *Child Development, 76*(2), 309-323. https://doi.org/10.1111/j.1467-8624.2005.00847_a.x
- Rudolph, K. D., Miernicki, M. E., Troop-Gordon, W., Davis, M. M., & Telzer, E. H. (2016). Adding insult to injury: neural sensitivity to social exclusion is associated with internalizing symptoms in chronically peer-victimized girls. *Social Cognitive and Affective Neuroscience, 11*(5), 829-842. <https://doi.org/10.1093/scan/nsw021>
- Rudolph, K. D., Troop-Gordon, W., & Llewellyn, N. (2013). Interactive contributions of self-regulation deficits and social motivation to psychopathology: Unraveling divergent pathways to aggressive behavior and depressive symptoms. *Development and Psychopathology, 25*(2), 407-418. <https://doi.org/10.1017/S0954579412001149>
- Russell, B. S., Londhe, R., & Britner, P. A. (2013). Parental contributions to the delay of gratification in preschool-aged children. *Journal of Child and Family Studies, 22*(4), 471-478. <https://doi.org/10.1007/s10826-012-9599-8>
- Rutherford, H. J., Wallace, N. S., Laurent, H. K., & Mayes, L. C. (2015). Emotion regulation in parenthood. *Developmental Review, 36*, 1-14. <https://doi.org/10.1016/j.dr.2014.12.008>
- Ryan, A. M., & Shim, S. S. (2008). An exploration of young adolescents' social achievement goals and social adjustment in middle school. *Journal of Educational Psychology, 100*(3), 672-687. <https://doi.org/10.1037/0022-0663.100.3.672>

- Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion, 30*(4), 344-360. <https://doi.org/10.1007/s11031-006-9051-8>
- Rydell, A. M., Berlin, L., & Bohlin, G. (2003). Emotionality, emotion regulation, and adaptation among 5-to 8-year-old children. *Emotion, 3*(1), 30-47. <https://doi.org/10.1037/1528-3542.3.1.30>
- Saarni, C. (1999). *The development of emotional competence*. Guilford press.
- Saarni, C., & Crowley, M. (1990). The development of emotion regulation: Effects on emotional state and expression. In E. A. Blechman (Ed.). *Emotions and the family: For better or for worse* (pp. 53–73). Lawrence Erlbaum Associates, Inc.
- Salonen, P., Lepola, J., & Vauras, M. (2007). Scaffolding interaction in parent-child dyads: Multimodal analysis of parental scaffolding with task and non-task oriented children. *European Journal of Psychology of Education, 22*(1), 77-96. <https://doi.org/10.1007/BF03173690>
- Salonen, P., Vauras, M., & Efklides, A. (2005). Social interaction-what can it tell us about metacognition and coregulation in learning?. *European Psychologist, 10*(3), 199-208. <https://doi.org/10.1027/1016-9040.10.3.199>
- Salvatori, P., Neri, E., Chirico, I., Andrei, F., Agostini, F., & Trombini, E. (2016). Mother-toddler play interaction in extremely, very low birth weight, and full-term children: a longitudinal study. *Frontiers in psychology, 7*, Article 1511.
- Sameroff, A. (1975). Transactional models in early social relations. *Human Development, 18*(1-2), 65-79. <https://doi.org/10.1159/000271476>
- Sameroff, A. (2010). A unified theory of development: A dialectic integration of nature and nurture. *Child Development, 81*(1), 6-22. <https://doi.org/10.1111/j.1467-8624.2009.01378.x>
- Sameroff, A. J., & Fiese, B. H. (2000). Models of development and developmental risk. In C. H. Zeanah, Jr. (Ed.). *Handbook of Infant Mental Health* (p. 3–19). Guilford Press.
- Sameroff, A. J., & MacKenzie, M. J. (2003). A Quarter-Century of the Transactional Model: How Have Things Changed? *Zero to Three (J), 24*(1), 14-22.
- Samyn, V., Roeyers, H., & Bijttebier, P. (2011). Effortful control in typically developing boys and in boys with ADHD or autism spectrum disorder. *Research in Developmental Disabilities, 32*(2), 483-490. <https://doi.org/10.1016/j.ridd.2010.12.038>
- Saxbe, D., & Repetti, R. L. (2010). For better or worse? Coregulation of couples' cortisol levels and mood states. *Journal of Personality and Social Psychology, 98*(1), 92-103. <https://doi.org/10.1037/a0016959>

- Schmitz, A., Merikangas, K., Swendsen, H., Cui, L., Heaton, L., & Grillon, C. (2011). Measuring anxious responses to predictable and unpredictable threat in children and adolescents. *Journal of Experimental Child Psychology, 110*(2), 159-170. <https://doi.org/10.1016/j.jecp.2011.02.014>
- Schultz, D., Izard, C. E., Ackerman, B. P., & Youngstrom, E. A. (2001). Emotion knowledge in economically disadvantaged children: Self-regulatory antecedents and relations to social difficulties and withdrawal. *Development and Psychopathology, 13*(1), 53-67. <https://doi.org/10.1017/s0954579401001043>
- Schunk, D. H. (2008). Attributions as motivators of self-regulated learning. *Motivation and self-regulated learning: Theory, research, and applications* (pp. 245–266). Lawrence Erlbaum Associates Publishers.
- Scott, S., Briskman, J., Woolgar, M., Humayun, S., & O'Connor, T. G. (2011). Attachment in adolescence: Overlap with parenting and unique prediction of behavioural adjustment. *Journal of Child Psychology and Psychiatry, 52*(10), 1052-1062. <https://doi.org/10.1111/j.1469-7610.2011.02453.x>
- Seifer, R., & Schiller, M. (1995). The role of parenting sensitivity, infant temperament, and dyadic interaction in attachment theory and assessment. *Monographs of the Society for Research in Child Development, 60*(2/3), 146-174. <https://doi.org/10.2307/1166176>
- Shankman, S. A., & Gorka, S. M. (2015). Psychopathology research in the RDoC era: Unanswered questions and the importance of the psychophysiological unit of analysis. *International Journal of Psychophysiology, 98*(2), 330-337. <https://doi.org/10.1016/j.ijpsycho.2015.01.001>
- Shapiro, A. F., & Gottman, J. M. (2004). The specific affect coding system. In *Couple observational coding systems* (pp. 205-222). Routledge.
- Sharp, C., & Fonagy, P. (2008). The parent's capacity to treat the child as a psychological agent: Constructs, measures and implications for developmental psychopathology. *Social Development, 17*(3), 737-754. <https://doi.org/10.1111/j.1467-9507.2007.00457.x>
- Sheeber, L., Davis, B., & Hops, H. (2002). *Gender-specific vulnerability to depression in children of depressed mothers*. In S. H. Goodman & I. H. Gotlib (Eds.). *Children of depressed parents: Mechanisms of risk and implications for treatment* (pp. 253–274). American Psychological Association. <https://doi.org/10.1037/10449-010>
- Sheppes, G., Suri, G., & Gross, J. J. (2015). Emotion regulation and psychopathology. *Annual Review of Clinical Psychology, 11*, 379-405. <https://doi.org/10.1146/annurev-clinpsy-032814-112739>
- Sheppes, G. (2020). Transcending the “good & bad” and “here & now” in emotion regulation: costs and benefits of strategies across regulatory stages. In *Advances in Experimental Social Psychology* (Vol. 61, pp. 185-236). Academic Press. <https://doi.org/10.1177/0963721420969386>

- Sher-Censor, E., & Yates, T. M. (2010). *Five Minute Speech Sample Narrative Coherence Coding Manual*. Haifa, Israel: University of Haifa.
- Sher-Censor, E., & Yates, T. M. (2015). Mothers' expressed emotion and narrative coherence: Associations with preschoolers' behavior problems in a multiethnic sample. *Journal of Child and Family Studies, 24*(5), 1392-1405. <https://doi.org/10.1007/s10826-014-9946-z>
- Sher-Censor, E., Grey, I., & Yates, T. M. (2013). The intergenerational congruence of mothers' and preschoolers' narrative affective content and narrative coherence. *International Journal of Behavioral Development, 37*(4), 340-348. <https://doi.org/10.1177/0165025413482760>
- Sher-Censor, E., Khafi, T. Y., & Yates, T. M. (2016). Preschoolers' self-regulation moderates relations between mothers' representations and children's adjustment to school. *Developmental Psychology, 52*(11), 1793-1804. <https://doi.org/10.1037/dev0000178>
- Sher-Censor, E., Shulman, C., & Cohen, E. (2018). Associations among mothers' representations of their relationship with their toddlers, maternal parenting stress, and toddlers' internalizing and externalizing behaviors. *Infant Behavior and Development, 50*, 132-139. <https://doi.org/10.1016/j.infbeh.2017.12.005>
- Sheldrick, R. C., Benneyan, J. C., Kiss, I. G., Briggs-Gowan, M. J., Copeland, W., & Carter, A. S. (2015). Thresholds and accuracy in screening tools for early detection of psychopathology. *Journal of Child Psychology and Psychiatry, 56*(9), 936-948. <https://doi.org/10.1111/jcpp.12442>
- Shewark, E. A., & Blandon, A. Y. (2015). Mothers' and fathers' emotion socialization and children's emotion regulation: A within-family model. *Social Development, 24*(2), 266-284. <https://doi.org/10.1111/sode.12095>
- Shields, A., & Cicchetti, D. (1997). Emotion regulation among school-age children: The development and validation of a new criterion Q-sort scale. *Developmental Psychology, 33*(6), 906-916. <https://doi.org/10.1037/0012-1649.33.6.906>
- Shields, A., Dickstein, S., Seifer, R., Giusti, L., Dodge Magee, K., & Spritz, B. (2001). Emotional competence and early school adjustment: A study of preschoolers at risk. *Early Education and Development, 12*(1), 73-96. https://doi.org/10.1207/s15566935eed1201_5
- Shipman, K. L., & Zeman, J. (2001). Socialization of children's emotion regulation in mother-child dyads: A developmental psychopathology perspective. *Development and Psychopathology, 13*(2), 317-336. <https://doi.org/10.1017/S0954579401002073>
- Shipman, K. L., Schneider, R., Fitzgerald, M. M., Sims, C., Swisher, L., & Edwards, A. (2007). Maternal emotion socialization in maltreating and non-maltreating families: Implications for children's emotion regulation. *Social Development, 16*(2), 268-285. <https://doi.org/10.1111/j.1467-9507.2007.00384.x>

- Shmueli-Goetz, Y., Target, M., Fonagy, P., & Datta, A. (2008). The Child Attachment Interview: A psychometric study of reliability and discriminant validity. *Developmental Psychology, 44*(4), 939–956. <https://doi.org/10.1037/0012-1649.44.4.939>
- Siegel, D. J. (2001). Toward an interpersonal neurobiology of the developing mind: Attachment relationships, “mindsight,” and neural integration. *Infant Mental Health Journal: Official Publication of The World Association for Infant Mental Health, 22*(1-2), 67-94. [https://doi.org/10.1002/1097-0355\(200101/04\)22:1<67::AID-IMHJ3>3.0.CO;2-G](https://doi.org/10.1002/1097-0355(200101/04)22:1<67::AID-IMHJ3>3.0.CO;2-G)
- Sigel, I. E., Stinson, E. T. and Kim, M. (1993) ‘Socialization of cognition: the distancing model’. In R. H. Wozniak & K. W. Fischer (Eds.). *Development in Context: Acting and Thinking in Specific Environments*, (pp. 211–224). Hillsdale, NJ: Lawrence Erlbaum.
- Silk, J. S., Shaw, D. S., Skuban, E. M., Oland, A. A., & Kovacs, M. (2006). Emotion regulation strategies in offspring of childhood-onset depressed mothers. *Journal of Child Psychology and Psychiatry, 47*(1), 69-78. <https://doi.org/10.1111/j.1469-7610.2005.01440.x>
- Silverman, I. W., & Ippolito, M. F. (1995). Maternal antecedents of delay ability in young children. *Journal of Applied Developmental Psychology, 16*(4), 569-591. [https://doi.org/10.1016/0193-3973\(95\)90005-5](https://doi.org/10.1016/0193-3973(95)90005-5)
- Silverman, I. W., & Ragusa, D. M. (1990). Child and maternal correlates of impulse control in 24-month-old children. *Genetic, Social, and General Psychology Monographs, 116*(4), 435–473.
- Singer, J.D. & Willett, J.B. (2003). *Applied Longitudinal Data Analysis*. New York, NY: Oxford University Press. DOI:10.1093/acprof:oso/9780195152968.001.0001
- Skinner, E., & Edge, K. (2002). Parenting, motivation, and the development of children's coping. In L. J. Crockett (Ed.). *Vol. 48 of the Nebraska symposium on motivation. Agency, motivation, and the life course* (pp. 77–143). University of Nebraska Press.
- Skuban, E. M. (2006). *Dyadic Synchrony and The Development of Boys' Conduct Problems in Early Childhood* [Doctoral thesis, University of Pittsburgh]. University of Pittsburgh.
- Skuban, E. M., Shaw, D. S., & Nichols, S. R. (2006). Toddler-Mother Synchrony and the Development of Problem Behavior in At-Risk Boys. *Developmental Psychology, 29*(3), 423-434. <https://doi.org/10.1016/j.infbeh.2006.02.004>
- Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment & Human Development, 7*(3), 269-281. <https://doi.org/10.1080/14616730500245906>
- Sloan, D. M. (2004). Emotion regulation in action: Emotional reactivity in experiential avoidance. *Behaviour Research and Therapy, 42*(11), 1257-1270. <https://doi.org/10.1016/j.brat.2003.08.006>
- Smith, L. B., & Thelen, E. E. (1993). *A Dynamic Systems Approach to the Development of Cognition and Action*. MIT Press.

- Smith, L. B., & Thelen, E. (2003). Development as a dynamic system. *Trends in Cognitive Sciences*, 7(8), 343-348. [https://doi.org/10.1016/s1364-6613\(03\)00156-6](https://doi.org/10.1016/s1364-6613(03)00156-6)
- Smith, J. D., Dishion, T. J., Moore, K. J., Shaw, D. S., & Wilson, M. N. (2013). Effects of video feedback on early coercive parent-child interactions: The intervening role of caregivers' relational schemas. *Journal of Clinical Child & Adolescent Psychology*, 42(3), 405-417. <https://doi.org/10.1080/15374416.2013.777917>
- Smith, J. D., Dishion, T. J., Shaw, D. S., & Wilson, M. N. (2015). Negative relational schemas predict the trajectory of coercive dynamics during early childhood. *Journal of Abnormal Child Psychology*, 43(4), 693-703. <https://doi.org/10.1007/s10802-014-9936-z>
- Snyder, J., Stoolmiller, M., Wilson, M., & Yamamoto, M. (2003). Child anger regulation, parental responses to children's anger displays, and early child antisocial behavior. *Social Development*, 12(3), 335-360. <https://doi.org/10.1111/1467-9507.00237>
- Snyder, J., Cramer, A., Afrank, J., & Patterson, G. R. (2005). The contributions of ineffective discipline and parental hostile attributions of child misbehavior to the development of conduct problems at home and school. *Developmental Psychology*, 41(1), 30-41. <https://doi.org/10.1037/0012-1649.41.1.30>
- Soenens, B., & Vansteenkiste, M. (2010). A theoretical upgrade of the concept of parental psychological control: Proposing new insights on the basis of self-determination theory. *Developmental Review*, 30(1), 74-99. <https://doi.org/10.1016/j.dr.2009.11.001>
- Soenens, B., Vansteenkiste, M., Lens, W., Luyckx, K., Goossens, L., Beyers, W., & Ryan, R. M. (2007). Conceptualizing parental autonomy support: Adolescent perceptions of promotion of independence versus promotion of volitional functioning. *Developmental Psychology*, 43(3), 633-646. <https://doi.org/10.1037/0012-1649.43.3.633>
- Southam-Gerow, M. A., & Kendall, P. C. (2002). Emotion regulation and understanding: Implications for child psychopathology and therapy. *Clinical Psychology Review*, 22(2), 189-222. [https://doi.org/10.1016/s0272-7358\(01\)00087-3](https://doi.org/10.1016/s0272-7358(01)00087-3)
- Spinrad, T. L., Eisenberg, N., Cumberland, A., Fabes, R. A., Valiente, C., Shepard, S. A., Reiser, M., Losoya, S. H., & Guthrie, I. K. (2006). Relation of emotion-related regulation to children's social competence: A longitudinal study. *Emotion*, 6(3), 498-510. <https://doi.org/10.1037/1528-3542.6.3.498>
- Spritz, B. L., Sandberg, E. H., Maher, E., & Zajdel, R. T. (2010). Models of emotion skills and social competence in the Head Start classroom. *Early Education and Development*, 21(4), 495-516. <https://doi.org/10.1080/10409280902895097>
- Squires, J., & Nickel, R. (2003). Never too soon: Identifying social-emotional problems in infants and toddlers. *Contemporary Pediatrics*, 20(3), 117-124.
- Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & Human Development*, 7(4), 349-367. <https://doi.org/10.1080/14616730500365928>

- Sroufe, L. A., & Waters, E. (2017). Attachment as an organizational construct. In D. Canter, B. Laursen, & R. Žukauskienė (Eds.). *Interpersonal development* (pp. 109-124). Routledge.
- Steele, J. S., & Ferrer, E. (2011). Latent differential equation modeling of self-regulatory and coregulatory affective processes. *Multivariate Behavioral Research, 46*(6), 956-984. <https://doi.org/10.1080/00273171.2011.625305>
- Stern, D. N. (1985). *The Interpersonal World of the Infant*. New York: Basic Books.
- Stifter, C. A., & Braungart, J. M. (1995). The regulation of negative reactivity in infancy: function and development. *Developmental Psychology, 31*(3), 448-455. <https://doi.org/10.1037/0012-1649.31.3.448>
- Stifter, C. A., Spinrad, T., & Braungart-Rieker, J. (1999). Toward a developmental model of child compliance: The role of emotion regulation in infancy. *Child Development, 70*(1), 21-32. <https://doi.org/10.1111/1467-8624.00003>
- Stoolmiller, M. (2016). An introduction to using multivariate multilevel survival analysis to study coercive family process. In T. J. Dishion & J. J. Snyder (Eds.). *Oxford library of psychology. The Oxford handbook of coercive relationship dynamics* (pp. 363–378). Oxford University Press.
- Stoolmiller, M., & Snyder, J. (2014). Embedding multilevel survival analysis of dyadic social interaction in structural equation models: Hazard rates as both outcomes and predictors. *Journal of Pediatric Psychology, 39*(2), 222-232. <https://doi.org/10.1093/jpepsy/jst076>
- Stormark, K. M., Heiervang, E., Heimann, M., Lundervold, A., & Gillberg, C. (2008). Predicting nonresponse bias from teacher ratings of mental health problems in primary school children. *Journal of Abnormal Child Psychology, 36*(3), 411-419. <https://doi.org/10.1007/s10802-007-9187-3>
- Strassberg, Z. (1997). Levels of analysis in cognitive bases of maternal disciplinary dysfunction. *Journal of Abnormal Child Psychology, 25*(3), 209-215. <https://doi.org/10.1023/A:1025795915802>
- Stringaris, A., & Goodman, R. (2009). Mood lability and psychopathology in youth. *Psychological Medicine, 39*(8), 1237-1245. <https://doi.org/10.1017/S0033291708004662>
- Sturge-Apple, M. L., Davies, P. T., & Cummings, E. M. (2006). Impact of hostility and withdrawal in interparental conflict on parental emotional unavailability and children's adjustment difficulties. *Child Development, 77*(6), 1623-1641. <https://doi.org/10.1111/j.1467-8624.2006.00963.x>
- Sulik, M. J., Huerta, S., Zerr, A. A., Eisenberg, N., Spinrad, T. L., Valiente, C., Gunta, L. D., Pina, A. A., Eggum, N. D., Sallquist, J., Edwards, A., Kupfer, A., Lonigan, A. J., Phillips, B. M., Wilson, S. B., Clancy-Menchetti, J., Landry, S. H., Swank, P. R., Assel, M. A., & Taylor, H. B. (2010). The factor structure of effortful control and measurement invariance across

ethnicity and sex in a high-risk sample. *Journal of Psychopathology and Behavioral Assessment*, 32(1), 8-22. <https://doi.org/10.1007/s10862-009-9164-y>

Supplee, L. H., Shaw, D. S., Hailstones, K., & Hartman, K. (2004). Family and child influences on early academic and emotion regulatory behaviors. *Journal of School Psychology*, 42(3), 221-242. <https://doi.org/10.1016/j.jsp.2004.02.001>

Suveg, C., Shaffer, A., & Davis, M. (2016). Family stress moderates relations between physiological and behavioral synchrony and child self-regulation in mother–preschooler dyads. *Developmental Psychobiology*, 58(1), 83-97. <https://doi.org/10.1002/dev.21358>

Tiberio, S. S., Capaldi, D. M., Kerr, D. C., Bertrand, M., Pears, K. C., & Owen, L. (2016). Parenting and the development of effortful control from early childhood to early adolescence: A transactional developmental model. *Development and Psychopathology*, 28(3), 837-853. <https://doi.org/10.1017/S0954579416000341>

Thelen, E. (1989). The (re) discovery of motor development: Learning new things from an old field. *Developmental Psychology*, 25(6), 946-949. <https://doi.org/10.1037/0012-1649.25.6.946>

Thelen, E., & Ulrich, B. D. (1991). Hidden skills: A dynamic systems analysis of treadmill stepping during the first year. *Monographs of the Society for Research in Child Development*, 56(1), 1-104.

Thelen, E., & Smith, L. B. (1994). *A dynamic systems approach to the development of cognition and action*. Cambridge, MA: Bradford/MIT Press.

Therneau, T. (2015). Mixed effects Cox models. *CRAN repository*. Retrieved from: <https://cran.r-project.org/web/packages/coxme/vignettes/coxme.pdf>

Thomas, A., & Chess, S. (1977). *Temperament and development*. Oxford, England: Brunner/Mazel.

Thomas, R., Abell, B., Webb, H. J., Avdagic, E., & Zimmer-Gembeck, M. J. (2017). Parent-child interaction therapy: a meta-analysis. *Pediatrics*, 140(3), e20170352. <https://doi.org/10.1542/peds.2017-0352>

Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research in Child Development*, 59(2–3), 25–52.

Thompson, R.A. (2008), “Early attachment and later development. Familiar questions, new answers”. In J. Cassidy, & P. R. Shaver (Eds.). *Handbook of Attachment: Theory, Research, and Clinical Applications* (2nd Ed., pp. 348-65). New York, NY: Guilford Press.

Thompson, R. A., & Calkins, S. D. (1996). The double-edged sword: Emotional regulation for children at risk. *Development and Psychopathology*, 8(1), 163-182. <https://doi.org/10.1017/S0954579400007021>

- Thompson, R. A. (2000). The legacy of early attachments. *Child Development, 71*(1), 145-152. <https://doi.org/10.1111/1467-8624.00128>
- Thompson, R. A., Lewis, M. D., & Calkins, S. D. (2008). Reassessing emotion regulation. *Child Development Perspectives, 2*(3), 124-131. <https://doi.org/10.1111/j.1750-8606.2008.00054.x>
- Tobin, R. M., & Graziano, W. G. (2011). The disappointing gift: Dispositional and situational moderators of emotional expressions. *Journal of Experimental Child Psychology, 110*(2), 227-240. <https://doi.org/10.1016/j.jecp.2011.02.010>
- Trapolini, T., Ungerer, J. A., & McMahon, C. A. (2008). Maternal depression: Relations with maternal caregiving representations and emotional availability during the preschool years. *Attachment & Human Development, 10*(1), 73-90. <https://doi.org/10.1080/14616730801900712>
- Trevarthen, C. (1980). The foundations of intersubjectivity: Development of interpersonal and cooperative understanding in infants. In D. R. Olson (Ed.). *The social foundations of language and thought* (pp. 316-342+). Norton.
- Tronick, E. Z. (1989). Emotions and emotional communication in infants. *American Psychologist, 44*(2), 112-119. <https://doi.org/10.1037/0003-066X.44.2.112>
- Tronick, E. (2007). *The neurobehavioral and social-emotional development of infants and children*. WW Norton & Company.
- Tronick, E., & Beeghly, M. (2011). Infants' meaning-making and the development of mental health problems. *American Psychologist, 66*(2), 107-119. <https://doi.org/10.1037/a0021631>
- Tronick, E., & Reck, C. (2009). Infants of depressed mothers. *Harvard Review of Psychiatry, 17*(2), 147-156. <https://doi.org/10.1080/10673220902899714>
- Tronick, E., Brazelton, T. B., & Als, H. (1978). The structure of face-to-face interaction and its developmental functions. *Sign Language Studies, 18*, 1-16.
- Tronick, E. Z., & Gianino, A. (1986). Interactive mismatch and repair: Challenges to the coping infant. *Zero to Three, 6*(3), 1-6.
- Tudge, J., & Winterhoff, P. (1993). Can young children benefit from collaborative problem solving? Tracing the effects of partner competence and feedback. *Social Development, 2*(3), 242-259. <https://doi.org/10.1111/j.1467-9507.1993.tb00016.x>
- Valiente, C., Eisenberg, N., Smith, C. L., Reiser, M., Fabes, R. A., Losoya, S., Guthrie, I. K., & Murphy, B. C. (2003). The relations of effortful control and reactive control to children's externalizing problems: A longitudinal assessment. *Journal of Personality, 71*(6), 1171-1196. <https://doi.org/10.1111/1467-6494.7106011>

- Valiente, C., Lemery-Chalfant, K., & Reiser, M. (2007). Pathways to problem behaviors: Chaotic homes, parent and child effortful control, and parenting. *Social Development, 16*(2), 249-267. <https://doi.org/10.1111/j.1467-9507.2007.00383.x>
- Van Bommel, D. M. H., van der Giessen, D., van der Graaff, J., Meeus, W. H. J., & Branje, S. J. T. (2018). Mother–adolescent conflict interaction sequences: The role of maternal internalizing problems. *Journal of Research on Adolescence, 29*(4), 1001-1018. <https://doi.org/10.1111/jora.12441>
- Van der Gaag, M.A.E. (2018). Iterativity and interdependency. In E. S. Kunnen, N. M. P. de Ruiter, B. F. Jeronimus, & M. A. E. van der Gaag (Eds.). *Psychosocial Development in Adolescence: Insights from the Dynamic Systems Approach (Studies in Adolescent Development)*. Routledge.
- Van der Giessen, D., Branje, S., & Meeus, W. (2014). Perceived autonomy support from parents and best friends: Longitudinal associations with adolescents' depressive symptoms. *Social Development, 23*(3), 537-555. <https://doi.org/10.1111/sode.12061>
- Van der Giessen, D., Hollenstein, T., Hale, W. W., Koot, H. M., Meeus, W., & Branje, S. (2015). Emotional variability in mother-adolescent conflict interactions and internalizing problems of mothers and adolescents: Dyadic and individual processes. *Journal of Abnormal Child Psychology, 43*(2), 339-353. <https://doi.org/10.1007/s10802-014-9910-9>
- Van Geert, P. (1991). A dynamic systems model of cognitive and language growth. *Psychological Review, 98*(1), 3-53. <https://doi.org/10.1037/0033-295X.98.1.3>
- Van Geert, P. (2003). Dynamic systems approaches and modeling of developmental processes. In J. Valsiner & K. Connolly (Eds.). *Handbook of developmental psychology* (pp. 640 - 672). SAGE Publications Inc.
- Van Goozen, S. H. (2015). The role of early emotion impairments in the development of persistent antisocial behavior. *Child Development Perspectives, 9*(4), 206-210. <https://doi.org/10.1111/cdep.12134>
- Verhoeven, M., Junger, M., van Aken, C., Deković, M., & van Aken, M. A. (2010). Parenting and children's externalizing behavior: Bidirectionality during toddlerhood. *Journal of Applied Developmental Psychology, 31*(1), 93-105. <https://doi.org/10.1016/j.appdev.2009.09.002>
- Vinik, J., Almas, A., & Grusec, J. (2011). Mothers' knowledge of what distresses and what comforts their children predicts children's coping, empathy, and prosocial behavior. *Parenting: Science and Practice, 11*(1), 56-71. <https://doi.org/10.1080/15295192.2011.539508>
- Volet, S., Vauras, M., & Salonen, P. (2009). Self-and social regulation in learning contexts: An integrative perspective. *Educational Psychologist, 44*(4), 215-226. <https://doi.org/10.1080/00461520903213584>

- Von Bertalanffy, L. 1968a . *General System Theory - Foundations, Development, Applications*. New York, NY: Braziller.
- Von Suchodoletz, A., Trommsdorff, G., & Heikamp, T. (2011). Linking maternal warmth and responsiveness to children's self-regulation. *Social Development, 20*(3), 486-503. <https://doi.org/10.1111/j.1467-9507.2010.00588.x>
- Vygotsky, L. S. (1962). Thought and Word. In L. Vygotsky, E. Hanfmann, & G. Vakar (Eds.). *Studies in communication. Thought and language* (pp. 119–153). MIT Press. <https://doi.org/10.1037/11193-007>
- Wakschlag, L. S., Briggs-Gowan, M. J., Carter, A. S., Hill, C., Danis, B., Keenan, K., McCarthy, K. J. & Leventhal, B. L. (2007). A developmental framework for distinguishing disruptive behavior from normative misbehavior in preschool children. *Journal of Child Psychology and Psychiatry, 48*(10), 976-987. <https://doi.org/10.1111/j.1469-7610.2007.01786.x>
- Wakschlag, L. S., Choi, S. W., Carter, A. S., Hullsiek, H., Burns, J., McCarthy, K., Leibenluft, E., & Briggs-Gowan, M. J. (2012). Defining the developmental parameters of temper loss in early childhood: implications for developmental psychopathology. *Journal of Child Psychology and Psychiatry, 53*(11), 1099-1108. <https://doi.org/10.1111/j.1469-7610.2012.02595.x>
- Waller, R., Gardner, F., Hyde, L. W., Shaw, D. S., Dishion, T. J., & Wilson, M. N. (2012). Do harsh and positive parenting predict parent reports of deceitful-callous behavior in early childhood?. *Journal of Child Psychology and Psychiatry, 53*(9), 946-953. <https://doi.org/10.1111/j.1469-7610.2012.02550.x>
- Waters, S. F., Virmani, E. A., Thompson, R. A., Meyer, S., Raikes, H. A., & Jochem, R. (2010). Emotion regulation and attachment: Unpacking two constructs and their association. *Journal of Psychopathology and Behavioral Assessment, 32*(1), 37-47. <https://doi.org/10.1007/s10862-009-9163-z>
- Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: a meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin, 138*(4), 775-808. <https://doi.org/10.1037/a0027600>
- Weinberg, M. K., & Tronick, E. Z. (1998). Emotional characteristics of infants associated with maternal depression and anxiety. *Pediatrics, 102*(Supplement E1), 1298-1304.
- Weintraub, S., Dikmen, S. S., Heaton, R. K., Tulsky, D. S., Zelazo, P. D., Bauer, P. J., Carlozzi, N. E., Slotkin, J., Blitz, D., Wallner-Allen, K., Fox, N. A., Beaumont, J. L., Mungas, D., Nowinski, C. J., Richler, J., Deocampo, J. A., Anderson, J. E., Manly, J. J., Borosh, B., Havlik, R., Conway, K., Edwards, E., Freund, F., King, J. W., Moy, C., Witt, E., & Gershon, R. C. (2013). Cognition assessment using the NIH Toolbox. *Neurology, 80*(11 Supplement 3), S54-S64. <https://doi.org/10.1212/WNL.0b013e3182872ded>
- Wernicke, J., Li, M., Sha, P., Zhou, M., Sindermann, C., Becker, B., Kendrink, K. M., & Montag, C. (2019). Individual differences in tendencies to attention-deficit/hyperactivity disorder

and emotionality: empirical evidence in young healthy adults from Germany and China. *ADHD Attention Deficit and Hyperactivity Disorders*, 11(2), 167-182.
<https://doi.org/10.1007/s12402-018-0266-9>

Wienke, A. (2014). Frailty models. *Wiley StatsRef: Statistics Reference Online*.
<https://doi.org/10.1002/9781118445112.stat06941>

Welsh Assembly Government. (2019). Welsh IMD 2019 data. Retrieved from:
<https://statswales.gov.wales/Catalogue/Community-Safety-and-Social-Inclusion/Welsh-Index-of-Multiple-Deprivation>

Wong KY, Zeng D, & Lin DY (2017). Efficient estimation for semiparametric structural equation models with censored data. *Journal of the American Statistical Association*, 113(522), 893-905. <https://doi.org/10.1080/01621459.2017.1299626>

Woodruff-Borden, J., Morrow, C., Bourland, S., & Cambron, S. (2002). The behavior of anxious parents: Examining mechanisms of transmission of anxiety from parent to child. *Journal of Clinical Child and Adolescent Psychology*, 31(3), 364-374.
https://doi.org/10.1207/S15374424JCCP3103_08

Wyman, P. A., Cross, W., Brown, C. H., Yu, Q., Tu, X., & Eberly, S. (2010). Intervention to strengthen emotional self-regulation in children with emerging mental health problems: Proximal impact on school behavior. *Journal of Abnormal Child Psychology*, 38(5), 707-720. <https://doi.org/10.1007/s10802-010-9398-x>

Yang, X., Zhou, Z., Liu, Q., & Fan, C. (2019). Mobile phone addiction and adolescents' anxiety and depression: the moderating role of mindfulness. *Journal of Child and Family Studies*, 28(3), 822-830. <https://doi.org/10.1007/s10826-018-01323-2>

Yap, M. B., Allen, N. B., & Ladouceur, C. D. (2008). Maternal socialization of positive affect: The impact of invalidation on adolescent emotion regulation and depressive symptomatology. *Child Development*, 79(5), 1415-1431.
<https://doi.org/10.1111/j.1467-8624.2008.01196.x>

Yap, M. B., Schwartz, O. S., Byrne, M. L., Simmons, J. G., & Allen, N. B. (2010). Maternal positive and negative interaction behaviors and early adolescents' depressive symptoms: Adolescent emotion regulation as a mediator. *Journal of Research on Adolescence*, 20(4), 1014-1043. <https://doi.org/10.1111/j.1532-7795.2010.00665.x>

Yates, T. M., Obradović, J., & Egeland, B. (2010). Transactional relations across contextual strain, parenting quality, and early childhood regulation and adaptation in a high-risk sample. *Development and Psychopathology*, 22(3), 539-555.
<https://doi.org/10.1017/S095457941000026X>

Yirmiya, N., Gamliel, I., Pilowsky, T., Feldman, R., Baron-Cohen, S., & Sigman, M. (2006). The development of siblings of children with autism at 4 and 14 months: Social engagement, communication, and cognition. *Journal of Child Psychology and Psychiatry*, 47(5), 511-523. <https://doi.org/10.1111/j.1469-7610.2005.01528.x>

- Zaki, J., & Williams, W. C. (2013). Interpersonal emotion regulation. *Emotion, 13*(5), 803-810. <https://doi.org/10.1037/a0033839>
- Zeanah, C. H. and Benoit, D. (1995). Clinical applications of a parent perception interview in infant mental health. *Child and Adolescent Clinics of North America, 4*(3), 539–554. [https://doi.org/10.1016/S1056-4993\(18\)30418-8](https://doi.org/10.1016/S1056-4993(18)30418-8)
- Zelazo, P. D., Anderson, J. E., Richler, J., Wallner-Allen, K., Beaumont, J. L., & Weintraub, S. (2013). II. NIH Toolbox Cognition Battery (CB): Measuring executive function and attention. *Monographs of the Society for Research in Child Development, 78*(4), 16-33. <https://doi.org/10.1111/mono.12032>
- Zeman, J., Cassano, M., Perry-Parrish, C., & Stegall, S. (2006). Emotion regulation in children and adolescents. *Journal of Developmental & Behavioral Pediatrics, 27*(2), 155-168. <https://doi.org/10.1097/00004703-200604000-00014>
- Zeman, J., Klimes-Dougan, B., Cassano, M., & Adrian, M. (2007). Measurement issues in emotion research with children and adolescents. *Clinical Psychology: Science and Practice, 14*(4), 377-401. <https://doi.org/10.1111/j.1468-2850.2007.00098.x>
- Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta psychiatrica scandinavica, 67*(6), 361-370. <https://doi.org/10.1111/j.1600-0447.1983.tb09716.x>
- Zimmermann, L. K., & Stansbury, K. (2004). The influence of emotion regulation, level of shyness, and habituation on the neuroendocrine response of three-year-old children. *Psychoneuroendocrinology, 29*(8), 973-982. <https://doi.org/10.1016/j.psyneuen.2003.09.003>

Appendix

Appendix 1

Table A1.1 Bivariate correlations between risk factors and durations of child emotion and regulatory strategies.

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-----|-------------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|-------|----|
| 1. | NE episodes | | | | | | | | | | | | |
| 2. | NE | .755** | | | | | | | | | | | |
| 3. | RES | 0.073 | -0.108 | | | | | | | | | | |
| 4. | DIS | -0.091 | 0.113 | -0.143 | | | | | | | | | |
| 5. | AVOID | 0.043 | 0.059 | -.269* | -0.106 | | | | | | | | |
| 6. | HS | 0.426 | 0.430 | -0.033 | 0.275 | -0.240 | | | | | | | |
| 7. | TD | 0.163 | 0.110 | 0.203 | 0.059 | 0.173 | 0.264 | | | | | | |
| 8. | EXT | .226* | 0.117 | 0.208 | 0.033 | 0.055 | 0.349 | .824** | | | | | |
| 9. | INT | 0.044 | 0.057 | 0.131 | 0.075 | 0.226 | -0.010 | .786** | .300** | | | | |
| 10. | MA | 0.230 | -0.015 | 0.136 | -0.008 | 0.026 | -0.146 | .314* | .295* | 0.213 | | | |
| 11. | MD | .411** | .336* | -0.056 | -0.065 | -0.006 | -0.013 | 0.167 | 0.182 | 0.089 | .522** | | |
| 12. | IC | -0.036 | -0.123 | 0.153 | -0.121 | -.247* | -0.079 | -0.128 | -.231* | 0.044 | 0.233 | .320* | |

Note: * significant at $p < .05$. ** significant at $p < .001$. NE episodes: Total number of episodes of negative emotion. NE: duration of negative emotion. RES: duration of self-resignation. DIS: duration of unfocused distraction. AVOID: duration of behavioural avoidance. HS: duration of help-seeking. TD: total difficulties (SDQ). INT: Internalising difficulties (SDQ). EXT: Externalising difficulties. IC: Inhibitory control (NIH Toolbox Flanker). MA: Maternal anxiety (HADS). MD: Maternal depression (HADS).

Appendix 2

Table A2.1 Bivariate correlations between risk factors and durations of child emotion and mother coregulatory strategies.

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|-----|----------|---------|--------|--------|--------|--------|---------|--------|-------|-------|-------|----|
| 1. | INT | | | | | | | | | | | |
| 2. | EXT | .259* | | | | | | | | | | |
| 3. | TD | .776** | .808** | | | | | | | | | |
| 4. | MA | 0.172 | 0.229 | 0.250 | | | | | | | | |
| 5. | MD | 0.109 | .297* | 0.254 | .497** | | | | | | | |
| 6. | Child NE | 0.077 | -0.217 | -0.096 | -0.029 | -0.078 | | | | | | |
| 7. | Child PE | -0.005 | -0.010 | -0.008 | 0.100 | 0.057 | -.476** | | | | | |
| 8. | AS | -.310** | -0.051 | -.222* | 0.209 | 0.141 | -0.053 | -0.004 | | | | |
| 9. | PD | -0.067 | -0.064 | -0.076 | 0.000 | -0.087 | 0.119 | -0.180 | 0.057 | | | |
| 10. | HOS | -0.167 | 0.014 | -0.084 | 0.180 | -0.048 | 0.264 | -0.211 | 0.010 | 0.103 | | |
| 11. | INTR | -0.120 | -.313* | -0.273 | -0.101 | 0.007 | 0.095 | -0.097 | 0.032 | 0.002 | 0.161 | |

Note: * significant at $p < .05$. ** significant at $p < .001$. INT: Internalising difficulties. EXT: Externalising difficulties. TD: Total difficulties (SDQ). MA: Maternal anxiety (HADS). MD: Maternal depression (HADS). AS: duration of autonomy support. PD: duration of positive directives. HOS: duration of hostility. INTR: duration of intrusiveness. Child NE: duration of child negative emotion. Child PE: duration of child positive emotion.

Appendix 3

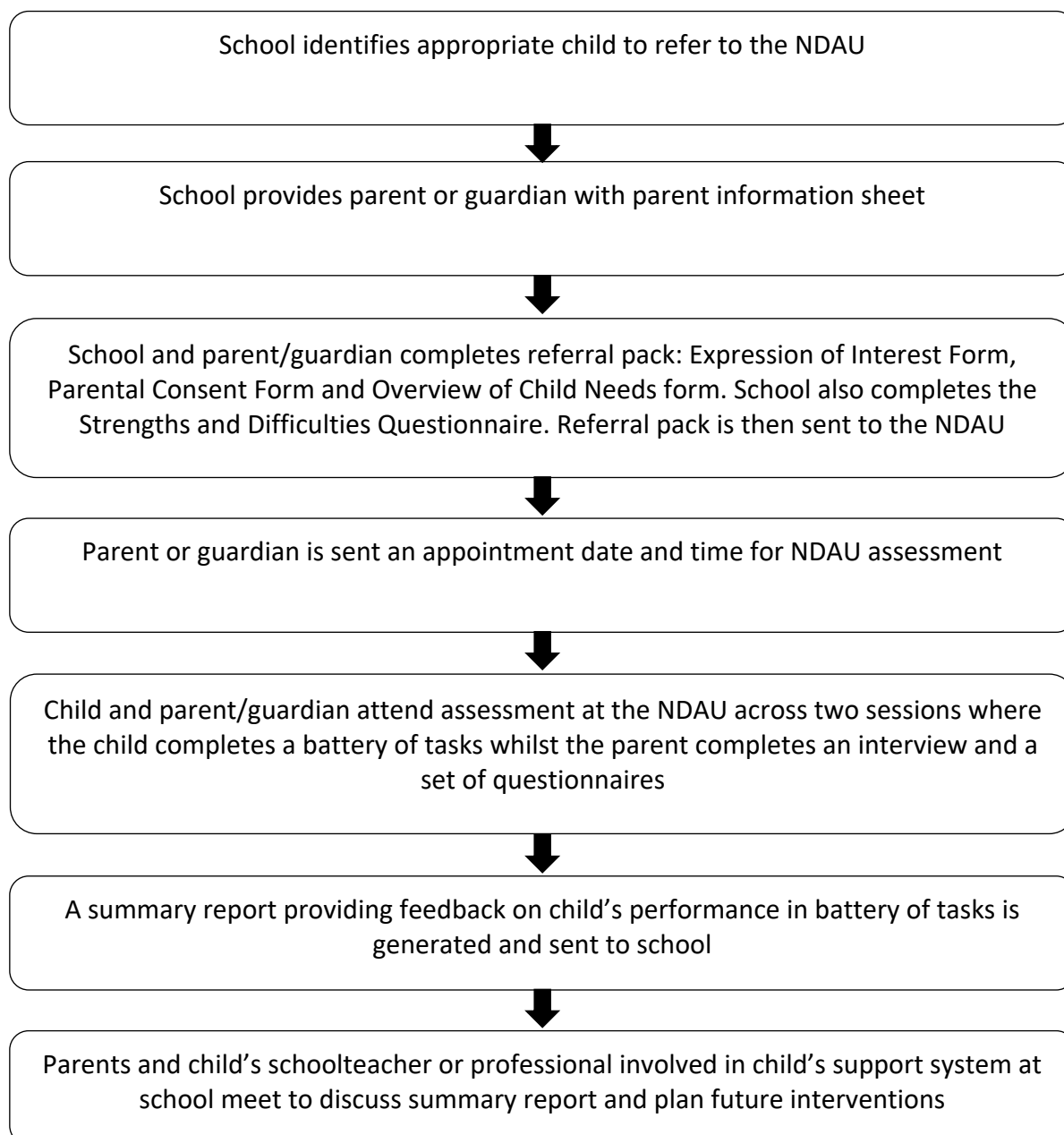
Table A3.1 Bivariate correlations between risk factors and durations of child emotion and mother coregulatory strategies.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----------------|--------|--------|--------|-------|--------|--------|---------|---|
| 1. NC | | | | | | | | |
| 2. TD | -.262* | | | | | | | |
| 3. MA | -0.149 | 0.203 | | | | | | |
| 4. MD | -0.223 | 0.176 | .445** | | | | | |
| 5. Mother SCor | .230* | -.225* | 0.067 | 0.024 | | | | |
| 6. Mother UCor | 0.059 | -0.203 | -0.029 | 0.076 | 0.239 | | | |
| 7. Child NE | 0.122 | 0.013 | 0.027 | 0.025 | -0.03 | 0.061 | | |
| 8. Child PE | -0.025 | 0.003 | 0.078 | 0.102 | -0.051 | -0.156 | -.454** | |

Note: * significant at $p < .05$. ** significant at $p < .001$. Narrative coherence (FMSS-Coherence). TD: Total difficulties (SDQ). MA: Maternal anxiety (HADS). MD: Maternal depression (HADS). Mother SCor: duration of mother supportive coregulation (Autonomy support, positive directives). Mother UCor: duration of mother unsupportive coregulation (hostility, intrusiveness). Child NE: duration of child negative emotion. Child PE: duration of child positive emotion.

Appendix 4

NDAU referral process



Appendix 5

Table A5.1 NDAU assessment battery.

| Child | |
|---|---|
| Session 1 | |
| Task | Description |
| Stranger Approach (Lab-TAB episode) | Novel interaction with stranger |
| Lucid Ability | Computer-based reasoning task |
| British Picture Vocabulary Scale (BPVS) | Receptive language task |
| ANT ROO | Computer-based assessment of attention and inhibitory control |
| Pupil task | Pupil response to emotion-evoking pictures |
| Empathy task | Assessment of cognitive and affective empathy using emotive video clips |
| Theory of Mind (ToM) False belief tasks | Belief-emotion and false-belief ToM tasks |
| Harter | Self-esteem/self-perception task |
| Facial Emotion Recognition (FER) task | Computer-based task assessing emotion recognition |
| Theory of Mind (ToM) False belief tasks | False belief and second-order ToM tasks |
| Renfrew Bus Story | Picture book task assessing expressive language |
| AWMA | Computer-based task assessing working memory |
| BELT | Computer-based task assessing sensitivity to reward and threat |
| Height & Weight | Physical indicators of development |
| Etch-A-Sketch task | Parent-child collaboration task |
| Session 2 | |
| Task | Description |
| ANT Pursuit | Computer-based assessment of sustained attention |
| Picture Sequence Memory (NIH Toolbox) | Computer-based assessment of episodic memory |
| DCCS (NIH Toolbox) | Computer-based assessment of cognitive flexibility |
| ANT Tapping | Computer-based assessment of motor coordination |
| ANT Tracking | Computer-based assessment of motor coordination |
| Hungry Donkey | Computer-based assessment of risk aversion/impulsivity |
| Flanker (NIH Toolbox) | Computer-based assessment of executive attention/inhibitory control |

| | |
|--|----------------------------|
| The Impossibly Perfect (Blue) Circle (Lab-TAB episode) | Frustrative nonreward task |
| Saliva sample | Genetic information |

Parent

Session 1

| Task | Description |
|----------------------------------|---|
| Five Minute Speech sample (FMSS) | Parent's narrative of the child and the parent-child relationship |
| Parent interview | Identifies child's difficulties |
| Questionnaires | Questionnaires on family background and child functioning |

Session 2

| Task | Description |
|----------------|---|
| Questionnaires | Questionnaires on family background and child functioning |

Appendix 6

Protocol for Lab-TAB “Impossibly Perfect (blue) circles task

Task phase (3.5 minutes):

Give the child a sheet of white paper and a blue marker pen.

“I want you to draw the perfect blue circle”

Start the timer when the child begins drawing – the task lasts for 3.5 minutes.

Critique each circle drawn by the child *in a neutral voice* and ask the child to draw another one.

Examples:

“That one is too pointy, try again.”

“That one is too small, try again.”

“The lines don’t meet, try again.”

“That’s not quite right.”

“That is not round enough.”

At every minute repeat the instructions to the child to “draw a perfect green circle”.

End the experiment at 3.5 minutes by praising the child’s most recent circle as being really good.

Recovery period (approximately 1 minute):

Continue to give the child positive feedback on the last circle. Also, the experimenter can spend further time encouraging the child to make the best circle into a smiley face or other picture, continuing to praise the child’s efforts and affirming how hard circles can be to draw and suggesting that the child show this picture to his or her parent later.

Notes:

If the child tries to turn the paper over during the task, tell the child that the circles need to be drawn on the same side and it is okay if lines cross. Keep the task going until the end of the 3.5 minutes or until the child gives up completely or becomes very frustrated.

Appendix 7

“Stranger” questions to child in Lab-TAB “Stranger Approach” task

Hello, I would like to know a bit more about you...
Do you know what you’re going to be doing today?
Can you tell me something you’re really good at?
What is something you’re not too good at?
Can you tell me about a time when you had fun with your mum/dad?
Do you have any brothers or sisters? What do you like best about them?

Example scenarios

Example 1

Stranger: (Approaches child) Hi, I would like to know a little more about you, is that Ok?
Child: (Averts gaze away from stranger)
Stranger: What do you think you’ll be doing here today?
Child: (Moves away from stranger) I don’t know
Mother: Come on, what do you think? Maybe playing games?
Child: (Shrugs shoulders)
Mother: Why are you being shy? You’re not usually this shy
Stranger: Can you tell me something you’re really good at?
Child: I don’t know
Mother: I know something you’re good at doing...what about...(uses hand gesture to imitate colouring)

Example 2

Stranger: (Approaches child) Hi, I would like to know a little more about you, is that Ok?
Child: (Orients attention towards mother)
Stranger: Do you know what you’re going to be doing today?
Child: (Gets up from chair and walks across the room to look at computer)
Mother: (uses hand gesture to refocus child’s attention) She’s just asked you a question
Child: What does this do? Do you have Minecraft games here?
Mother: Ok, can you come back and answer these questions now
Child: No, I want to play on this
Stranger: What do you think you’ll be doing here today?
Child: I don’t know

Appendix 8

Five Minute Speech Sample Administration – Parent version

The first thing I would like you to do is – I would like to hear your thoughts and feelings about (child's name), in your own words and without my interrupting with any questions or comments.

When I ask you to begin, I would like you to speak for 5 minutes, telling me what kind of a person (child's name) is and how the two of you get along together. After you begin to speak, I will not be able to answer any questions until the 5 minutes are up.

Okay? Do you have any questions?

So, for the next 5 minutes, please tell me what kind of a person (child's name) is, and how the two of you get along together. I'll let you know when 5 minutes are up.

Summary of the Coherence scores range:

- A score of 1 - there is no narrative (mom refuses to response, say something but does not create even a meagre narrative).
- A score of 2 – the narrative is disorganized, there are major parts which are illogical, or contradictory.
- A s score of 3 and up reflects a generally logical narrative (one can understand what the mother says, although there could be some parts which are not coherent).
- A score of 3 will be assigned if there are significant problematic aspects to the narrative. For example: the narrative is so meagre that we learn very little about the child, or the mother describes the child in a mostly negative way, or the mother is extremely overwhelmed with concern, so we learn very little about who the child is a side from the concerning aspect, etc...
- A score of 5 means a good enough narrative.
- Scores of 5-7 on the coherence scale can be assigned only if the mother received: a score of at least a 5 on focus, elaboration, separateness, acceptance and complexity scales and a score not higher than a 4 on the concern scale.