UNIVERSITA' DEGLI STUDI "G. d'Annunzio"
Chieti-Pescara

SCUOLA SUPERIORE "G. d'Annunzio"

DOTTORATO DI RICERCA IN

BUSINESS AND BEHAVIORAL SCIENCES

CICLO

XVII

Mindfulness as a Buffer Across Contexts: Navigating the Interpersonal Challenges of Parenting and the Workplace

Dipartimento di Neuroscienze Imaging e Scienze Cliniche

Settore Scientifico Disciplinare E11/M-PSI 04

Dottorando
Dott. Ilenia Passaquindici

Coordinatore
Prof. Riccardo Palumbo

Tutor
Prof. Maria Spinelli

Anni Accademici 2022/2024

TABLE OF CONTENTS

ABSTRACT……1

1 CHAPTER 1 | INTRODUCTION……..3

1.1 WHAT IS MINDFULNESS? INTRAPERSONAL AND INTERPERSONAL MECHANISMS OF ACTION……5

1.2 MINDFULNESS AS A BUFFER IN DIFFERENT RELATIONAL CONTEXTS: PARENTING AND THE WORKPLACE……9

1.2.1 THE ROLE OF MINDFULNESS IN PARENTING……...9

1.2.1.1 PARENTING CHALLENGES FROM INFANCY TO PRESCHOOL: THE ROLE OF MINDFULNESS……11

1.2.2 WORKPLACE RELATIONAL CHALLENGES: THE ROLE OF MINDFULNESS……...16

1.3 THE CURRENT PROJECT: RESEARCH AIMS AND STRUCTURE OF THE THESIS……19

2 CHAPTER 2 | FROM INNER TO DYADIC CONNECTION: THE ROLE OF MINDFULNESS IN MOTHER-INFANT INTERACTION DURING THE FIRST YEAR OF LIFE……...22

ABSTRACT……..22

2.1 INTRODUCTION……24

2.1.1 THE ROLE OF MATERNAL MINDFULNESS ON MOTHER-INFANT ATTUNEMENT……...25

2.1.2 MINDFULNESS-BASED INTERVENTIONS AND MOTHER-INFANT ATTUNEMENT……...28

2.1.3 THE CURRENT STUDY…….32

2.2 STUDY 1……...33

2.2.1 METHOD……...33

2.2.1.1 PARTICIPANTS……..33

2.2.1.2 PROCEDURE……..34

2.2.1.3 MEASURES…….35

2.2.1.3.1 MATERNAL DISPOSITIONAL MINDFULNESS…….35

2.2.1.3.2 MATERNAL MINDFUL PARENTING…….35

2.2.1.3.3 MOTHER-INFANT BEHAVIOURAL ATTUNEMENT……...36

2.2.1.3.4 MOTHER-INFANT PHYSIOLOGICAL FUNCTIONING…….37

2.2.1.4 ANALYTIC PLAN……..37

2.2.2 RESULTS……38

2.2.2.1 DESCRIPTIVES AND CORRELATIONS…….38

2.2.2.2 OUTCOME: MOTHER RSA……...38

2.2.2.2.1 MODEL 09a: INFANT RSA x IMP TOTAL SCORE……...39

2.2.2.2.2 MODEL M10a: INFANT RSA x FFMQ TOTAL SCORE…….....40

2.2.2.3 OUTCOMES: SYMMETRICAL AND UNILATERAL CO-REGULATION…….41

2.2.2.3.1 MODEL M08b: IMP TOTAL SCORE + TIME……....41

2.2.2.3.2 MODEL M07b: FFMQ TOTAL SCORE + TIME……43

2.3 STUDY 2……..46

2.3.1 METHOD……...46

2.3.1.1 PARTICIPANTS……..46

2.3.1.2 PROCEDURE…….47

2.3.1.2.1 MINDFULNESS INTERVENTION……...47

2.3.1.3 MEASURES……48

2.3.1.3.1 MATERNAL DISPOSITIONAL MINDFULNESS AND MATERNAL MINDFUL PARENTING…….48

2.3.1.3.2 BEHAVIORAL ATTUNEMENT……48

2.3.1.3.3 PHYSIOLOGICAL ATTUNEMENT……..49

2.3.1.3.4 PARENTING STRESS…….50

2.3.1.5 ANALYTIC PLAN……..50

2.3.2 RESULTS……51

2.3.2.1 DESCRIPTIVES AND CORRELATIONS AT T1……51

2.3.2.2 EFFECT OF THE INTERVENTION……..52

2.3.2.2.1 OUTCOMES: MINDFULNESS AND PARENTING STRESS…….....52

2.3.2.2.2 OUTCOMES: MOTHER-INFANT INTERACTION VARIABLES……...52

2.5 GENERAL DISCUSSION……53

2.6 ACKNOWLEDGEMENTS……...60

3 CHAPTER 3 | MATERNAL DISPOSITIONAL MINDFULNESS AND MOTHER-CHILD RELATIONSHIP: THE MEDIATING ROLE OF EMOTIONAL CONTROL DURING PARENTING……..61

ABSTRACT……..61

3.1 INTRODUCTION……62

3.2 METHODS……..65

3.2.1 PARTICIPANTS……...65
3.2.2 PROCEDURES……65
3.2.3 MEASURES……..66
3.2.3.1 MATERNAL DISPOSITIONAL MINDFULNESS……....66
3.2.3.2 MATERNAL LACK OF EMOTIONAL CONTROL DURING PARENTING……..66
3.2.3.3 MOTHER-CHILD RELATIONSHIP…….67
3.2.4 ANALYTIC PLAN……...67
3.3 RESULTS……69
3.3.1 PRELIMINARY ANALYSES……...69
3.3.2 MEDIATION AND MODERATED MEDIATION ANALYSES……..70
3.4 DISCUSSION……..73
3.5 KEY MESSAGES……76
3.6 ACKNOWLEDGMENTS……...76

4 CHAPTER 4 | MATERNAL MINDFULNESS BUFFERS PARENTING IN HIGHLY SENSITIVE MOTHERS……77
ABSTRACT……..77
4.1 INTRODUCTION……78
4.2 METHOD……79
4.2.1 PARTICIPANTS AND PROCEDURES……..79
4.2.2 MEASURES……..79
4.2.2.1 HIGHLY SENSITIVE PERSON SCALE……...79
4.2.2.2 FIVE FACET MINDFULNESS QUESTIONNAIRE SHORT FORM……..80
4.2.2.3 PARENT EMOTION REGULATION SCALE…….80
4.2.2.4 MATERNAL POSTNATAL ATTACHMENT SCALE……..80
4.3 RESULTS……80
4.3.1 MULTIVARIATE REGRESSION MODELS……..81
4.4 DISCUSSION……..83

5 CHAPTER 5 | MINDFULNESS AT WORK: BUFFERING THE IMPACT OF LEADERSHIP ON EMPLOYEES' WELL-BEING, PERFORMANCE AND TEAM COHESION……85
ABSTRACT……..85
5.1 INTRODUCTION……86

5.1.1 LEADERSHIP STYLES AND EMPLOYEES ADJUSTMENT AT THE WORKPLACE……..88

5.1.2 BEYOND CONTEXTUAL VARIABLES: THE ROLE OF INDIVIDUAL DIFFERENCES AND MINDFULNESS AT THE WORKPLACE……88

5.1.3 THE CURRENT STUDY……91

5.2 METHOD……92

5.2.1 PARTICIPANTS AND PROCEDURE……... 92

5.2.2 MEASURES……..92

5.2.2.1 LEADERSHIP STYLE……92

5.2.2.2 MINDFULNESS……..93

5.2.2.3 NEGATIVE AFFECT……94

5.2.2.4 JOB PERFORMANCE……94

5.2.2.5 TEAM COHESION……94

5.2.3 ANALYTIC PLAN……...95

5.3 RESULTS……96

5.3.1 PRELIMINARY RESULTS……..96

5.3.2 MODERATION MODELS (OUTCOME: NEGATIVE AFFECT)……... 98

5.3.2.1 MODEL 1: AUTHORITARIAN LEADERSHIP * MINDFULNESS……98

5.3.2.2 MODEL 2: DEMOCRATIC LEADERSHIP * MINDFULNESS……...98

5.3.3 MULTIVARIATE MODERATION MODELS (OUTCOMES: JOB PERFORMANCE AND TEAM COHESION)……..100

5.3.3.1 MODEL 3: AUTHORITARIAN LEADERSHIP * MINDFULNESS……...100

5.3.3.2 MODEL 4: DEMOCRATIC LEADERSHIP * MINDFULNESS…….101

5.4 DISCUSSION……102

5.5 LIMITATIONS AND STRENGHTS……..105

5.6 CONCLUSIONS AND IMPLICATIONS……..106

6 CHAPTER 6 | GENERAL DISCUSSION……..108

6.1 OVERVIEW OF THE MAIN FINDINGS……108

6.2 LIMITATIONS AND STRENGTHS OF THIS DISSERTATION……115

6.3 GENERAL CONCLUSIONS……..117

REFERENCES……...119

SUPPLEMENTARY MATERIALS OF CHAPTER 2……152

SUPPLEMENTARY MATERIALS OF CHAPTER 4……173

Abstract

Social interactions are fundamental to human life, yet the challenges individuals face in establishing, maintaining, and navigating relationships vary significantly across contexts. Based on the idea that if we are aware of and connected to our own inner experience we connect better with others, mindfulness has gained attention for its potential benefits in enhancing interpersonal functioning. However, its role as a buffer across diverse relational contexts remains underexplored. By adopting a mixed-methods approach that integrates behavioral, physiological, and self-reported measures, this dissertation provides a comprehensive investigation of how mindfulness interacts with contextual challenges and individual resources to shape interpersonal adjustment in two critical life domains: parenting and the workplace. Given the evolving demands of early childhood parenting, the first three empirical chapters examine how mindfulness supports mother-child relationships from infancy to preschool years. Specifically, *Chapter 2* explores the role of maternal dispositional mindfulness and the effects of a mindfulness-based intervention on mother-infant behavioral and physiological attunement during the first year of life. Findings indicated that maternal mindfulness was associated with greater physiological and behavioral attunement at 3 months, as well as more positive maternal behaviors and lower parenting stress at 9 months. While the intervention group showed slight improvements in dispositional mindfulness and reductions in parenting stress, no significant effects were found on mother-infant attunement. *Chapters 3* and *4* extend this focus to toddlerhood and preschool years, further examining the role of maternal mindfulness in parenting. Results showed that mothers' ability to regulate negative emotions partially mediated the relationship between dispositional mindfulness and mother-child relationship quality. Moreover, child age moderated this association, with stronger effects observed among mothers of older children (*Chapter 3*). Furthermore, mindfulness appeared to protect highly sensitive mothers (i.e., those with high Sensory

Processing Sensitivity, SPS) of preschoolers, fostering more adaptive emotion regulation during parenting and enhancing positive mother-child interactions (*Chapter 4*). Finally, we investigated the role of mindfulness in the workplace, particularly its role in buffering the impact of challenging relational contexts, such as differing leadership styles (*Chapter 5*). Findings indicated that mindfulness was positively associated with employees' well-being, job performance and team cohesion. Notably, mindful employees experienced fewer negative emotions and maintained job performance in highly authoritarian environments.

Overall, this dissertation provides evidence of mindfulness as a protective factor in both early childhood parenting and workplace adjustment. Findings underscore its potential as a screening tool for identifying individuals at greater risk and emphasize the need for context-specific interventions tailored to the unique challenges of each environment.

Chapter 1 | Introduction

Mindfulness - defined as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p. 145) – has been extensively studied as an intrapersonal phenomenon, reflecting an individual ability to connect with and regulate personal inner experience (Siegel, 2007). Much of the mindfulness literature focuses on the benefits for individual mental health, consistently linking mindfulness to psychological well-being (see Galante et al., 2021; Querstret et al., 2020 for reviews), effective emotion regulation (e.g., Guendelman et al., 2017; Raugh et al., 2024), and lower levels of anxiety, depression, and stress (Medvedev et al., 2018).

Grounded in the idea that if we are aware of and connected to our own inner experiences we connect better with others, there is growing interest in mindfulness' impact on interpersonal functioning across various life domains. This shift in focus is particularly significant, as interpersonal relationships constitute a vital part of our daily life and introduce distinct challenges that mindfulness may help navigate.

The role of mindfulness for interpersonal functioning has been primarily studied in the context of intimate romantic relationships, where it has been associated with relationship quality and conflict management. Research suggest that mindfulness is linked to greater marital satisfaction (Khaddouma et al., 2015; Williams & Cano, 2014), a stronger sense of connection with the partner and improved conflict resolution (Karremans et al., 2020). Additionally, mindfulness has been shown to enhance dyadic synchrony, expressed in both behavioral synchronization (Haas & Langer, 2014) and physiological arousal (Laurent et al., 2017) during partner dyadic interactions.

While this line of research is well-established, studies on mindfulness in other key relational life domains, such as parenting and the workplace, are still in their early stages an

remain underexplored. These contexts are especially important, as they represent two of the most significant and challenging environments in an individual's life. While they require individuals to continuously adapt and exhibit flexibility, both parenting and the workplace also offer profound opportunities for personal fulfillment, contributing substantially to an individual's sense of purpose, growth, and overall life satisfaction (Stewart, 1985).

Studies investigating mindfulness in parenting and the workplace have begun to reveal promising associations, demonstrating positive links with the quality of the parent-child relationship across various developmental stages[1] (e.g., Ben Uriel-Maoz et al., 2023; Medeiros et al., 2016; Coatsworth et al., 2010, 2018; Pickard et al., 2018; Potharst et al., 2021), as well as with the development of supportive and cooperative relationships between employees and their coworkers (e.g., Hawkes & Neale, 2020; Mesmer-Magnus et al., 2017). Despite these intriguing findings, research in these areas remains limited, with numerous gaps yet to be addressed. Given the unique social and emotional challenges each of these environments presents, there is a critical need to better understand if and how mindfulness may function as a protective resource specifically in these contexts.

This PhD thesis aims to contribute to the field by expanding empirical evidence on the role of mindfulness in parenting and the workplace through four studies outlined in the following chapters. Specifically, the main aim of this research is to explore how mindfulness interacts with contextual challenges and individual resources to shape relational adjustment across these distinct contexts of human life. Exploring mindfulness within these settings will provide valuable insights into its impact on interpersonal dynamics across diverse relational

---

[1] While some studies include fathers (e.g., Kil & Grusec, 2020), most research on mindfulness in parenting focuses on mothers. Since my project involves samples of mothers, I will often refer to mothers, though the concepts may be applied to parents in general. This focus reflects the existing literature and study design but also highlights the need for future studies on fathers.

contexts. In turn, this deeper understanding may inform the development of interventions that are sensitive to the unique characteristics of each context

1.1 What is Mindfulness? Intrapersonal and Interpersonal Mechanisms of Action

In recent years, mindfulness has gained significant attention in both clinical practice and research. Originally rooted in Buddhist traditions, it has been increasingly integrated into Western society and has been defined in many ways within the scientific literature (for a review, see Quaglia et al., 2015). One of the most widely cited definitions comes from Jon Kabat-Zinn, who describes mindfulness as the awareness that arises from "*paying attention in a particular way: on purpose, in the present moment, and non-judgmentally*" (Kabat-Zinn, 2023, p. 23). This definition captures three key components of mindfulness common across most conceptualizations. Shapiro and collegues (2006) synthesized these three components into the AAI model of mindfulness, comprising Attention (A), Attitude (A) and Intention (I). This model proposes that the mindful individual is guided by an *intention* to explore and regulate the self, using present-moment *attention* to both internal and external experiences, while maintaining a *non-judgmental attitude* marked by kindness, curiosity, and acceptance. These three components are not isolated processes or stages, but they are strictly interrelated in a continuous cycle and occur simultaneously. This framework emphasizes that to be mindful it is not important merely to be aware, but also *how* the individual is aware, i.e., the quality of the awareness. For instance, attention can be distant and critical, or it can be infused with compassion and accepting curiosity toward own thoughts and feelings in the present moment, allowing them to simply be, without judgment or evaluation.

While mindfulness is often associated with formal meditation, research suggests that individuals naturally differ in their ability to remain aware of and connected to their thoughts, emotions, and sensations with a non-judgmental attitude. This implies that mindfulness exists

to some degree in everyone (i.e., dispositional mindfulness; Brown et al., 2007). Mindfulness as a dispositional trait, thus, reflects a natural state of awareness and consciousness accessible to all individuals, with meditation serving as a structured tool that helps cultivate this intrinsic human capacity. As a way of being rather than merely a practice, mindfulness fosters adaptability and resilience in the face of life's demands. It is precisely this inherent quality that makes mindfulness universally applicable, enabling individuals to navigate intrapersonal and interpersonal challenges across diverse contexts.

The core principles of mindfulness were introduced to the West in the second half of the twentieth century, when Jon Kabat-Zinn developed the mindfulness-based stress reduction (MBSR) protocol, initially designed to help patients manage chronic pain and cope with a wide range of medical conditions (Siegel, 2007). Since then, mindfulness has become a widely adopted therapeutic approach, incorporating techniques to reduce anxiety, depression, and stress, while also improving overall well-being and mental health (see Querstret et al., 2020; Zhang et al., 2021 for reviews). Due to its versatility, mindfulness has been applied across diverse psychological contexts, extending beyond clinical treatments to areas such as education (e.g., Zenner et al., 2014), parenting (e.g., Fernandes et al., 2022), and organizational settings (e.g., Lomas et al., 2019).

Several mechanisms of action may explain how mindfulness works and contributes to enhanced intrapersonal and interpersonal outcomes.

From an intrapersonal perspective, many researchers have described mindfulness as a metacognitive ability that enhances one's capacity to observe and reflect on own mental processes (Baer, 2003; Bishop, 2002). This metacognitive ability, known as *reperceiving* (Shapiro et al., 2006), enables individuals to shift from identifying with their emotions and to view them as temporary mental events. Rather than becoming overwhelmed by emotional intensity, mindfulness allows individuals to step back and recognize their thoughts as

transient, rather than fixed and overwhelming. As result of this metacognitive process, the mindful individual observes thoughts as "thoughts" and is freer to respond to potentially challenging situations in more adaptive ways and with more effective coping strategies. For instance, when an individual is having a difficult emotional experience (e.g., anxiety), he/she can step back from the experience, to see it clearly as simply an emotional state that is arising and will in time pass away. The knowledge that all phenomena are not permanent along with this heightened self-awareness can allow for a greater tolerance of unpleasant states and may enhance the ability to regulate and manage own emotions and, ultimately, contribute to greater psychological well-being (Nyklíček, 2011). In this way, mindfulness can be seen as a form of intrapersonal attunement and "a way of developing a secure attachment" (Siegel, 2007; pag. 180) with the self.

From this internal secure base promoted by mindfulness, it is possible that when individuals are aware of and connected to their own inner experiences, they may be able to understand, connect with, attune and respond appropriately to others' emotions, needs, and communicative cues. Snyder et al. (2012) suggest that mindfulness supports healthy interactions by deepening self-connection and self-awareness in two key ways. First, mindfulness enhances the "*quality of presence*", allowing individuals to fully engage in interactions, consciously receiving and responding to what others bring to the exchange. This presence fosters an awareness of both one's own participation and the dynamic flow of the interaction. By being fully present, individuals (e.g., whether partners, parents, or employees) can perceive and embrace consciously what is happening internally and externally, and connect and attune to others with greater sensitivity. Second, mindfulness promotes "*intentional responsiveness*", i.e., the ability to respond with awareness of what is happening, instead of reacting without awareness. This enables the mindful individual to develop a "space" between the stimulus and the response where it is possible to notice and regulate own

emotional states (e.g., moments of frustration) and choose more functional and constructive ways to respond and engage with others, rather than acting automatically.

This distinction between reactive and mindful responses has also described as the "*low road*" versus "*high road*" functioning of the mind (Siegel & Hartzell, 2003). In *low road* functioning, responses are automatic, driven by habit, projection, and unexamined emotions. For instance, a mother may feel frustrated and overwhelmed by repeated attempts of the child to get her attention while she is engaging in trying to complete other tasks. She may instinctively perceive the child as demanding and irritating and react with frustration and maladaptive behaviors. In contrast, *high road* functioning promoted by mindfulness encourages self-awareness of our reactions to particularly challenging situations and intentional choice. In this way, the mother, instead of reacting impulsively, may notice her frustration, recognize physical sensations of tension, and become aware of her flow of thoughts. This metacognitive capacity may then allow her to pause, reflect, regulate her own emotions and respond more thoughtfully. She can show compassion to both herself, recognizing her own stress without judgment for feeling in that way, and to her child, who seeks connection and closeness.

These theoretical frameworks collectively emphasize metacognitive processes and emotion regulation as key mechanisms through which mindfulness may enhance both intrapersonal and interpersonal well-being. Empirical evidence further supports these mechanisms, indicating that emotion regulation and metacognitive reperceiving explains why more mindful individuals experience lower levels of anxiety, depression, and stress, along with improved interpersonal functioning, such as feeling more connected to others, getting along better, and experiencing greater satisfaction in relationships (He et al., 2024; Pepping et al., 2014; Quaglia et al., 2015).

1.2 Mindfulness as a Buffer in Different Relational Contexts: Parenting and the Workplace

1.2.1 The Role of Mindfulness in Parenting

Becoming a parent represents one of the most significant and transformative milestones in human life. While the experience of raising and caring children is incredibly fulfilling and, in most cases, positive, it also presents profound challenges that require resilience, flexibility, and adaptability. The early years of a child's life, from infancy to preschool, are characterized by rapid development and evolving relational needs. During this critical period, parents face challenges that change quickly, requiring them to adapt their behaviors to align with the child's developmental rhythms and interactive demands (e.g., Bornstein, 2022; Trevarthen & Aitken, 2001). These dynamics have cascading effects on parent-child relationship and overall child development (e.g., Feldman, 2012; Frosch et al., 2021). Given the importance of the quality of parent-child relationship in fostering child socio-emotional adjustment and the development across different domains (e.g., Bowlby, 2008; Feldman, 2012; Rocha et al., 2020), it is essential to find ways to support parents in their role.

Considering that parenting is influenced by a complex interplay of factors (Belsky, 1984), along with contextual factors and child-related sources, also parental individual characteristics play a pivotal role in shaping parenting behaviors, significantly impacting the quality of these relationships and child development (e.g., Coplan et al., 2009; Root et al., 2016). For instance, maternal well-being and emotion regulation are particularly relevant, as they influence how mothers respond to their child's needs and regulate their own reactions in challenging situations (e.g., Beebe et al., 2012; Doba et al., 2022; Gao et al., 2023).

In this context, mindfulness, as a maternal individual characteristic, has emerged as a promising approach, as it may enhance not only maternal connection with her own inner emotional experiences but also with those of the child. Although existing research has

identified positive associations between maternal mindfulness and the quality of mother-child interactions, these studies have primarily focused on parenting during childhood and adolescence. More mindful mothers showed more positive mother–child interactions (Duncan al., 2015; Medeiros et al., 2016; Zhang et al., 2019), more positive and supportive conflict resolution (Bird et al., 2021; Kil & Grusec, 2020) and shared more positive emotions with their child (Turpyn & Chaplin, 2016).

Research examining the implications of maternal mindfulness during early years, when infants develop the foundation of socio-emotional competences primarily through the quality of mother-child interaction, remains limited and presents mixed findings (e.g., Ben Uriel-Maoz et al., 2023; Medeiros et al., 2016; Coatsworth et al., 2010, 2018; Pickard et al., 2018; Potharst et al., 2021). Additionally, recent meta-analytic findings (Anand et al., 2023) along with a systematic review (Fernandes et al., 2022) have highlighted the uncertainty surrounding the impact of mindfulness-based interventions for parenting on the mother-child relationship in early years. Finally, the mechanisms underlying the associations between maternal mindfulness and mother-child relationship quality are not yet clearly understood.

Considering the rapidly evolving nature of parenting challenges from infancy to preschool years, alongside the complex demands of the mother-child relationship during early childhood and the variability in parental resources, it is essential to deepen our understanding of whether and how mindfulness can serve as a protective factor. Specifically, investigating how mindfulness can support parents in navigating these challenges and fostering positive, adaptive relationships with their children is of paramount importance. Exploring mindfulness across various early developmental stages of childhood may reveal unique forms of support that enable parents to effectively manage the changing demands associated with their child's development. Such insights could inform the design of mindfulness-based interventions

tailored to the specific characteristics of each developmental stage, thereby providing parents with appropriate and targeted support.

1.2.1.1 Parenting Challenges from Infancy to Preschool: The Role of Mindfulness

The early years of life are crucial for socio-emotional development, with these competencies largely shaped within the parent-child relationship. During this critical period, children are still learning how regulate their emotions and behaviors, and parents play an essential role in guiding them through this process (Kopp, 1989). As primary sources of external regulation, parents help their children understand, express, and manage their emotions, while teaching them how to navigate and engage with the world around them, with the ultimate goal of fostering well-adjusted individuals who can thrive within their specific sociocultural context (Bornstein, 2013).

In infancy, mother-infant interactions are often described as mutually regulated and attuned, referring to the dynamic and reciprocal adaptation of each partner to internal and external states of the other (Bornstein, 2013). Mother-infant dyadic attunement occurs at various levels, encompassing not only their coordinated and contingent behaviors (i.e. emotional expressions, movements, vocalizations) but also shared physiological functioning (e.g. breath, hearth rate) (e.g., Feldman, 2006, 2007). During infancy, given the nature of these interactive experiences, a primary challenge for the parent is addressing the infant's distress which can arise from physical discomfort, disrupted physiological rhythms, or heightened emotional arousal during interactive situations. Although both partners contribute to these interactions, early communicative asymmetries place greater responsibility on the mother to recognize, regulate, and appropriately respond to the infant's signals (Trevarthen & Aitken, 2001; Stern, 1985).

As the child enters toddlerhood (i.e., from 1 to 3 years) and the preschool period (i.e., from 3 to 5 years), new dynamics emerge, and relational needs evolve. Already by the end of the first year of life, the child becomes more interactive and independent, acquiring new skills such as walking, talking, and start to experience a broader range of emotions. In this phase, the parent's role remains crucial in providing emotional security and regulation, but also adopts a more disciplinary function, helping to contain and guide the child's emerging behaviors and emotions (Powell et al., 2006; Verhoeven et al., 2019). As children start to assert their autonomy, parents face new challenges. While the primary focus during infancy was on providing physical care, safety and emotional security, the challenges shift in toddlerhood and the preschool years toward fostering autonomy, setting structure and boundaries, and managing oppositional and challenging behaviors (Staples & Bates, 2018).

This progression suggests that, while parenting remains inherently challenging at all stages, the nature of these challenges and the relational demands they entail evolve as the child develops. Consequently, parents must continuously adapt their behaviors and strategies to meet, identify and respond to the child's developmentally changing needs and capacities.

Given these varying challenges across the different stages of parenting, mindfulness may serve as a distinct protective factor, offering tailored support as parenting demands shift. More specifically, mindfulness can empower parents attunement to their child's evolving interactive needs and competencies, thereby enabling adaptive support strategies that address the unique developmental challenges inherent to each phase.

In the first year of life, mindfulness, through a deeper connection to the self, may help parents remain present during interactions, improving their ability to understand and attune to their infant's physiological and emotional cues (Parent et al., 2016; Pickard et al., 2018; Potharst et al., 2021). As children move into toddlerhood and preschool, mindfulness may support parents in managing oppositional behaviors with greater patience, flexibility, and

empathy, thereby fostering positive relationships. For instance, more mindful parents may be better equipped to interpret a child's behavior - such as throwing toys - not as a deliberate act of disobedience or an attempt to irritate the parent, but rather as an indicator that the child has yet to learn appropriate behaviors. A mindful parent is likely to be more attuned to their own emotional state, allowing them to regulate their reactions with greater compassion - both towards their own feelings of frustration and towards the child, who is still in the process of learning acceptable behaviors. An intrapersonal connection with oneself can empower a parent to adopt more effective strategies for managing situations, establishing clear limits and boundaries while also showing warmth and emotional availability, supporting both the child's development and a positive parent-child interaction.

Existing studies, primarily relying on self-report measures, have revealed intriguing positive associations between maternal mindfulness and the quality of mother-child interactions across different developmental stages. For instance, maternal dispositional mindfulness assessed during pregnancy was associated to self-reported mother-child bonding during pregnancy (Cohen, 2010; Golmakani et al., 2021) and in the second year of life (Brassel et al., 2020). Maternal mindfulness appears to have a positive effect on the mother-child relationship in preschoolers, with cascading effects on children's prosocial behaviors and emotion regulation (Siu et al., 2016), suggesting that maternal mindfulness not only strengthens their relationship with the child but also contributes to the development of the child's social and emotional competencies. However, to the best of our knowledge, no studies have examined the impact of mindfulness in parents of toddlers. Moreover, the limited studies conducted so far have generally employed broad age ranges, potentially overlooking the unique challenges associated with distinct developmental stages and have not considered child age as a potential moderating variable. For instance, Potharst et al. (2021) found that, in an observational study, maternal mindfulness was associated with increased maternal gaze,

greater sensitivity, and more positive affect during interactions with children aged 0 to 48 months. Similarly, Zeegers et al. (2019), in a sample of mothers with 0-48 months old children who participated in a mindful parenting intervention, found improvements in reducing non-attuned mind-mindedness comments and enhancing children's responsiveness in vocalization turn-taking, while no significant effects were observed for dyadic synchrony and maternal sensitivity (for a more comprehensive review of the literature, see *Chapters 2* and *3*). While these findings suggest a potential relationship between maternal mindfulness and the quality of the mother-child relationship, the use of broad age ranges in these studies - encompassing children with vastly different interactive capacities and needs - limits the generalizability and understanding of the specific parenting challenges that arise at distinct developmental stages.

Given the critical role of the mother-child relationship in early development, further research is warranted, particularly studies focusing on narrower age ranges during the early years of life, to better elucidate these associations and assess the effectiveness of mindfulness interventions for parents. A recent systematic review (Fernandes et al., 2022) revealed a limited impact of these interventions on parental well-being and the mother-infant relationship during the first year of the infant's life, a critical period when infants develop the foundation of socio-emotional competences, which are largely shaped through the quality of mother-infant interactions (see *Chapter 2* for a more detailed review of the literature). The findings suggest that their efficacy in this context may be modest, highlighting the need for further research to explore and enhance the effectiveness of such interventions during this period.

Furthermore, given that parenting is multifaceted (Belsky, 1984), in addition to child-related aspects (e.g., child age), also individual differences in parental resources may influence how parents face the challenges of parenting, significantly impacting parent-child

relationship and child development (e.g., Root et al., 2016). Recently, there has been increasing interest in exploring how Sensory Processing Sensitivity (SPS; Aron & Aron, 1997) - a trait marked by heightened sensitivity to stimuli, leading to stronger emotional reactivity and a greater risk of feeling overwhelmed, yet also an enhanced response to positive stimuli (Lionetti et al., 2018) - affects parenting. Highly sensitive (HS) parents are more prone to parenting difficulties, reporting harsh and permissive discipline, withdrawal, and negative caregiving feelings (Aron et al., 2019; Branjerdporn et al., 2019; Goldberg & Scharf, 2020). Mindfulness could support HS parents, who may be more at risk of overwhelming, by improving their self-regulation during parenting experience. To the best of our knowledge, no studies have yet investigated the role of mindfulness in respect to individual differences in SPS (see *Chapter 4* for a more detailed review of the literature).

Finally, while some evidence of the association between mindfulness and emotion regulation in samples of parents (e.g., Derakhshanpour et al., 2022), to the best of our knowledge no studies have specifically examined how mindfulness influences emotion regulation during parenting and its cascading effects on the quality of the parent–child relationship (see *Chapter 3* for a more complete review of the literature).

To address these gaps, *Chapter 2* will present an observational study exploring the role of maternal dispositional mindfulness and a mindfulness-based intervention in promoting mother-infant attunement both behaviorally and physiologically during the first year of life. *Chapter 3* will present a study exploring the role of maternal dispositional mindfulness in shaping the quality of the mother-child relationship among toddlers and preschoolers. The study will also investigate whether emotion regulation, particularly the ability to manage negative emotions during parenting, mediates the relationship between maternal dispositional mindfulness and parent-child relationship quality. Additionally, the study will examine whether the child's age moderates this association, recognizing that parenting tasks and

challenges differ according to the child's developmental stage. Finally, *Chapter 4* will present a study investigating the interaction between SPS and mindfulness in predicting both mother-child relationship quality (i.e., self-reported maternal satisfaction, confidence and pleasure in interacting with the child) and maternal emotion regulation during parenting, specifically in parents of toddlers and preschoolers.

1.2.2 Workplace Relational Challenges: The Role of Mindfulness

Stewart (1985) noted that work often represents the second most important social unit of an individual's life, following the immediate family environment. Within work settings, relationships play a fundamental part of organizational life, comprising patterns of interaction and exchange between individuals, groups, or organizations, typically aimed at achieving shared objectives (Ferris et al., 2009).

These relationships are critical, as they are closely linked to various employee and organizational outcomes. For instance, positive workplace relationships - particularly those characterized by coworker support - are associated with enhanced psychological well-being, job satisfaction, job performance, stronger team commitment, greater team performance, increased team innovativeness, and higher levels of organizational citizenship behavior (e.g., Herawati et al., 2023; Schermuly & Meyer, 2016; Srivastava & Singh, 2015).

Although work relationships share similarities with non-work relationships, the organizational context introduces unique challenges that underscore the importance of studying them. The workplace is a dynamic and complex environment, where individuals constantly navigate a variety of relational challenges that arise from the interactions between colleagues, supervisors, and subordinates. These challenges can take many forms, such as communication barriers, interpersonal conflicts, stress, and power dynamics, all of which can significantly affect individual well-being and team performance (Eby et al., 2020).

Successfully navigating these relational complexities requires adaptability and strong communicational skills, which are crucial for fostering a healthy and productive work environment.

The quality of relationships at work is influenced by multiple elements, including contextual factors (for a review see Theorell et al., 2015). Among these, leadership plays a pivotal role. The behaviors of leaders and the degree of control they exert over employees have far-reaching implications, affecting not only employee psychological well-being and job-related outcomes (Erschens et al., 2022; Onesti, 2023a; Wen et al., 2019) but also interpersonal relationships and team functioning (Bucic et al., 2010; Cha et al., 2015).

In addition to leadership, employees' individual differences and interpersonal styles significantly influence the nature and quality of relationships among coworkers as well (Ferris et al., 2009). These individual differences shape how relationships develop, how conflicts are managed, how collaboration is fostered and how the individual may manage relational challenges at work. Given the importance of workplace relationships not only for employees' well-being and job-related outcomes but also for overall organizational productivity, it is essential to understand how to support and promote them.

Mindfulness has gained considerable attention in organizational research, particularly regarding its role in supporting and fostering healthy relationships among coworkers. Eby et al. (2020) suggest that mindfulness can influence interpersonal functioning at work through three main pathways: cognition, emotions, and behaviors. Cognitive processes associated with mindfulness involve greater awareness of one’s partner and the relationship, an enhanced ability to maintain focus on the partner and the relationship in the present moment, the capacity to detach from one’s own thoughts and experiences, to connect more fully with current relational experiences (i.e., relational reperceiving), and a greater tendency to adopt a non-judgmental attitude during interactions with the partner and within the relationship.

Regarding emotions, mindfulness involves experiencing greater compassion, more positive emotions toward others, and recovering more quickly from negative emotions in interpersonal situations. In terms of behavior, mindfulness may lead to less impulsive responding to others and more flexible responding in interpersonal situations, by creating a space between perception and action. Through these cognitive, emotional, and behavioral processes, more mindful employees may develop a more adaptive relational style, characterized by greater emotion regulation, more thoughtful interactions, and improved conflict resolution. It is possible that more mindful employees can enhance their ability to manage stress, reduce emotional reactivity, improve communication, and develop more constructive relationships with colleagues. For example, when faced with disagreement with a colleague or supervisor, a mindful individual can pause, take a deep breath, and respond thoughtfully rather than react impulsively. This ability to regulate emotions and respond with intention can foster more positive, cooperative relationships in the workplace.

Meta-analytic findings indicate that employees' dispositional mindfulness is directly associated with employees intrapersonal outcomes, such as reducing burnout, increased job satisfaction, performance, while also contributing to the improvement of interpersonal relationships among coworkers (Mesmer-Magnus et al., 2017). However, research on mindfulness in organizational contexts remains limited, with mixed findings and several gaps requiring further exploration (see *Chapter 5* for a more comprehensive review of the literature). In particular, despite the evidence of direct associations, there is a need for a deeper understanding of how mindfulness, as an individual trait, interacts with potentially challenging contextual factors to influence employees' relational adjustment in the workplace and the development of supportive relationships within teams. This line of inquiry is crucial for clarifying the mechanisms through which mindfulness may buffer the impact of workplace stressors and foster healthier interpersonal dynamics in organizational settings.

To fill these gaps, *Chapter 5* will present a study examining how employees with different levels of mindfulness respond to different potentially challenging leadership contexts. Specifically, the study aims to explore the role of mindfulness as a buffer, protecting employees' adjustment at work both at the intrapersonal (i.e., employees' wellbeing and job performance) and interpersonal level (i.e., team cohesion). This understanding could help identify vulnerable employees and find customized strategies to support them more effectively, ultimately fostering a healthier and more resilient workforce.

1.3 The Current Project: Research Aims and Structure of the Thesis

Social interactions and relationships are fundamental to human life, serving as a core component across all contexts in which individuals are embedded. From personal to professional environments, the capacity to establish, maintain, and navigate social relationships is essential for individual well-being and social functioning. Although relational dynamics are a universal and transversal aspect of human experience, the specific challenges and relational demands individuals encounter vary significantly across different contexts. As deeply described above, each setting presents distinct complexities that shape how relationships are formed and maintained.

Despite growing interest in the role of mindfulness in shaping interpersonal functioning, its potential as a protective factor across diverse relational contexts is not yet fully understood. The overarching aim of this project is to investigate how mindfulness can support individuals in navigating the unique relational demands across diverse environments. Specifically this thesis focuses on two key domains - i.e., parenting and the workplace- where relational dynamics are particularly impactful (Stewart, 1985). Each chapter contributes to the literature by addressing distinct aspects of mindfulness within

these contexts, while collectively advancing our understanding of how mindfulness may function as a resource for relational challenges across life domains.

Overall, *Chapters 2*, *3*, and *4* aim to explore how mindfulness supports individuals in navigating the challenges of parenting and promoting mother-child relationship from infancy to preschool age. These studies adopt a mixed-methods design, integrating behavioral observational measures, physiological assessments, and maternal self-reports. By combining these complementary levels of analysis, this research offers a comprehensive perspective on the role of mindfulness in early parenting. Specifically, ***Chapter 2*** explored, through two observational studies, the role of maternal dispositional mindfulness in shaping the quality of mother-infant interactions at 3 and 9 months of infants' age, specifically the mother's ability to attune to the infant on both behavioral and physiological level simultaneously. Additionally, it evaluates the effectiveness of a mindfulness-based intervention in enhancing this maternal capacity at 9 months. A key strength of this chapter is the integration of multiple measurement approaches, which offers a unique and essential contribution to understanding the multifaceted mechanisms underlying early parenting.

Chapter 3 aimed to examine the association between maternal dispositional mindfulness and the quality of the mother-child relationship in a sample of toddlers and preschoolers, and to investigate whether emotion regulation during parenting mediates this relationship. Additionally, the study will explore whether the child's age moderates the association between maternal mindfulness emotion regulation during parenting, acknowledging that parenting tasks and challenges differ according to the child's developmental stage. ***Chapter 4*** examined the role of mindfulness as a buffer against potentially challenging individual differences that may influence parenting behaviors, specifically by investigating the interaction between SPS and mindfulness in predicting

both the quality of the mother-child relationship and maternal emotion regulation during parenting, particularly in parents of toddlers and preschoolers.

Finally, ***Chapter 5*** investigated the role of mindfulness as a buffer in the workplace, specifically in relation to potentially challenging relational contexts (i.e., different leadership styles), and its impact on employee adjustment, both at the intrapersonal level (i.e., job performance and psychological well-being) and the relational level (i.e., team cohesion). By extending the investigation of mindfulness beyond parenting, this chapter highlights its role in mitigating relational stressors in professional settings, demonstrating the broader applicability of mindfulness across life domains.

By examining mindfulness in both parenting and workplace contexts, this dissertation provides a comprehensive framework for understanding its role as a resource for navigating relational challenges. While each chapter focuses on a specific domain (i.e., different phases of parenting and the workplace), the overarching contribution lies in demonstrating how mindfulness enhances interpersonal attunement across different relational settings. This integrative perspective tries to bridge the gap between research on mindfulness in parenting and occupational contexts, offering theoretical and practical implications for promoting well-being in both personal and professional relationships.

Chapter 2 | From Inner to Dyadic Connection: The Role of Mindfulness in Mother-Infant Interaction During the First Year of Life

Passaquindici, I., Pastore, M., Nardozza, O., Lionetti, F., D'Urso, G., Palumbo, R., Fasolo, M., Spinelli, M. (2024). From Inner to Dyadic Connection: The Role of Mindfulness in Mother-Infant Interaction During the First Year of Life. *Frontiers in Behavioral Neuroscience, 18,* 1398042. https://doi.org/10.3389/fnbeh.2024.1398042

Abstract

Introduction: Mother-infant attunement is fundamental to support infant socio-emotional development. Based on the assumption that we connect better with others if we are aware of and connected with our own experience, mindfulness could affect maternal ability to attune to the infant. However, little is known about this topic in the first year of life. Study 1 aimed to investigate the role of maternal dispositional mindfulness and mindful parenting in mother-infant physiological and behavioral attunement at 3 months of age. Study 2 aimed to explore the effect of a mindfulness-based intervention not specific of parenting experience on mother-infant behavioral and physiological attunement and on maternal well-being at 9 months of age.

Methods: In Study 1, mother-infant (n = 67) behavioral and physiological attunement (i.e., co-regulation and RSA) were collected simultaneously each 20 sec during face-to-face interaction. Mothers completed questionnaires about their dispositional mindfulness and mindful parenting. In Study 2, mother-infant dyads were randomly divided into a control (n = 20) and intervention group (n = 29). The intervention group attended a 5 weeks mindfulness-based intervention. At T1 and T2, the same procedure described in Study 1 was applied and mothers reported about their well-being.

Results: Results showed that maternal mindfulness was associated with high physiological and behavioral attunement at 3 months, and with more positive maternal behaviors and less

stress at 9 months. Analysis evidenced a slight improvement in the intervention group in maternal dispositional mindfulness and a reduction in parenting stress at T2.
Discussion: Findings from both studies suggested that maternal mindfulness could represent a protective factor that could support mothers to foster better dyadic interactions with their infants. The implementation of mindfulness-based interventions for mothers could have preventive and clinical implications.

Keywords: mindfulness, mindfulness-based interventions, physiological attunement, mother-infant interaction, parenting stress

2.1 Introduction

Mindfulness - defined as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p. 145) – has been widely studied as an intrapersonal phenomenon indicating individual ability to connect with and regulate personal inner experience (Siegel, 2007). Indeed, mindfulness is generally associated with psychological well-being (Lundwall et al., 2019; Harrington et al., 2014; Bränström et al., 2011), good emotion regulation (Iani et al., 2018; Guendelman et al., 2017; Roemer et al., 2015), and low anxiety, depression, and stress (Medvedev et al., 2018). The beneficial effect of mindfulness has been demonstrated even from a physiological perspective. Previous research has shown the potential role of mindfulness in changing adults' physiological functioning, i.e. reducing physiological stress and improving physiological regulation (see Grecucci et al., 2015 and Skoranski et al., 2019 for reviews).

Mindfulness also affects interpersonal functioning and the quality of intimate interactions. Adults' mindfulness is positively associated with marital satisfaction (Khaddouma et al., 2015; Williams & Cano, 2014), friendship quality (Pratscher et al., 2018), and dyadic synchrony expressed both by the synchronization of behaviors (Haas & Langer, 2014) and physiological arousal (Laurent et al., 2017) with the partner during dyadic interactions.

More recently, the literature has drawn attention to the role of mindfulness in the critical intimate interpersonal relationship between the mother and the child. Building on the premise that maternal mindfulness may enhance not only the maternal connection with her own emotional experiences but also with those of the infant, the limited studies investigating this topic have reported intriguing positive associations between maternal mindfulness and the quality of mother-infant interaction across various developmental stages (e.g., Ben Uriel-Maoz et al., 2023; Medeiros et al., 2016; Coatsworth et al., 2010, 2018; Pickard et al., 2018;

Potharst et al., 2021). This lead to the development of several mindful-based interventions directed to parents in order to improve their interaction with offsprings (e.g., Anand et al., 2023; Fernandes et al., 2022). However, literature on this subject remains limited, with numerous gaps yet to be addressed. Results have shown inconsistency, and only a few studies, primarily relying on self-reports, have examined this topic during infancy, a critical period when infants develop the foundation of socio-emotional competences primarily through the quality of mother-infant interaction. Understanding whether mindfulness could be deemed a potential protective factor is crucial. Moreover, most studies focused on only one member of the dyad (i.e. the mother or the infant) (e.g., Noroña-Zhou et al., 2022) and none considered both behavioral and physiological dyadic attunement.

2.1.1 The Role of Maternal Mindfulness on Mother-Infant Attunement

The importance of early mother-infant interactions in the first year of life has been well-established, pointing out the short- and long-term positive effects on several child's developmental domains, such as emotional, social, and cognitive skills (e.g., Cooke et al., 2019; Feldman, 2012; Feldman & Eidelman, 2005; Lionetti et al., 2022; Rocha et al., 2020; Shah et al., 2023; Spinelli et al., 2022).

During infancy, mother-infant interactions are often described as mutually regulated and attuned. Attunement is a dyadic construct that refers to the dynamic and reciprocal adaptation of each partner to internal and external states of the other interactive partner (Bornstein, 2013). Mother-infant dyadic attunement occurs at different levels of experience, involving not only their coordinated and contingent behaviors (i.e. emotional expressions, movements, vocalizations) but also a coordinated and shared physiological functioning (i.e. breath, hearth rate) (Feldman, 2006, 2007; Spinelli & Mesman, 2018). Given that infants' communicative skills are still immature during the first months of life, mother-infant attunement is largely

associated with the mother's ability to attune, regulate, and respond appropriately to the infant's signals (Stern, 1985). This ability could be influenced by many maternal individual factors, and mindfulness could be one of those.

When mothers are aware and connected with their own inner experience they might suppose to be more able to understand and attune with the infant's needs, emotions and communicative cues (Parent et al., 2016; Pickard et al., 2018; Potharst et al., 2021). According to Snyder et al. (2012), mindfulness may foster healthy interactions through a better connection with oneself for two main reasons. The first one is the "quality of presence" that describes the availability to receive whatever the other person brings to the interaction, to sense her own participation in the interaction, and to be aware of her own awareness. By being present the mother is available to perceive and embrace consciously what is happening internally and externally and to connect and attune to infant's cues. The second reason is the ability to respond with awareness of what is happening, instead of reacting without awareness. This enables the mindful mother to develop a "space" between perception and action where is possible to notice her moments of frustration, to regulate her emotions, and to find more functional and adaptive ways to respond to the infant rather than acting automatically.

This ability to bring non-judgmental, present-centered awareness to the child has been defined as mindful parenting (Pratscher et al., 2019), and its implications for the quality of parent-infant interaction has been examined mainly during childhood and adolescence using parent-reports. More mindful parents showed more positive parent-child interactions (Zhang et al., 2019; Medeiros et al., 2016; Duncan et al., 2015), more positive and supportive conflict resolution (Bird et al.,2021; Kil & Grusec, 2020), and shared more positive emotions with their child (Turpyn & Chaplin, 2016) than less mindful parents. During post-partum high maternal mindful parenting facilitated the developing of the bond with the infant (Fernandes

et al., 2021). Observational studies are limited. Potharst et al. (2021) evidenced an association among some aspects of maternal mindful parenting and the quality of mothers' behaviors during the interaction with their 0-to-48 months old infants, such as more gaze to the infant, higher maternal sensitivity, and more positive affect. Furthermore, Laurent et al. (2017) suggested a positive effect of mindful parenting on mother's physiological regulation of interactive distress during the Still-Face Procedure, evidenced by steeper cortisol recovery slopes.

Another area of study has explored the role of mindfulness as an individual trait—not specific of parenting experience—known as dispositional mindfulness, in the context of mother-infant interaction, to see if the ability of the mother to generally focus on her inner experience is related to her attunement with the child. In this sense, maternal dispositional mindfulness assessed during pregnancy was associated to self-reported mother-child bonding during pregnancy (Cohen, 2010; Golmakani et al., 2021) and in the second year of life (Brassel et al., 2020). More mindful pregnant women had better cardiovascular adaptation during pregnancy (i.e., less decrease in cardiac parasympathetic activity), less emotional distress, both during and after pregnancy, and at 4 months they reported their infants to be more adaptable (Braeken et al., 2017). Maternal dispositional mindfulness can serve as a protective factor in mitigating the adverse effects of depressive symptoms and maternal emotional dysregulation, respectively, on prenatal mother-infant bonding (Hicks et al., 2018) as well as on infant neurobehavioral development (Ostlund et al., 2021). A recent cross-sectional study evidenced how more mindful mothers of 1-to-5 years old children reported a better capacity to regulate own emotions during parenting consequently positively affecting their satisfaction, confidence and pleasure in interacting with their child (Passaquindici et al., 2024).

Similar to what occurs with mindful parenting, very few studies explored the role of maternal dispositional mindfulness during observed mother-infant interaction, yielding mixed findings. Mothers high in dispositional mindfulness exhibited heightened neural perceptual and emotional processing when observing positive moments in video recordings of interactions with their 3-month-old infants, and less when observing negative moments. This suggests an inclination to allocate more attention and perceptual/emotional processing resources to moments of playfulness and joy with their infants, as opposed to moments of frustration (Laurent et al., 2018). Maternal dispositional mindfulness during pregnancy, specifically the ability to non-react to inner experience, was associated with maternal attuned responses to infant distress, but not with maternal sensitivity, at 7-10 weeks post-birth (Pickard et al., 2017) and at 6 months (Pickard et al. 2018).

While these findings suggest a potential relationship between mindful parenting, dispositional mindfulness, and certain maternal and children's behaviors and physiological functioning, which are relevant indicators of mother-child attunement, the current limitations in the literature prevent definitive conclusions. Given the significance of mother-infant attunement, especially during infancy when the characteristics of dyadic interactions vary notably, further studies are required. Specifically, research investigating these associations during the early years of life, with narrower age ranges, and employing observational methods is necessary.

2.1.2 Mindfulness-Based interventions and Mother-Infant Attunement

Based on the positive associations emerged among mindfulness and the quality of mother-child relationship and maternal well-being, various types of interventions aimed at improving maternal mindfulness have been promoted both in clinical and non-clinical settings. Among

those, several modalities were developed including both face-to-face (e.g., Gu et al., 2015; Goldberg et al., 2018) and online (Spijkerman et al., 2016) mindfulness-based interventions.

Interventions focused on mindful parenting have been positively associated with maternal well-being when attended during pregnancy and the post-partum. Online mindfulness-based interventions, delivered through text messages or audio-recorded formal practices with mindful parenting specific content, reduced anxiety and stress of pregnant women (Ciciolla et al., 2023; Hulsbosch et al., 2023). Mothers who participated in a face-to-face mindfulness intervention during pregnancy - including mixed contents, e.g., raisin meditation, breathing awareness, body scan, mindful yoga, labor pain cognitive education and, formal and informal meditation homework - reported lower depression and somatic anxiety, and increased mindfulness and life satisfaction (Wang et al., 2023). Face-to-face interventions with practices tailored for mothers - e.g., exercises where mothers learn to focus their mindful attention on the baby and adopt the baby's perspective - showed benefits for maternal anxiety, stress and depression when attended during the first year of the infant's life (Min et al., 2023; Potharst et al., 2017, 2022).

The few studies examining the effects of mindfulness based-interventions during pregnancy on mother-infant interaction have shown positive outcomes. An intervention delivered via text messages, which included instructions on deep breathing, meditation, responding to fetal movements, planning activities, or reading a story to the baby, led to a reported stronger bond with the fetus (Shreffler et al., 2019). Mothers who participated in face-to-face sessions of mindfulness meditation focused on body scan, mindful eating, mindful communication, labor pain management in couples, breastfeeding, and mind/body connection, reported better infant emotional regulation at 3 months (Lönnberg et al., 2021).

Observational studies reported mixed results. Zeegers et al. (2019) found an effect of a mindful parenting face-to-face training (i.e., meditations in which mothers focus on their

child, including joint sessions with the child) in reducing maternal non-attuned mind-mindedness comments and in improving their 0-48 months old children's responsiveness in vocalization turn-taking, but not on dyadic synchrony and maternal sensitivity. During school age, a face-to-face family-based mindfulness intervention (i.e., audio-recorded meditations based on notice and not judging physiological, emotional and cognitive reaction in stressful moments of parenting) reduced children's diurnal and parents' evening cortisol levels, evidencing a potential benefit on neuroendocrine functioning (Ho et al., 2020).

A recent meta-analysis (Anand et al., 2023) along with a systematic review (Fernandes et al., 2022) have summarized findings that indicate modestly positive impact of mindful-parenting interventions on the mother-child relationship. However, the authors underlined that the literature is limited to few studies, with wide variability among participants, and included studies involved mainly mothers of school aged children. Interestingly, while the reported effect of interventions on maternal well-being is medium to high, the meta-analyses did not find evidence of significant improvements in maternal mindful parenting. This suggests that the mechanisms through which some interventions work, and other don't, do not necessarily relate to mindfulness and needs to be further explored.

With the aim of enhancing maternal well-being and the quality of mother-child interaction by fostering maternal intrapersonal connection with own moment-to-moment sensations, thoughts, and emotions, interventions also concentrated on improving dispositional mindfulness by engaging mothers in meditative practices or relaxing tasks (Snyder et al., 2012).

Mothers who attended a mindfulness-based intervention delivered on the WeChat app based on pre-recorded videos about main general mindfulness topic (e.g. mindful breathing and body scan), and on formal and informal homework, have infants with easier temperament at 6 weeks of age (Zhang et al., 2023). An intervention including mindfulness practices not

adapted for mothers (e.g., mindful breathing, body, scan, mindful listening) through a smartphone app reduced symptoms of maternal depression, anxiety and stress, and increased maternal dispositional mindfulness during the post-partum (Bear et al., 2022). The pilot study conducted by Cowling and Van Gordon (2018) demonstrated how mothers of preschoolers who participated in an online three-days mindfulness based-intervention, composed by a 15-minutes pre-recorded audio including body-scan and breathing meditation, exhibited improved mindfulness and decreased psychological distress and parenting stress.

To the best of our knowledge, only two studies examined the effect of a mindfulness-based intervention, both face-to-face and during pregnancy, on observed mother-infant interaction with inconsistent findings. Derakhshanpour et al. (2022) evidenced the effects of a mindfulness-based intervention - composed by general mindful practices such as mindful eating, sitting meditations, exercises of visualization and homework - only on maternal emotional control and not on mother-infant quality of attachment. Noroña-Zhou et al. (2022), instead, reported evidence of a face-to-face mindfulness-based intervention both with formal and informal exercises - e.g., awareness of breathing, body sensations, thoughts and feelings - on the sympathetic nervous system activity and regulation after a stressor at 6 months, that are consistent with lower risk for psychopathology and health problems in mothers who participated to the intervention. No significant effects of the intervention were found for infants observed negative behavior and physiological functioning.

In conclusion, although mindfulness interventions for parents appear to be beneficial, the underlying mechanisms remain unclear. Furthermore, there is a lack of observational studies and research on mindfulness-based interventions that foster maternal intrapersonal connection with moment-to-moment sensations, thoughts, and emotions, and their impact on mother-infant interaction.

2.1.3 The Current Study

During infancy, greater infant-mother behavioral and physiological attunement is crucial for supporting the infant's emotional development (Feldman, 2012). Therefore, understanding whether mindfulness could serve as a protective factor for mother-infant attunement is particularly intriguing.

To address this, we conducted two exploratory observational studies aimed at examining the role of maternal mindfulness on the quality of behavioral and physiological mother-infant attunement during the interaction. Study 1 examined maternal and infant behavioral and physiological functioning during face-to-face interactions at 3 months of age, in relation to maternal dispositional mindfulness and mindful parenting. Study 2 investigated the impact of an online mindfulness-based intervention not specific of parenting experience on mother-infant behavioral and physiological attunement at 9 months of age.

We choose 3 and 9 months that represent two crucial developmental stages with different infant communicative needs (Trevarthen & Aitken, 2001; Trevarthen & Hubley, 1978). Behavioral attunement was assessed using two microanalytical coding systems aimed at evaluating the coordination of mother's and infant's behaviors and affect during interaction. Physiological attunement was measured in both studies by computing the Respiratory Sinus Arrhythmia index (RSA) of both partners. Changes in RSA reflect dynamic adjustments of the autonomic nervous system via the vagus nerve to maintain homeostasis and support growth and restoration (Porges, 2007; Porges & Furman, 2011). Suppression of RSA reflects adaptive regulatory efforts in response to emotionally challenging events, while maintaining or increasing RSA during interpersonal interaction indicates calm and social engagement (Porges, 2007). Simultaneous changes in parent and infant RSA may illuminate the degree to which they are mutually responsive to each other's physiological functioning during

interaction, potentially predicting beneficial effects for the infant (Depasquale, 2020; Miller et al., 2023).

Because the literature on the topic is scarce and not consistent, the nature of these studies was explorative. For Study 1, it was hypothesized that high maternal dispositional mindfulness/mindful parenting would be linked to 1) a strong association between the mother's and infant's RSA during interaction, and 2) high dyadic symmetrical co-regulation. For Study 2 it was hypothesized that the mindfulness intervention would improve maternal mindfulness, reduce parenting stress, and improve mother-infant behavioral and physiological attunement. These a priori expectations were transformed into Bayesian priors as further detailed in the Supplementary Materials of *Chapter 2*.

2.2 STUDY 1

2.2.1 Method

2.2.1.1 Participants

A total of 67 mother–child dyads participated to the study, recruited from the hospitals in urban areas in the center of Italy. All infants were Italian, 49.3% (*n* = 33) were male, 22.4% (*n* = 15) had one or more siblings. Inclusion criteria were full-term born and healthy infants, with no developmental delays declared at 3 months, according to their family pediatrician. Average maternal age was 35.43 years (*SD* = 4.58; *range* = 24 - 43), and mothers had an average year of 16.52 education (*SD* = 2.77; *range* = 8 - 21), indicating high education level (i.e., bachelor degree or higher). All fathers and 83.6% of the mothers (*n* = 56) were employed with a stable job. Parents were informed that the aim of the study was to examine how infants develop the ability to cope with emotional situations, and their written consent was obtained. The families were compensated for their participation with 25 euros. The sample was treated in accordance with the ethical standards outlined by the American

Psychological Association and the Italian Association of Academic Psychologists, and the study was approved by the Department Ethics Review Board of the University G. d'Annunzio of Chieti-Pescara.

2.2.1.2 Procedure

At 3 to 4 months of infant's age (M = 3.30, SD = 0.37), mothers were invited to the lab and video-recorded during three minutes of face-to-face free-play interaction (M duration in seconds = 186.91, SD = 10.95). Mothers were instructed to play with their infants as they usually do without objects and were allowed to touch the infant and speak. Before the beginning of the procedure, the dyad was given time to adapt to the laboratory context and the experimental procedure was explained. The room was outfitted with a table and one chair for the mother. Infants were positioned in a highchair on the table in front of the mother and a mirror behind the infant allowed the recording of the behaviors and facial expressions of both partners. The interaction was stopped before the three minutes when the infant was too distressed.

During the interaction, mother and infant's physiological activity was recorded applying ECG sensors on the body of both the infant and the mother. Additionally, mothers completed self-reports to measure maternal mindfulness.

Out of the 67 dyads, full data on dyadic behaviors, physiological functioning and maternal mindfulness were completed for 45 dyads. No differences between the full sample and the final sample were present on socio-demographic characteristics.

2.2.1.3 Measures

2.2.1.3.1 *Maternal Dispositional Mindfulness*

Maternal dispositional mindfulness was measured using the Five Facet Mindfulness Questionnaire (FFMQ, Baer et al., 2006). The FFMQ is a 39-item self-report scored on a 5-Likert-Type scale from *never or very rarely true to very often or always true* (e.g., "When I do things, my mind wanders off and I'm easily distracted", "I watch my feelings without getting lost in them", "I tell myself that I shouldn't be thinking the way I'm thinking"). The questionnaire consists of 5 sub-scales outlining different aspects of mindfulness: (a) observing to sensations, perceptions, thoughts and feelings, (b) describing the experience with words, (c) non-reactivity to inner experience, (d) nonjudging of experiences, and (e) acting with awareness. The total scale, used for the present study, consisted of the sum of the mean scores of each scale. Cronbach's α of the total scale was 0.85, similar to the validation study with an α for each subscale ranging from .75 to .91 (Baer et al., 2006).

2.2.1.3.2 *Maternal Mindful Parenting*

Maternal mindful parenting was measured using the Interpersonal Mindfulness in Parenting scale (IMP; Duncan, 2007, 2023). The IMP is a 31-item self-report rated on a 5-point scale from *never true* to *always true* e.g., "I pay close attention to my baby when we are spending time together," "I notice how changes in my baby's mood affect my mood," "When things I try to do as a parent do not work out, I can accept them and move on". The questionnaire consists of 5 scales outlining different aspects of mindful parenting: (a) listening with full attention, (b) emotional awareness of self and child, (c) self-regulation in parenting, (d) nonjudgmental acceptance in parenting, and (e) compassion for self and child. The total scale, used in the present study, consisted of the mean scores of all scale.

Cronbach's α of the total scale was 0.78, similar to α = .75 of the validation study (Duncan, 2007).

2.2.1.3.3 *Mother-Infant Behavioural Attunement*

Mother-infant observed behaviors were coded with the Revised Relational Coding System (Fogel et al., 2003) to compute dyadic co-regulation. Every dyadic behavior that lasted almost 2 seconds was coded using Mangold INTERACT Software. Co-regulation can be described along a continuum from mutual adjustment of partners with shared experience via vocal and nonvocal behaviors (i.e., symmetrical) to the absence of orientation of one partner toward the other (i.e., unilateral). We applied the full coding system, but in the present study we used the durations of symmetrical and unilateral dyadic co-regulation in the analyses. Symmetrical co-regulation included each moment during which both partners adjust their behaviors continuously and mutually based on behaviors of the other and, co-participating to the innovation of the topic with verbal or non-verbal contributions. Unilateral co-regulation was coded when one partner was paying attention or innovating to the other that was engaged in own activities and did not respond or did not pay attention to the partner. Coding was conducted by a trained coder, and an independently trained coder randomly coded 20% of the sessions to calculate inter-observer reliability. The mean *Cohen's kappa* value was .80.

To account for the dynamical changes of dyadic co-regulation across the interaction, the relative durations of symmetrical and unilateral co-regulation each 20 secs of the interaction were computed. A minimum of 3 values per dyad and a maximum of 9 were computed (according to the total length of the interaction).

2.2.1.3.4 *Mother-Infant Physiological Functioning*

Physiological data of both the mother and the infant were collected with "ENCEPHALAN-EEGR-19/26" (version E_1863_0M manufactured by Medicom MTD Ltd). Mother's and infant's heart rate was recorded simultaneously using disposable electrocardiogram (ECG) electrodes. The negative recording electrode was placed on the mother and infant right collarbone (i.e., the right clavicle area) and the positive electrode on the left. A ground electrode was placed on the right deltoid. All data were monitored online, and physiological signals were sampled at 508 Hz. A standard ECG filter 0.5 to 30 Hz was used for the cardiac signals prior to data storage.

RSA magnitude estimation was obtained using the Porges and Bohrer (1990) technique that includes parsing the component signal into discrete epochs (10 - 120 sec) and then calculating the natural log of the variance in each epoch. In order to explore dynamic changes in physiological regulation of infants and mothers, a critical information for understanding physiological attunement, we extracted a continuous estimate of RSA with a 20- sec sliding window applying Abney et al (2021) implemented MATLAB script.

2.2.1.4 Analytic Plan

Analyses were conducted using the statistical software R (R Core Team, 2021), with rstanarm (Goodrich, Gabry, Ali, & Brilleman, 2022) and brms (Burkner, 2017, 2018) packages, both integrated with STAN for Markov Chain Monte Carlo (MCMC) sampling (Stan Development Team, 2022). Graphics were created using the ggplot2 package (Wickham, 2016).

First, we explored univariate and bivariate distributions of target variables. Afterwards, we compared and explored a series of regression models adopting a Bayesian approach for estimating parameters and using a mixed model approach, incorporating the subject random

intercept. The first series of linear regression models explored the additive and interactive effects of Infant RSA, IMP Total Score (Mindful Parenting) and FFMQ Total Score (Maternal Dispositional Mindfulness) on Maternal RSA. Secondly, we explored the additive and interactive effects of Infant RSA, IMP Total Score (Mindful Parenting) and FFMQ Total Score (Maternal Dispositional Mindfulness) on Symmetrical and Unilateral Co-regulation, applying a series of multivariate models. Models were compared using a series of comparative indexes (see S.1. and S.2.) and the best model for each dependent variable was retailed and commented. Further details about the analysis are reported in the Supplementary Materials of *Chapter 2* (see S.1. and S.2.).

2.2.2 Results

2.2.2.1 Descriptives and Correlations

Univariate and bivariate descriptives are presented in the Supplementary Materials of *Chapter 2* (Table S1 and Figure S1). Mother and infant RSA were highly associated. Both mother and infant RSA were positively associated with high Maternal Dispositional Mindfulness (FFMQ Total Score) and high Unilateral co-regulation proportional duration.

2.2.2.2 Outcome: Mother RSA

For Mother RSA we fitted and compared a set of linear models (see Table S2 and Figure S2 and S3 in the Supplementary Materials of *Chapter 2*). Two models, M09a and M10a (i.e., the model including respectively Infant RSA X IMP Total Score, and Infant RSA X FFMQ Total Score as predictors), were equivalent and comparatively better than all other tested models, with an evidence ratio (ER) of .229/.219 = 1.046. Comparing these models with their counterparts without interaction (M05a and M06a respectively) allows us to gauge the relative evidence of interaction: ER = .229/.102 = 2.24 for model M09a and ER = .219/.158 =

1.39 for model M10a. This indicates that interactions are not particularly substantial but still interaction models are better than main effect models. As these two models exhibit similar evidence, we report the results for both.

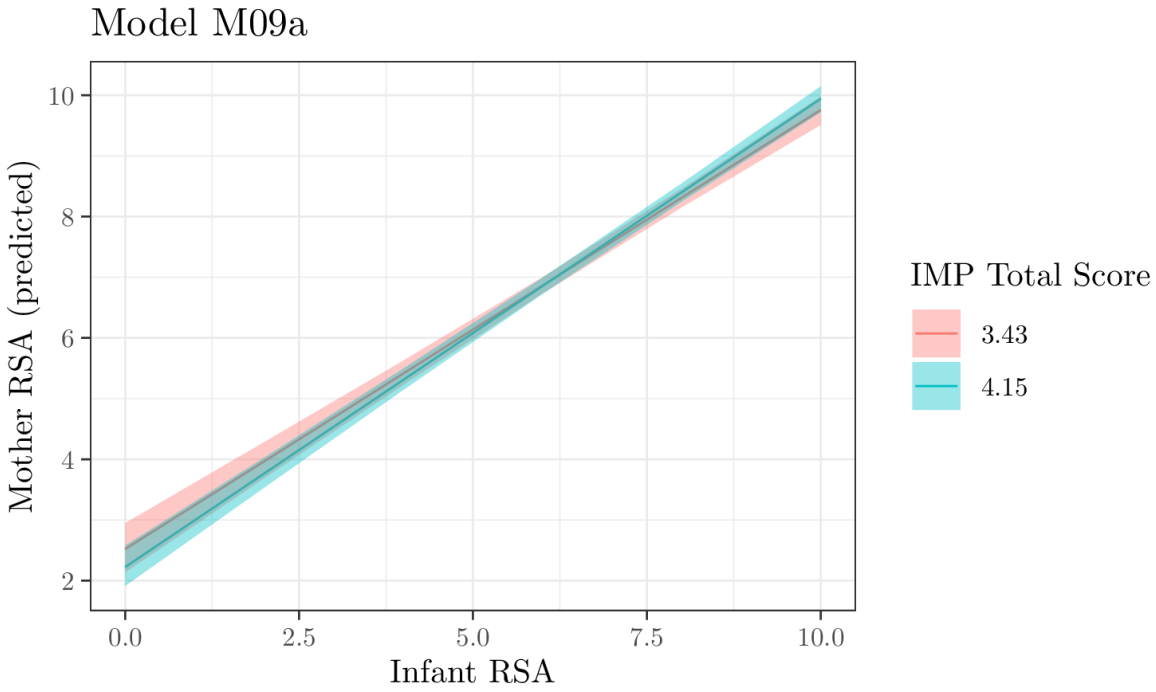
2.2.2.2.1 Model 09a: Infant RSA X IMP Total Score.

Estimated parameters of posterior distributions for the model are shown on Table 1. The interaction parameter is small, and its 90% CI includes zero among the most likely (a posteriori) values. Nevertheless, approximately 88% of the posterior values are positive, indicating a posterior probability of .88 for a positive interaction. Figure 1 depicts the expected values of Mother RSA as a function of Infant RSA (on the x-axis) X IMP Total Score (in colors). The two lines represent values conditioned to the mean (3.79) ± the standard deviation of IMP Total Score. The RSA of mothers with higher Mindful Parenting (IMP scores) is strongly associated with infant RSA both when infant RSA is high and when is low.

Table 1. *Estimated Parameters of Posterior Distributions for the Models M09a and M10a*

Model M09a	*Estimate (SD)*	*CI 95%*
Infant RSA	0.49 (0.23)	0.12 - 0.86
IMP Total score	-0.41(0.38)	-1.04 – 0.20
Infant RSA x IMP Total Score	0.07(0.06)	-0.03 – 0.16
Model M10a		
Infant RSA	0.54 (0.17)	0.25 - 0.82
FFMQ Total score	-0.19 (0.34)	-0.75 – 0.37
Infant RSA x FFMQ Total Score	0.06 (0.05)	-0.02 – 0.14

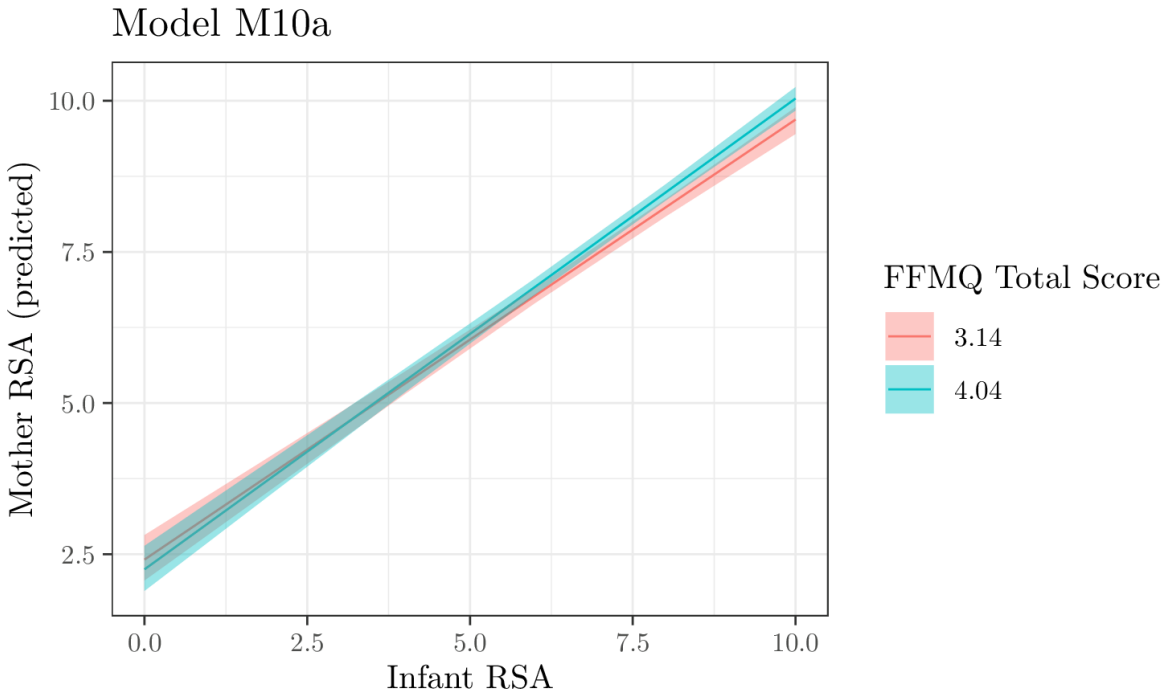
Figure 1. *Model M09a. Expected values of the interaction between Infant RSA X IMP Total Score (in colors). The three lines represent values conditioned to the mean and the mean ± the standard deviation of IMP Total Score.*



2.2.2.2.2 Model M10a: Infant RSA X FFMQ Total Score.

Estimated parameters of posterior distributions for the model are shown on Table 1 Similar to the interaction parameter of M09a, for this model as well, the interaction parameter is close to zero and its 90% CI encompasses zero among the most probable values (a posteriori). We observe approximately 89% positive posterior values and a posterior probability of around .89 indicating that the interaction is positive. Figure 2 depicts the expected values of Infant RSA interaction (on the x-axis) x FFMQ Total Score (in colors). The two lines represent values conditioned to the mean (3.59) ± the standard deviation of FFMQ Total Score. The figure is very similar to those of model M09a, indicating that the RSA of mothers with higher Dispositional Mindfulness (FFMQ scores) is strongly associated with infant RSA both when infant RSA is high and when is low.

Figure 2. *Model M10a. Expected values of the interaction between Infant RSA X FFMQ Total Score (in colors). The three lines represent values conditioned to the mean and the mean ± the standard deviation of FFMQ Total Score.*



2.2.2.3 Outcomes: Symmetrical and Unilateral Co-regulation

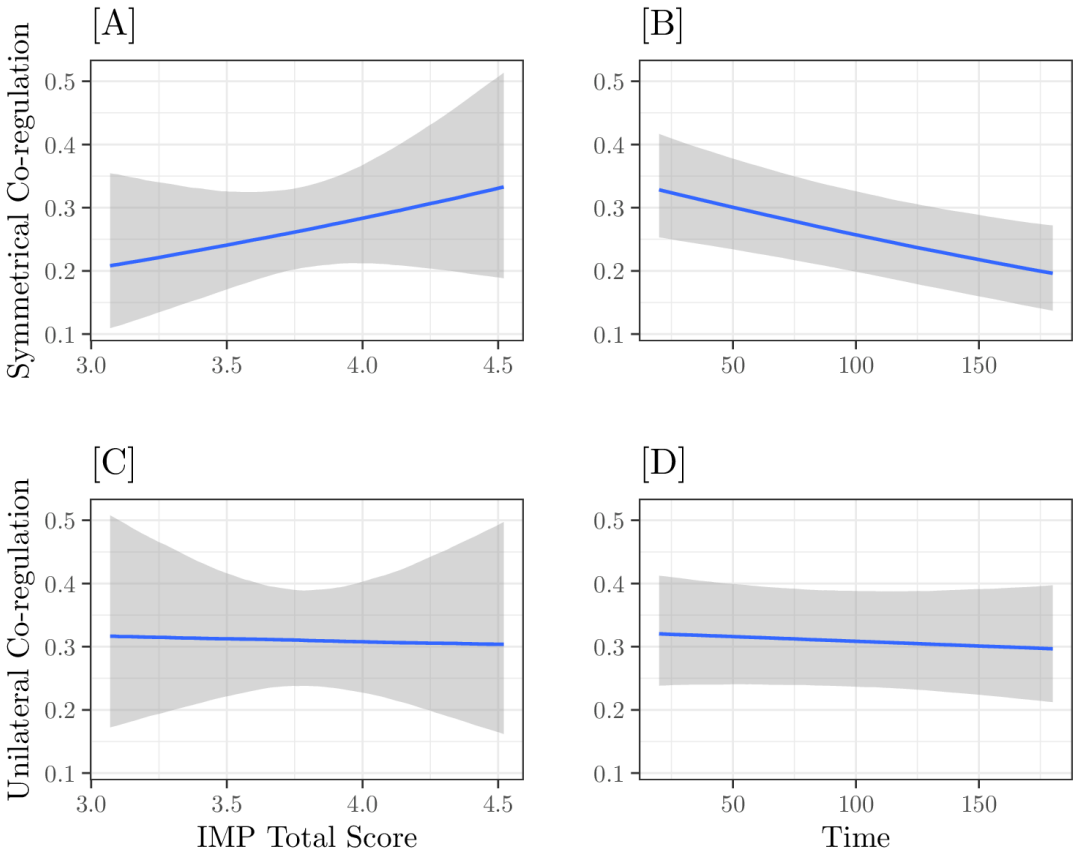
For co-regulation variables, we considered a set of multivariate regression models that simultaneously included Symmetrical and Unilateral Co-regulation as dependent variables. Table S3 in the Supplementary Materials of *Chapter 2* summarizes the model comparison (see Figure S4, S5, S6, and S7 for diagnostics). The best model (i.e. M08b with IMP Total Score + Time as predictors) has a weight of .338 and an ER of 1.5 compared to the second model (i.e. M07b with FFMQ Total Score + Time as predictors). This indicates that the two best models are very close in terms of evidence. Consequently, we reported results for both.

2.2.2.3.1 Model M08b: IMP Total Score + Time.

Estimated parameters of posterior distributions for the model for Symmetrical Co-regulation as outcome are reported on Table 2. Figure 3 depicts the conditional predictions for

Symmetrical and Unilateral Coregulation as a function of IMP Total Score and Time. Panels (A) and (B) pertain to Symmetrical Co-Regulation, while panels (C) and (D) relate to Unilateral Co-regulation, respectively. The Symmetrical Co-regulation increased as a function of IMP Total Score (panel (A)), indicating that dyads with mothers with high Mindful Parenting spent more time in Symmetrical Co-regulation during the interaction. Symmetrical Co-regulation also decreased over Time (panel(B)). The Unilateral Co-regulation did not show any change, neither as a function of IMP Total Score (panel (C)) nor over Time (panel (D)).

Figure 3. *Model M08b. Expected values of Symmetrical Co-regulation as a function of (A) IMP Total Score and (B) Time; Expected values of Unilateral Co-regulation as a function of (C) IMP Total Score and (D) Time.*



2.2.2.3.2 Model M07b: FFMQ Total Score + Time.

Estimated parameters of posterior distributions for the model for Symmetrical Co-regulation and for the model for Unilateral Co-regulation as outcomes are reported on Table 2. Figure 4 depicts the conditional predictions for Symmetrical and Unilateral Coregulation as a function of FFMQ Total Score and Time. Panels (A) and (B) pertain to Symmetrical Co-Regulation, while panels (C) and (D) relate to Unilateral Co-regulation, respectively. In this case, we observed a decrease in Symmetrical Co-regulation as a function of both FFMQ Total Score and Time. Specifically, dyads with mothers with high Dispositional Mindfulness spent less time in Symmetrical Co-regulation during the interaction (panel (A)). Additionally, Symmetrical Co-regulation decreased over Time (panel (B)), similar to what occurred in model M08b. The Unilateral Co-regulation did not show any changes over Time (panel (D)) but exhibited a decrease as a function of FFMQ Total Score (panel (C)). Dyads with mothers with high Dispositional Mindfulness spent less time in Unilateral Co-regulation during the interaction.

Figure 4. *Model M07b. Expected values of Symmetrical Co-regulation as a function of (A) FFMQ Total Score and (B) Time; Expected values of Unilateral Co-regulation as a function of (C) FFMQ Total Score and (D) Time.*

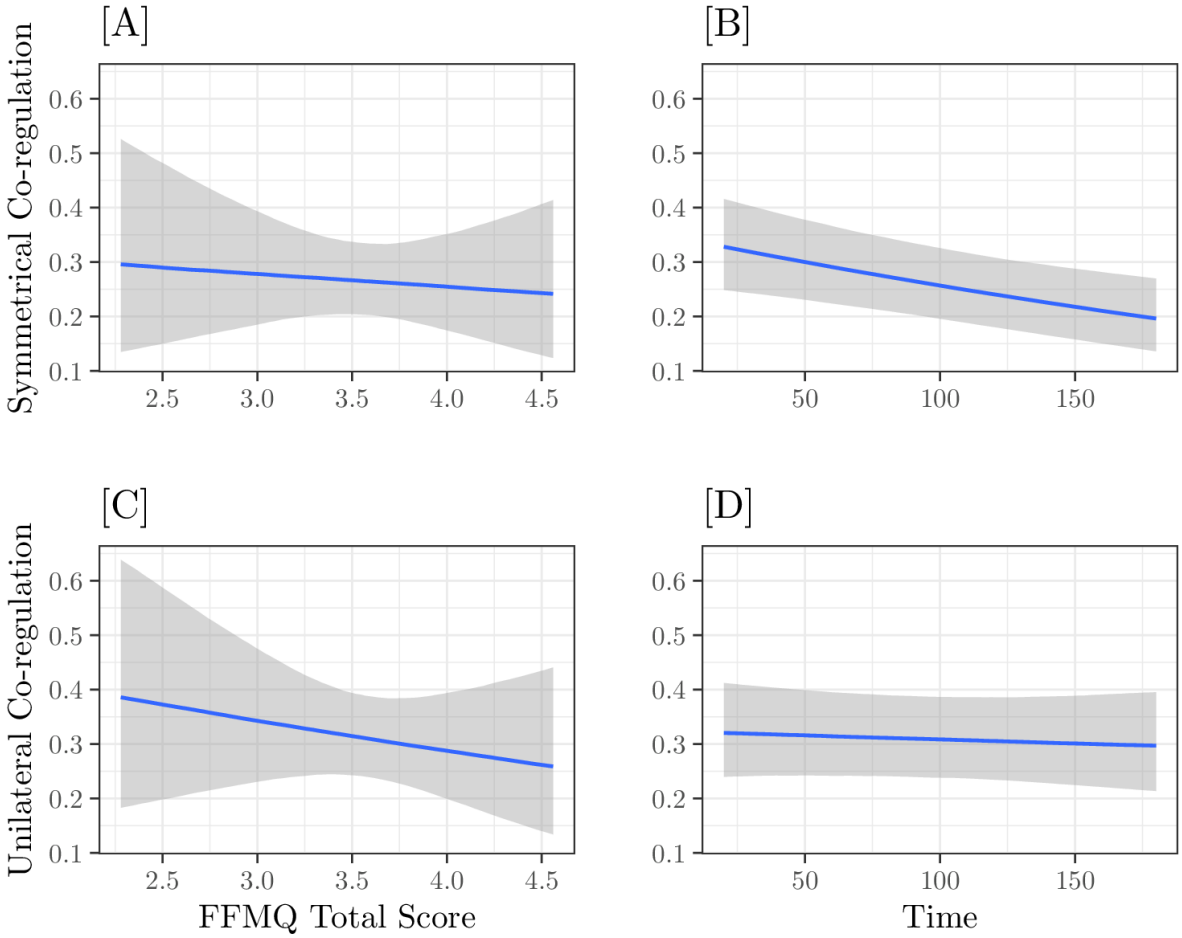


Table 2. *Estimated Parameters of Posterior Distributions for the Models M08b and M07b*

Model M08b	*Estimate (SD)*	*CI 95%*
Symmetrical Co-regulation		
IMP Total Score	0.44 (0.47)	-0.48 - 1.37
Time	-0.00 (0.00)	-0.01 – 1.00
Unilateral Co-regulation		
IMP Total Score	-0.04 (0.50)	-1.03 – 0.95
Time	-0.00 (0.00)	-0.00 – 0.00
Model M07b		
Symmetrical Co-regulation		
FFMQ Total Score	-0.12 (0.37)	-0.83 – 0.60
Time	-0.00 (0.00)	-0.01 - -0.00
Unilateral Co-regulation		
FFMQ Total Score	-0.26 (0.38)	-1.01 – 0.49
Time	-0.00 (0.00)	-0.00 – 0.00

2.3 STUDY 2

2.3.1 Method

2.3.1.1 Participants

A total of 61 mother–child dyads recruited from social media and in urban areas in the center of Italy participated in this study. All infants, aged between 6 and 13 months (*M* = 9.14, *SD* = 1.42), were Italian: 44.3% (*n* = 27) were male; 27.9% (*n* = 17) had one or more siblings. Infants were considered for inclusion if they were healthy, with no developmental delays assessed at pre-test, according to their family pediatrician. Average maternal age was 34.86 years (*SD* = 4.89; *range* = 22 - 46), and mothers had an average of 16.32 years of education (*SD* = 2.98; *range* = 8 - 21), indicating high education level (i.e., bachelor degree or higher). All fathers and 80.3% of the mothers (*n* = 49) were employed with a stable job. After parents were informed about detailed procedure and their right to withdraw at any time, their written consent was obtained. To minimize potential influence on mothers, we informed them that the study aimed to gather their feedback on the mindfulness intervention's effectiveness in inducing relaxation. The families were compensated for their participation with 25 euros. Of the 61 initial sample, 12 mothers dropped out, mainly from the control group (*n* = 10). The final sample was composed of 49 mother-infant dyads. The sample was treated in accordance with the ethical standards outlined by the American Psychological Association and the Italian Association of Academic Psychologists, and the study was approved by the Department Ethics Review Board of the University.

2.3.1.2 Procedure

Participants were randomly assigned to the control group (n = 20) or to the intervention group (n = 29).

At pre-test (T1) and 5 weeks later (T2), the same procedure described in Study 1 was applied for both groups. Dyads were video-recorded for three minutes free-play interaction (M duration in seconds = 173.37, SD = 25.5), both partners physiological functioning was recorded applying ECG sensors, and mothers completed mindfulness and parenting stress questionnaires.

Between T1 and T2 the intervention group participated to a 5-weeks mindfulness-based intervention started within a few days after the pre-test.

2.3.1.2.1 *Mindfulness Intervention*

The intervention group participated to a five-week duration mindfulness-based intervention, developed ad-hoc for this study by a mindfulness trainer. The intervention consisted in listening to five audios focused on five main mindfulness topics (see Table 3 for details). Mothers received each audio twice on specific days (Monday and Wednesday) of each week of the intervention via WhatsApp and they were asked to follow the meditation practice. Each audio was 7- to 19- minutes long and it was supplemented by instructions and by an explanation of the practice. After the practice, they were asked to fill in a short questionnaire on their enjoyment of the experience to confirm that they completed the practice.

Table 3. *Details of the 5-weeks mindfulness-based intervention applied in Study 2*

Session	Practice	Duration in minutes	Description
1	Mindful Breathing	6.59	The practice consists in paying attention to the sensation of the breath coming in and out, noticing where you feel it in the body without trying to change it.
2	Body Scan	19.03	The practice consists of paying attention to body parts and body sensations in a gradual sequence from the feet to the head.
3	Mindful Walking	10.45	The practice consists of paying attention to our feet and feeling the contact with the floor or ground with each step, with the aim of being aware of our surroundings and body sensations while walking.
4	Expanded Awareness	19.03	The practice aims to notice that the awareness can be "restricted" and "expanded" whenever desired. From breath to body, from sounds to thoughts, everything can be observed and received with awareness and each phenomenon, arrive, have a peak, an unfolding, and then leave us.
5	Loving Kindness	6.54	The practice consists of directing a positive flow of intentions and auspices towards oneself with the consequence of amplifying states of joy and well-being.

2.3.1.3 Measures

2.3.1.3.1 *Maternal Dispositional Mindfulness and Maternal Mindful Parenting*

Maternal dispositional mindfulness and maternal mindful parenting were measured respectively using the Five Facets Mindfulness Questionnaire (FFMQ; Baer et al., 2006) and the Interpersonal Mindfulness in Parenting scale (IMP; Duncan, 2007, 2023), as in Study 1. Cronbach's αin the current study was .77 and .81 for the FFMQ Total score, and .70 and .73 for the IMP Total Score respectively at T1 and T2.

2.3.1.3.2 *Behavioral Attunement*

Infant and mother behaviors were coded using the Infant Caregiver Engagement Phases (ICEP; Weinberg & Tronick, 1998). The ICEP contains a set of mutually exclusive mother

and infant codes and combines facial expressions, the direction of gaze, vocalizations and behavior allowing to code the positive/neutral/negative affect of each member of the dyad (see Tronick et al 2005 for further details). For the purpose of the present study, we focused on infant positive affect (Infant Positive), mother social monitor with positive vocalization (Mother Positive Voc.), and mother positive affect (Mother Positive). Infant positive affect was coded when the infant was smiling at the caregiver and/or cooing, laughing, babbling or squealing while looking at the caregiver. For mothers, social monitoring with positive vocalization was coded when the mother was focused on the infant's face with occasional smiles and positive vocalizations (i.e. infant-directed speech, singing, talking). Social positive engagement was coded if the mother expressed positive affect in smile, laughter or by making playful faces. The combination of infant and maternal codes was applied to explore behavioral attunement. Specifically, we computed the total duration of the following combinations: mother positive-infant positive (M Positive-I Positive), mother social monitor with positive vocalization- infant positive (M Positive Voc.-I Positive). The total duration of matched affective states (the infant and the mother sharing the same affect: Affective Match) and matched attention (the infant and the mother looking at each other, no matter what affect they express: Attentive Match) were also computed.

The proportional duration of each code on the total duration of the interaction was calculated and used for analyses. As in Study 1, intercoder reliability was assessed by having a second trained observer who independently coded a randomly selected 20% of the videos. Mean *Cohen's K* across codes was 0.72.

2.3.1.3.3 *Physiological Attunement*

Mother and infant RSA during the interaction were estimated each 20 sec using the same procedure of Study 1. RSA attunement was based on infants' and mothers' RSA cross-

correlation where the lag-0 cross-correlation was estimated. Each dyad with at least three RSA data (three 20 sec intervals) resulted with a measure of physiological attunement (*M* = .54, *SD* = .45, *range* = -.998 - .983). Positive correlations indicated a positive association between mother's and infant's RSA, negative correlations indicated a negative association. RSA attunement was available for 37 dyads (19 of the control group and 18 of the intervention group) at T1 and 40 dyads (17 of the control group and 23 of the intervention group) at T2. The reason of the reduction of available data is due mainly to technical reason (i.e the ECG sensor moved during the interaction and failed to record data).

2.3.1.3.4 *Parenting Stress*

Mothers were asked to complete the Parental Distress scale (PSI PD, Abidin, 2006; Guarino et al., 2016) of the Parenting Stress Index Short Form questionnaire. The questionnaire is commonly used to measure stress in the parent–child system and to identify those caregivers most in need of support and the PSI PD scale indicates the perceived stress related to the parental role. The scale includes 12 items rated from 1 to 5 on a Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). High values indicate more parenting stress. Scores were expressed as means. The internal consistency of the current sample was satisfactory and equal to Cronbach's α .86 for PSI PD, as the α = .80 of the Italian validation study (Guarino et al., 2016).

2.3.1.5 Analytic Plan

Analyses were conducted using the same statistical software and packages detailed for Study 1 (see section 2.1.3.5).

First, we explored univariate and bivariate distributions of target variables. Afterwards, we compared and explored a series of regression models adopting a Bayesian approach for

estimating parameters and using a mixed model approach, incorporating the subject random intercept for taking into account the pre and post intervention assesment.

For exploring the effectiveness of the intervention on outcome variables (Mindful Parenting, Maternal Dispositional Mindfulness, Parenting Stress, Physiological Attunement, Symmetrical and Unilateral Co-regulation) we computed the effect of the interaction between Time (T1 and T2) and the intervention condition (Control Group and Intervention Group).

2.3.2 Results

2.3.2.1 Descriptives and Correlations at T1

At T1, as expected (see Table S4), high correlations evidenced that high mindful mothers reported to experience parenting as a less stressful experience.

Concerning individual maternal behaviours, mothers with high mindful parenting and dispositional mindfulness showed more social monitor with positive vocalizations.

Maternal mindfulness (Mindful Parenting and Maternal Dispositional Mindfulness) was associated with high dyadic physiological attunement (measured with RSA cross-correlation), even if the association was low.

Concerning dyadic variables, only the stress perceived in the parenting role (PSI PD) was associated with less mother social monitor with positive vocalization when the infant was positive and with less affective and attentive match. This indicated that dyads with less stressed mothers showed a better dyadic behavioural attunement.

Univariate statistics of both the intervention and control group, at both T0 and T1, are presented in the Supplementary Materials of *Chapter 2* (see Table S5).

2.3.2.2 Effect of the Intervention

2.3.2.2.1 Outcomes: Mindfulness and Parenting Stress

Table S6 in the Supplementary Materials of *Chapter 2* displays the interaction parameter (Intervention condition X Session) estimates with 90% Credibility Interval (CI) for mindfulness and parenting stress (IMP Total Score, FFMQ Total Score, and PSI PD). See Figure S9 in the Supplementary Materials of *Chapter 2* for expected values of the models, and Figure S10 for posterior distributions of interaction parameters (black lines) compared with priors (red lines), and Figures S11, S12, and S13 for model diagnostics.

Posterior distributions show a trend of increase in the intervention group after the intervention of Maternal Dispositional Mindfulness (FFMQ Total Score) and a trend to decrease of Parenting Stress (PSI PD). For both variables the CIs included the zero, but the lower bound of the CI was very low in terms of absolute value and the upper bound of the CI was close to a relatively moderate effect size for FFMQ Total Score and the opposite situation is present for PSI PD. Almost no changes were identified for Mindful Parenting (IMP Total Score). As can we see from the CIs, for IMP Total Score the interaction value was cantered almost on the zero and the lower and upper CI were almost the same in terms of absolute values. Thus, the intervention increased Maternal Dispositional Mindfulness and decreased Parenting Stress.

2.3.2.2.2 Outcomes: Mother-Infant Interaction Variables

Table S7 displays the interaction parameter estimates (Intervention condition X Session) for mother-infant interaction variables (see previous section for further details). See Figure S14 in the Supplementary Materials of *Chapter 2* for expected values of the models, Figure S15 for posterior distributions of interaction parameters (black lines) compared with priors (red lines), and Figures S16-S22 for model diagnostics.

None of the observed variables showed a trend to increase after the intervention as can be seen by posterior distribution parameters and related CIs.

2.5 General Discussion

We conducted two exploratory studies with the main aim to explore the role of maternal mindfulness in promoting mother-infant interpersonal functioning both physiologically and behaviorally, during spontaneous mother-infant face-to-face interactions at two crucial points of infant development (4 and 9 months). We hypothesized that dyads with high maternal mindfulness would be characterized by better behavioral and physiological attunement (Study 1) and that an intervention aimed to improve maternal mindfulness would improve the quality of dyadic attunement (Study 2).

Overall, the results marginally supported our hypothesis. With respect to Study 1, as expected, maternal mindfulness – dispositional and mindful parenting – was associated with stronger mother-infant physiological attunement during the interaction at 4 months. Even if the strength of the interactions were low, and a high physiological attunement was evidenced in the whole group of dyads, high maternal mindfulness was associated with a stronger association between infant and maternal RSA during the interaction indicating stronger physiological attunement. This association did not emerge in Study 2, with dyads with high mindful mothers showing only a slight positive association with mother-infant RSA correlations.

In line with previous studies that reported how individual adult mindfulness was associated with physiological attunement during dyadic interactions (e.g., Haas & Langer, 2014; Lampinen et al., 2018), this study expands the emerging literature on the potential role of mindfulness on physiological interpersonal functioning also in mother-infant dyads. Mothers who pay more attention to their own present-moment internal images, thoughts,

sensations, and emotions, accepting them without judgment and without getting taken over by it (Kabat-Zinn, 2003) and/or more aware of what happens moment-by-moment during the interaction with their own infants (Pratscher et al., 2019) were more connected with the physiological activation of their infants both when he/she was calm (high RSA), and when he/she was upset (low RSA). This stronger physiological attunement of more mindful mothers to the stressed infant, indicated by high maternal cortisol level, was also previously reported during the stressful condition of the still-face paradigm at 6 months (Laurent et al., 2017).

Because mother-infant interaction supports infant emotional self-regulation, our findings suggest that maternal mindfulness could help mothers to self-regulate their own physiological activation during the interaction in order to serve as external regulator of their own baby's affect (Porges, 2001, 2007; Porges & Furman, 2011). However, the high association between mother and infant RSA in our sample (see Study 1) hides the effect of mindfulness. It may be that mindfulness' effects on physiological attunement are stronger during conditions of stress, when the ability of the mother to physiologically regulate her activation is more involved. Future studies should explore this association in other mother-infant conditions to confirm our findings.

The exploration of individual and dyadic behaviors of mothers in association with their mindfulness ability evidenced interesting results at 4 and at 9 months. Individual maternal behaviors were explored only at 9 months, evidencing more time spent talking to the infant with positive vocalizations of more mindful mothers (both high in mindful parenting and in dispositional mindfulness). At 9 months the infant enters in the secondary intersubjectivity phase (Trevarthen & Aitken, 2001; Trevarthen & Hubley, 1978) showing an increasing interest in the exploration of the environment. The role of the mother is to support this exploration by commenting actions and the focus of interest of the infant. At this stage

maternal talking is also crucial to support infant language development. We might suppose that more mindful mothers are more able to adapt their interactive modality to the needs of the infant, spending less time in shared face-to-face positive affect and more in talking and communicating to a more interactive and communicative infant. Longitudinal studies could help understanding if this interactive modality promotes a more adaptive development in infants of mindful mothers.

Dyadic attunement was explored with different microanalytical coding systems, both focused on the exploration of shared attention and affect. At 4 months, mindful parenting was directly associated to more behavioral attunement, thus more moments of shared attention and affect (i.e. symmetrical co-regulation), whereas maternal dispositional mindfulness was associated to less moments during which the mother leads the interaction leaving less space to the infant (i.e. unilateral co-regulation), showing in both cases a better quality of mother-infant co-regulation in dyads with more mindful mothers. Mothers more aware of what is happening here-and-now during the interaction with their infant and more aware of and connected to own here-and-now inner world, may be more present and attuned to infant's behavioral cues, non-reacting to them but responding with awareness, and supporting the baby to co-create a moment of mutual innovation in which each partner is active, anticipates the actions of the other, and adds something new – such as smiles and coos - that lets the interaction to proceed without interruptions (Fogel, 1993). At 9 months, this association was not confirmed, even if a strong association emerged among mindfulness scales and levels of maternal perceived stress experienced during the interaction with their infants. Maybe while mindfulness has an effect on face-to-face dyadic attunement at 4 months, during the second half of the first year of life when the infant increases his/her exploration of the environment, mother-infant attunement should be examined exploring different interactive dimensions. An

example could be the analyses of the ability of the mother to follow the focus of interest of the infant such as how much the mother uses verbal appropriate comments.

Because previous studies explored mother-infant interactions including wide infant's age ranges, comparisons with previous findings are difficult to accomplish. However, our results are consistent with studies reporting that mindful parenting was associated to more positive parent-child interactions, even if at different ages. Specifically, maternal mindful parenting was related to dyadic synchrony of positive facial expressions (Potharst et al., 2021) and more children's responsiveness in turn-taking (Zeegers et al., 2019) in large age samples including infants, toddlers, and preschoolers up to 48 months. Moreover, mindful parenting was directly related to parental-reported parent-child attachment in preschoolers (Zhang et al., 2019) and to more positive mother-adolescent interactions, more positive parenting, maternal communication skills and warmth (Duncan et al., 2015).

Altogether, our results suggest a role of mindful parenting and maternal dispositional mindfulness on mother-infant physiological and behavioral attunement highlighting how mindfulness could promote maternal sensitivity and responsiveness and maternal ability to adapt her behaviors to what previous experiences have taught them about how the infant will respond (Evans & Porter, 2009). However, our findings highlight the need to consider infant age and developmental needs in interpreting findings.

With respect to Study 2, contrary to our hypothesis, dyads of mothers who participated in the mindfulness-based intervention did not improve the quality of mother-infant physiological and behavioral attunement compared to dyads of mothers who did not. However, in dyads of mothers who participated in the intervention there was a trend towards a reduction in parenting stress after participating to the intervention. Consistent with this result, a meta-analysis by Anand et al. (2023) evidenced that the impact of mindfulness-based interventions for parents may be more efficacious intrapersonally (i.e. reduced parental

stress), rather than interpersonally, and especially when both parents and infants are engaged in the training. Moreover, a recent systematic review reported that mindfulness-based interventions promoted the quality of mother-child relationship by the promotion of positive parenting attitude toward the child (Fernandes et al., 2022). Considering this, it is possible that the intervention used in our study did not work directly on the mother-infant dyadic attunement but that the effect on dyadic functioning could be mediated by changes in other variables (e.g. maternal well-being, parenting styles) that we did not consider due to the limited sample size. Future studies with a larger sample should consider those variables and explore their moderating role on the intervention's effect on the mother-infant physiological and behavioral attunement.

Moreover, previous research reporting the effectiveness of mindfulness-based interventions in improving the quality of the mother-infant relationship used mainly maternal-reports (e.g., Shreffler et al., 2019; Potharst et al., 2017). Those results, with our reported reduction in parenting stress, might be interpreted as an increased awareness fostered by mindfulness practice that leads mothers to be more aware of their parenting abilities, reporting a more accurate evaluation of the quality of the relationship with their own infants. More empirical findings are needed to confirm if to this increased awareness also correspond a better observed quality of the interaction.

Furthermore, it is possible that the effect of the intervention is more evident during a stressful condition, a situation in which the effect of mindfulness may be stronger, then during face-to-face interactions as the condition explored in the present study. Future studies should take this into account.

Finally, mothers who attended the mindfulness-based intervention reported only a slight improvement in their dispositional mindfulness. The mindfulness literature underlined the limit of mindfulness self-reports that are often biased with mothers more aware of their

present-moment internal experience also more aware of the moments in which they are not and often reporting lower mindfulness. This, could contribute to the stability of the scores of mindful parenting (Per et al., 2020). Additionally, it must be considered that our sample consisted of low-risk mothers with high level of mindfulness at baseline. Future observational research should investigate the effect of mindfulness-based interventions in clinical at-risk samples (e.g., depressed or anxious mothers).

The current exploratory findings should be interpreted in the context of several limitations. First, in both studies, our sample was relatively small and only composed by self-selected mothers limiting the generalizability of findings to fathers and to other mothers less interested in the topic. The effects suggested here should be explored in larger samples. Moreover, we assessed the self-reported number of audios listened by mothers, which makes it difficult to know the trustworthiness of this information. This aspect may have adversely influenced our findings. Lastly, we explored the effects of mindfulness only on face-to-face free-play interactions. As evidenced by previous work (Laurent et al., 2017), the positive effect of maternal mindfulness could be stronger when mothers have to deal with a stressed infant, e.g. during the Still-Face Paradigm. Additionally, at 9 months of age the effect of mindfulness could be more pronounced when considering other interactive dimensions (i.e., triadic interaction) or exploring the effects on infant socio-emotional development. Future longitudinal studies should explore the effects of mindful parenting and maternal dispositional mindfulness on the quality of mother-infant physiological and behavioral attunement comparing face-to-face, play with toys interactions, and stressful interactive conditions.

Despite these limits, our exploratory research has several strengths. Research studying the role of maternal mindfulness on observed mother-infant interaction is yet scarce. While previous studies have mainly focused on mindful parenting, large age samples, and on

mother-infant physiological and behavioral functioning separately, this is the first study that highlights the protective role of mindfulness on both levels of mother-infant interaction simultaneously with observational measures at 4 and 9 months of infant age.

Even if our exploratory studies are composed by small and self-selected mothers' samples, both suggested that maternal dispositional mindfulness and mindful parenting are important protective factor that could support mothers to better attune to infant physiological and behavioral cues, a crucial maternal ability to promote a positive mother-infant interaction and to support infant emotional development (Feldman, 2007; Stern, 1985). Thus, mindfulness could be applied in screenings aimed to identify more at-risk dyads. Available interventions developed with the aim to promote positive parenting (Juffer et al., 2018) should consider maternal mindfulness as an individual factor that could affect the ability of the parent to attune to infants' signals and therefore to be sensitive to their needs. Further, mindfulness-based interventions could be offered mainly to more at-risk mothers in order support them in managing stress, enhancing emotion regulation and well-being, and in developing more appropriate dyadic interactions with their own infants. Indeed, these interventions could equip parents with effective coping strategies and practical tools that could be integrated into daily routines to deal with the challenges of parenting (e.g., deep breathing to stay calm during stressful moments and/or fully engaging in activities with the child). Because interventions based on mindfulness practices, especially those as our conducted with audios, are cheap and simple to implement, they may be particularly suitable for mothers of young infants who are already overburdened and have little time.

Finally, considering that our sample included non-clinical mothers, future studies investigating the effect of mindfulness-based interventions in at-risk populations could contribute to interesting insights for applied settings. These interventions may be particularly effective for at-risk populations and may significantly prevent the effects of maternal

psychological difficulties (e.g. depression or anxiety) on mother-infant attunement, with cascade consequences in socio-emotional infant developmental domains.

2.6 Acknowledgements

We would like to thank Elena Cristalli for developing the mindfulness intervention. Special thanks to all the infants and mothers who have participated in the research.

Chapter 3 | Maternal Dispositional Mindfulness and Mother-Child Relationship: The Mediating Role of Emotional Control During Parenting

Passaquindici, I., Nardozza, O., Sperati, A., Lionetti, F., D'Urso, G., Fasolo, M., & Spinelli, M. (2024). Maternal dispositional mindfulness and mother–child relationship: The mediating role of emotional control during parenting. *Child: Care, Health and Development, 50*(3), e13264. https://doi.org/10.1111/cch.13264

Abstract

Background: The literature supports the role of parental dispositional mindfulness on parent-child relationship quality. However, little is known about the connection between these two aspects.

Objective: The aim of this study was to investigate whether emotion regulation during parenting, i.e., the ability to control negative emotions, mediated the association between parental dispositional mindfulness and parent-child relationship quality. The study also explored the moderation role of child age on the association between parental dispositional mindfulness and parent's ability to control negative emotions during parenting.

Methods: Participants were 635 mothers of children aged between 12 months and 5 years. Mothers completed self-report questionnaires to measure maternal dispositional mindfulness, mother-child relationship quality and maternal control of negative emotions during parenting.

Results: Results showed that maternal ability to control negative emotions during parenting partially mediated the association between maternal dispositional mindfulness and mother-child relationship quality. Moreover, the moderation role of child age indicated that the association between maternal dispositional mindfulness and maternal ability to control negative emotions during parenting was stronger for older children's mothers.

Conclusion: Dispositional mindfulness has a protective role for the quality of parenting and the mother-child relationship. Theoretical and practical implications are discussed.

Keywords: mindfulness, parenting, emotion regulation, mother-child relationship

3.1 Introduction

Mindfulness - defined as "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p.145) – has been mainly explored as an intrapersonal ability to perceive, be aware, recognize and regulate many aspects of own inner experience (e.g., emotions and behaviors). Thus, mindfulness, and particularly the ability of describing and non-reacting to inner experience, reduces the intensity of emotional responses, increases tolerance, enhances emotional recovery, reduces negative evaluation of individual emotional responses (Bränström et al., 2011; Davis et al., 2019; Harrington et al., 2014), allowing the implementation of more functional emotion regulation strategies (Goodall et al., 2012; Hölzel et al., 2011; Iani et al., 2018; Roemer et al., 2015).

In addition to this, there is a growing interest in the study of mindfulness as an interpersonal ability and its effect on the enhancement of relationship quality. Several studies highlighted how adults' mindfulness was positively associated with their secure attachment (Pepping et al., 2013), friendship quality (Pratscher et al., 2018) and marital satisfaction (Khaddouma et al., 2015; Williams & Cano, 2014). Another strand of literature investigated the protective role of mindfulness in supporting the quality of the fundamental intimate interpersonal relationship that is parent-child relationship (Fernandes et al., 2022).

Indeed, recent studies showed that parental mindfulness was positively associated with mother's attachment to the fetus (Brassel et al., 2020; Hicks et al., 2018), and with the quality of parent-child relationship during infancy (Cohen, 2010; Derakhshanpour et al., 2022; Fernandes et al., 2021a), childhood (Brassel et al., 2020; Potharst et al., 2021), and adolescence (Medeiros et al., 2016; Turpyn & Chaplin, 2016; Duncan et al., 2015).

Despite this empirical evidence, the mechanism of the association between parental mindfulness and the quality of parent-child relationship is not clear yet. The attachment theory evidenced that the quality of parent-child relationship is affected by many factors, the main of which refers to the ability of the parent to sensitively notice, understand, and respond to infant's needs (Ainsworth, 1985; Bowlby, 1988). Sensitive responding and parenting behaviors are in turn facilitated by parent's capacity to manage the experience and expression of their own emotions in caregiving contexts, irrespective of the affective state of the child (Gross, 2014; Rutherford et al., 2015). Parents more able to regulate their emotions do not allow their negative emotional experiences to affect the quality of their relationship with their children.

Considering the positive association between mindfulness and individual emotion regulation (Goodall et al., 2012; Hölzel et al., 2011; Iani et al., 2018; Roemer et al., 2015), we hypothesize that emotion regulation could be the mechanism through which parental mindfulness could improve parent-child relationship quality. Parents with high mindfulness can connect with their inner emotional experience and to effectively regulate their distresses. The more effective emotion regulation allows them to have awareness of what is happening during parent-child interactions and to find more functional strategies to respond to the child, despite their own emotional experiences. This could in turn foster a good parent-child relationship (Parent et al., 2016; Snyder et al., 2012).

Despite some evidence of association between mindfulness and emotion regulation in samples of parents (e.g., Derakhshanpour et al., 2022), and mindfulness and positive parent-child relationship (e.g., Fernandes et al., 2022), to the best of our knowledge no studies have explored the effect of mindfulness on emotion regulation during parenting and the cascade effect on the quality of parent-child relationship. Because the quality of parent-child relationship is associated with short- and long-term effects on several domains of child

developmental (e.g., Evans & Porter, 2009; Feldman et al., 1996; Rocha et al., 2020; Ainsworth, 1985; Sansavini et al., 2015), it is particularly relevant to explore the potential protective role of parental mindfulness on the quality of parent-child relationship.

To fill this literature gap, the present study investigated whether emotion regulation during parenting, i.e., the ability to modulate owns negative emotions, in order to achieve parenting-related goals (Pereira et al., 2017), may mediate the association between parental dispositional mindfulness and the quality of parent-child relationship. Unlike most previous studies that focused on mindful parenting - a non-judgmental present-centered attention to parent-infant interactions (Pratscher et al., 2019) – it was decided to investigate the role of dispositional mindfulness as an individual trait in promoting the quality of parent-child relationship.

The objectives of the study can summarize into the following hypotheses:

- High parental dispositional mindfulness is associated with the regulation of negative emotions by parents.
- High parental dispositional mindfulness is associated with a high quality of the parent-child relationship.
- Emotion regulation during parenting mediates the association between mindfulness and the quality of the parent-child relationship.
- Child age moderates the association between parental dispositional mindfulness and emotion regulation during parenting in the previously described model, considering that parenting/caregiving tasks differ according to child age (Moreira & Canavarro, 2018).

3.2 Methods

3.2.1 Participants

The sample included 635 mothers (*M* = 36.97 years, *SD* = 4.98) of children aged between 12 months and 5 years. A power analysis suggested that a sample of N = 635 was sufficient to achieve power that approaches 0.80 (with a critical alpha of 0.05) to test the hypothesized moderated mediation model. The sample had the following characteristics: 606 mothers were Italian, all lived in Italy. Most of the sample (91.6 %) had a medium high socio-economic status. Mean years of education indicated high maternal education (*M* = 16.13 years, *SD* = 4.07). Children's mean age was 53.53 months (*SD* = 24.28), 364 were boys, 327 singleton, and 493 first-borns.

3.2.2 Procedures

Mothers were recruited online following a snowball procedure. Recruitment occurred via social media platforms (e.g., advertising the study via Facebook posts) aiming to reach a sample from different areas that was as representative as possible. We asked mothers to complete an anonymous online survey (Weygold et al., 2013; Vernon & Moretti, 2022; McDonald et al., 2022). Informed consent was obtained from all participants who were informed about the study description and ethical conditions. The survey included screening questions to identify exclusion criteria of participants (child's age, prematurity, and child's diseases). Of the 729 initial sample, 27 were excluded because the child had a disease, 6 because the child was younger than 12 months old, 11 because were not mothers, and 63 didn't complete the full set of questionnaires. The final sample consisted of 635 mothers. The study was approved by the Ethical Committee of the University G. d'Annunzio of Chieti-Pescara.

3.2.3 Measures

3.2.3.1 Maternal dispositional mindfulness

Maternal dispositional mindfulness was measured with the Five Facet Mindfulness Questionnaire-Short Form (FFMQ-SF; Wilkinson & Hao, 2021). The FFMQ-SF is composed of 20 items selected by the original 39-items of the FFMQ (Baer et al., 2006). Participants were asked to indicate to what extend each item is true for them on a Likert scale ranging from 1 - *never or rarely true* - to 5 - *very often or always true* (e.g., "When I do things, my mind wanders off and I'm easily distracted", "I watch my feelings without getting lost in them", "I tell myself that I shouldn't be thinking the way I'm thinking"). High scores indicate high dispositional mindfulness. The total score was used in the present study. Cronbach's αwas .75.

3.2.3.2 Maternal lack of emotional control during parenting

Maternal emotion regulation during parenting was assessed with the five items of the Parents' emotional lack of control subscale of the Parent Emotion Regulation Scale (PERS; Pereira et al., 2017). The PERS is a 20 items self-report aiming to assess the regulation of negative emotions in the context of parenting on a Likert scale ranging from 0 – *never or almost never* – to 4 – *always or almost always* (e.g., "When I am sad, anxious or angry, I can reasonably control my feelings/ emotions in front of my child", "I do get angry with my child, only because I am nervous or angry with other issues of my life"). High scores indicate low regulation of negative emotions in the parenting context. Cronbach's αin the current study was .66, similar to the .69 α of the validation study (Pereira et al., 2017).

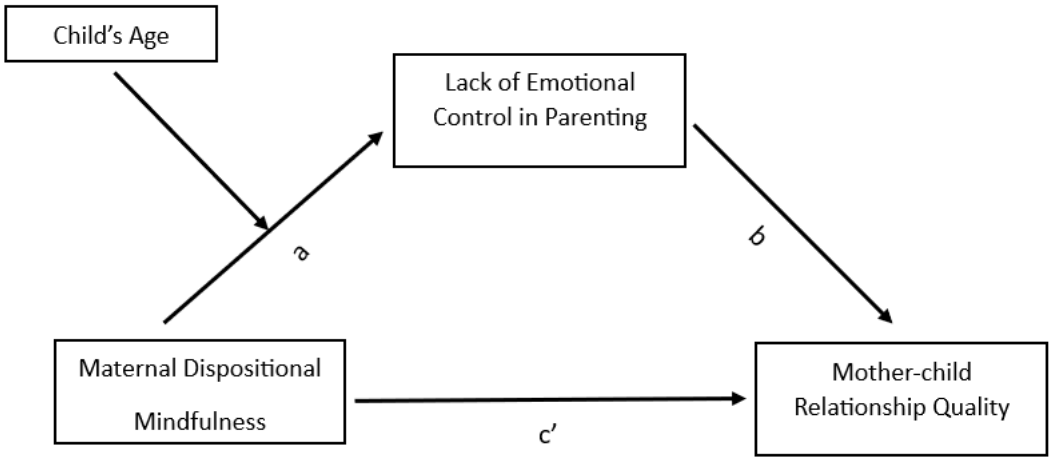
3.2.3.3 Mother-child relationship quality

Mothers completed the Maternal Postnatal Attachment Scale (MPAS; Condon & Corkindale, 2007) to assess the quality of mother-child relationship. The MPAS consists of 19 items on a 5-point Likert scale ranging from 1 - *never* - to 5 - *very frequently* (i.e., "I spend as much time as possible playing with my child", "When I am with the child, I am happy and satisfied"). High scores indicate a high relationship quality. The total score was used in the current study. Cronbach's α was .85.

3.2.4 Analytic Plan

Associations among study variables were explored with Pearson's correlations. The mediating role of maternal lack of emotional control during parenting (mediator) in the association between maternal dispositional mindfulness (predictor) and mother-child relationship quality (outcome) was examined with a mediation model conducted using SPSS PROCESS macro for SPSS version 4.0 (Hayes, 2017) after standardizing scores. Mother's years of education were entered as covariate. Then, in order to examine the moderating effect of child age (as a continuous variable) on the association between maternal dispositional mindfulness and the lack of emotional control during parenting, we added the interaction effect to the mediation model and a moderated mediation model was run (see Figure 1).

Figure 1. *The Moderated Mediation Model.*



Note. The proposed conceptual model for associations between maternal dispositional mindfulness and mother-child relationship quality as mediated by maternal lack of emotional control in parenting, with child's age moderating such an indirect effect. Maternal years of education were used as covariate.

Finally, we followed up the interaction effect by a conditional interaction plot with simple slopes. For purely representative purposes, the relationship between mother's dispositional mindfulness and lack of emotional control during parenting were plotted considering child age in months as a continuous variable (i.e., child months below 16th percentile, at 50th percentile and above 84th percentile). The bootstrap method was utilized to generate 95% confidence intervals (CI; Hayes, 2017; Preacher et al., 2008) to test the significance of the effects with 5,000 resamples.

3.3 Results

3.3.1 Preliminary Analyses

Descriptive statistics and Pearson's correlations among variables are presented on Table 1. Mothers of older children reported higher lack of emotional control during parenting, and lower mother-child relationship quality. Older mothers and mothers with higher education reported higher dispositional mindfulness and better mother-child relationship quality. Mothers with higher education reported less lack of emotional control during parenting, and mothers with higher dispositional mindfulness reported higher mother-child relationship quality. A negative association was present among maternal mindfulness and lack of emotional control during parenting.

Table 1. *Means (M), Standard Deviations (SD), and Pearson's Correlations of Study Variables.*

		M(SD)	1	2	3	4	5	6
1	Children's age (months)	53.53(24.28)	—	.28***	.05	.04	.24***	-.21***
2	Mothers' age (years)	36.97(4.99)		—	.18***	.19***	.02	-.03
3	Maternal years of education	16.01(4.98)			—	.21***	.02	-.14***
4	Maternal dispositional mindfulness	3.91(.50)				—	-.38***	.39***
5	Lack of emotional control in parenting	1.76(.58)					—	-.58***
6	Mother-child relationship quality	3.92(.50)						—

Note: *** p = < .001

3.3.2 Mediation and moderated mediation analyses

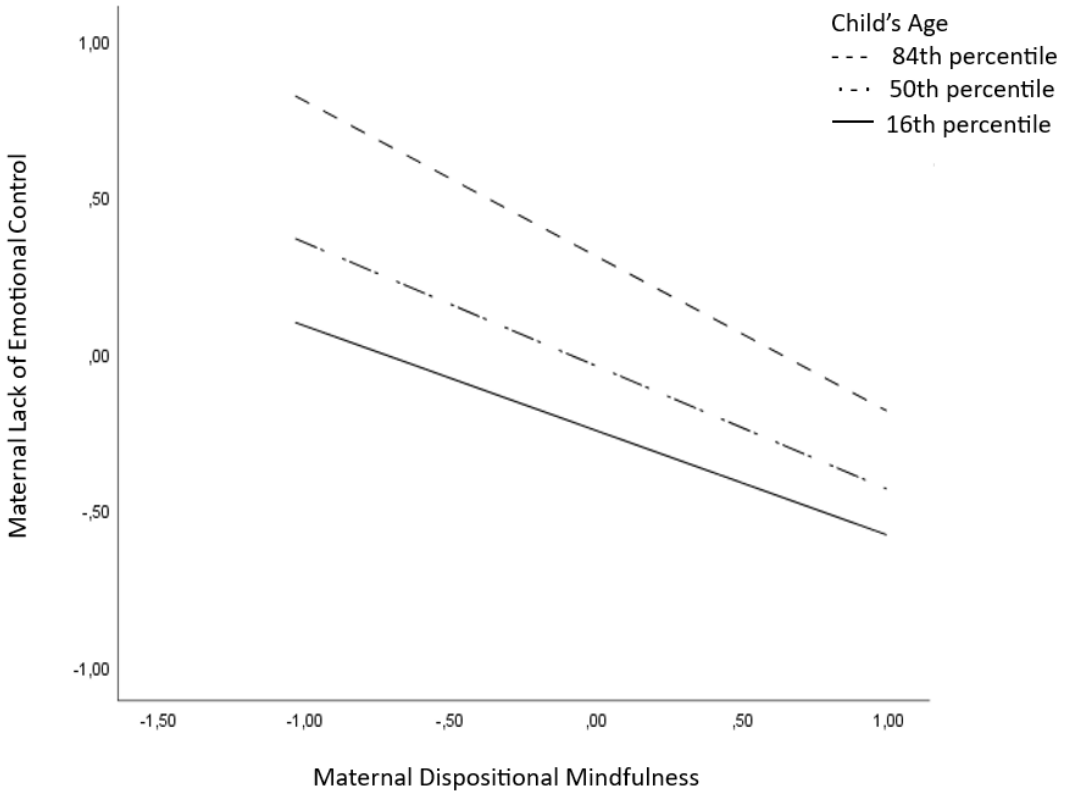
Results of the mediation and moderated mediation models are summarized in Table 2. High dispositional mindfulness significantly predicted low lack of emotional control during parenting, path a: β = - .398 p < .001, and high mother-child relationship quality, path c: β = .243, p < .001. Low lack of emotional control during parenting (that means high regulation of negative emotions during parenting) predicted a high quality of mother-child relationship, path b: β = -.484, p < .001. Maternal dispositional mindfulness indirectly predicted the quality of mother-child relationship through the ability of the mother to control negative emotions during parenting. path c': β = .193, 95% CI [.15, .24]. Overall, these results confirmed that the beneficial effect of maternal dispositional mindfulness on the mother-child relationship is partly explained by the mediating role of maternal lack of emotional control during parenting. Subsequently, we tested the moderating role of child age in the relationship between maternal dispositional mindfulness and lack of emotional control during parenting (see Table 2). Findings showed a significant effect of the interaction between maternal dispositional mindfulness and child age on the level of maternal lack of emotion regulation during parenting. When the interaction term was added the model goodness-of-fit significantly improved, R^2-change = .006, F(1, 630) = 4.779, p < .05.

To represent the interaction effect, we plotted simple slopes for child months below the 16th percentile, at the 50th percentile and above the 84th percentile (Figure 2).

Figure 2 showed that maternal dispositional mindfulness significantly predicted maternal lack of emotional control for mothers of all children, with a greater effect for mothers of older children than mothers of younger ones. In other words, at low levels of maternal dispositional mindfulness, mothers of older children reported greater lack of emotional control in parenting than mothers with younger children. In the context of high levels of dispositional mindfulness, mothers of older children showed lower levels of lack of

emotional control during parenting similar to mothers of younger ones. The conditional indirect effects for high (84th percentile), medium (50th percentile), and low (16th percentile) levels of the moderator child's age were, β = .241, 95% CI [.04, .17], β = .192, 95% CI [.02, .15], and β = .163, 95% CI [.02, .12] respectively.

Figure 2. *Conditional interaction plot. Each line represents the relation between maternal dispositional mindfulness and maternal lack of control conditioned to the 16th, 50th and 84th percentile of child's age (N = 635).*



Note. Child age moderated the association between maternal dispositional mindfulness and maternal lack of emotional control. The effect was stronger for mothers of older children.

Table 2. *Results of the mediation model and moderated mediation model*

	Mediation Model: Direct Effects					
Outcome	Predictors	*β*	*R2*	*SE*	*t*	*p*
Mother-child relationship quality	Maternal dispositional mindfulness Maternal years of education	.24	.40	.03	7.10	< .001
Lack of emotional control in parenting	Maternal dispositional mindfulness Mother's years of education	-.40	.15	.04	-10.63	< .001
Mother-child relationship quality	Lack of emotional control in parenting	-.48	.40	.03	-14.44	< .001
	Total Effect Model					
Maternal dispositional mindfulness → Lack of emotional control → Mother-child relationship quality		*β* .44	*R2* .20	*SE* .04	*t* 11.99	*p* < .001
	Indirect effects					
		β		*SE*	*LLCI*	*ULCI*
Mediator: Lack of emotional control in parenting		.19	/	.02	.15	.24
	Moderated mediation model: Interaction					
		β		*R2-chng*	*SE*	*p*
Maternal dispositional mindfulness X Child's Age		-.07	/	.0059	.03	.03
	Indirect effects of moderator					
Level		*Effect*		*SE*	*LLCI*	*ULCI*
Low (16th percentile)		.16	/	.02	.11	.21
Moderate (50th percentile)		.19	/	.02	.15	.24
High (84th percentile)		.24	/	.04	.17	.32
Index of moderated mediation		.04	/	.02	.01	.07

3.4 Discussion

The main aim of our study was to investigate the mediation role of emotion regulation during parenting (i.e., lack of emotional control) on the association between maternal dispositional mindfulness and the quality of mother-child relationship. Results showed how maternal dispositional mindfulness predicted directly and indirectly – through a better ability to control negative emotions during parenting - mother-child relationship quality. Mothers who were more aware of what happens moment-by-moment in the surrounding environment and who paid more attention to their own internal images, thoughts, sensations, and emotions, accepting them without judgment and without getting taken over by it, all aspects directly related to mindfulness (Kabat-Zinn, 2003), reported a better relationship with their child. These results are in line with previous studies conducted with pregnant women and mothers of adolescents (Derakhshanpour et al., 2022; Fernandes et al., 2021; Turpyn & Chaplin, 2016), highlighting the relevance of maternal mindfulness as an individual general trait in promoting the quality of mother-child relationship. This may suggest the relevance of mindfulness-based interventions focused on promoting individual dispositional, and not necessarily context-specific for parenting (i.e., mindful parenting), mindfulness in fostering the quality of mother-child relationship.

Moreover, this study highlighted the role of lack of emotional control during parenting in explaining the association between maternal dispositional mindfulness and the quality of mother-child relationship. Mothers with high dispositional mindfulness reported better ability to control their negative emotions during parenting (i.e. not getting angry with the child when they are nervous or angry with other issues of their life), and this was associated with higher quality of mother-child relationship (i.e., feeling happy and satisfied when playing and spending time together with their child). Consistent with previous studies showing a positive association between mindfulness and emotion regulation (Davis et al., 2019; Iani et al.,

2018), this study suggests that maternal mindfulness also promotes emotion regulation during parenting. Because mindfulness refers to the ability to pay attention and to be connected to own here-and-now thoughts and emotions, non-judging and non-reacting to them (Kabat-Zinn, 2003), our findings showed that these abilities are associated with better capacity of the mother to control and manage emotions in front of the child when they are sad, anxious and upset. Through these mechanisms, a more mindful mother could act consciously rather than reacting automatically (Snyder et al., 2012). Maladaptive emotional reactions may decrease and the mother's ability to notice and understand child's needs and signals more appropriately, attuning to them, may improve, enabling the roots of a more functional relationship (Ainsworth, 1985).

Consistent with our hypothesis, the results highlighted a moderating role of child's age on the relationship between maternal dispositional mindfulness and emotion regulation during parenting. In line with the idea that preschoolers present mothers more behavioral challenges than toddlers (i.e., greater lively and disobedient behaviors and higher demands for attention), mothers of older children regulated their negative emotions during parenting worse than mothers of younger children (Moreira & Canavarro, 2018). However, the positive impact of maternal mindfulness on the ability to regulate own emotions during parenting was stronger for mothers of older children, evidencing the powerful protective role that mindfulness may have for these mothers.

The results of this study should be considered in light of some limitations. Most important, all data were based on online self-report questionnaires. Future studies should provide a more comprehensive image on the relationship between dispositional mindfulness, regulation of negative emotion during parenting and mother-child relationship, including observational measures especially for the quality of mother-child relationship (i.e., observer-rated attachment relationship) and by observing mother's regulation of negative emotions during

mother-child interaction. Moreover, the current study used cross-sectional data that could produce biased estimates in the model fit (i.e., overestimated, underestimated, or only approximated (e.g., De Los Reyes, 2017; Valeri & VanderWeele, 2013; Maxwell & Cole, 2007). Further research could investigate longitudinally the effect of maternal dispositional mindfulness on the regulation of negative emotions during parenting and their influence on the quality of mother-child relationship. Finally, our sample largely included mothers who were highly educated and with high socio-economic status, limiting the generalizability to the population experiencing cultural, socio-economic, and other disadvantages. More at risk mothers could be more prone to difficulties in regulating emotions during parent-child interactions due to the socio-economic difficulties (Deater-Deckard et al., 2016) but also could benefit from a dispositional mindfulness training. Focusing on a more diverse population could inform mindfulness-focused training that could be helpful to buffer the potential negative effect of a disadvantage on the quality of mother-child relationship.

However, the present study is exploratory, and despite these limitations, it has explored important aspects that have never examined before. Moreover, although our data are cross-sectional, we measured mother's dispositional mindfulness, which is supposed to be a stable trait of the individual and measurable before parenting, with respect to mindful parenting. However, longitudinal studies are needed to further confirm these associations.

The present study suggests mindfulness is an important internal source of support and a potential protective factor that allows the mother to better regulate her own emotions during parenting, and to establish a good relationship with the child. Mindfulness could be evaluated as a screening to identify mothers more at risk to develop difficulties in parenting. For example, available interventions developed with the aim to promote positive parenting (Juffer et al., 2018) should consider dispositional mindfulness as an individual factor that could affect the ability of the parent to distinguish own and child emotions, and therefore to be

sensitive to child needs. Further, mindfulness interventions should be offered to mothers in order to maximize their ability to provide positive parenting and develop a good relationship with their child. From a preventive and clinical perspective, the role of mindfulness is more crucial for mothers of preschoolers, as they might have more difficulties in regulating their emotions during parenting than mothers of infants. Considering that this difficulty might affect the quality of the mother-child relationship, which is known to have important cascading effects on the child's development (e.g., Rocha et al., 2020), mindfulness-based interventions should be offered especially to mothers of preschoolers, with the aim of improving their emotional control during parenting through an enhanced mindfulness ability.

3.5 Key messages

- Maternal dispositional mindfulness, as an individual general trait not necessary context-specific for parenting, is associated to mother-child relationship.
- An adaptive parenting, specifically the ability to control negative emotions, is a mechanism of such association.
- Mindfulness is a protective factor and an internal source of support for mothers, especially for those of preschoolers.
- Mindfulness-based interventions should be offered mainly to mothers of preschoolers.

3.6 Acknowledgments

This study was supported by a grant (number 131/20) from BIAL Foundation, Portugal

Chapter 4 | Maternal Mindfulness Buffers Parenting in Highly Sensitive Mothers

Passaquindici, I., Sperati, A., Lionetti, F., Fasolo, M., Spinelli, M. (*under 2nd review*). Maternal Mindfulness Buffers Highly Sensitive Parents. *Current Psychology*.

Abstract

Recently, there has been increasing interest in exploring the role of individual trait of Sensory Processing Sensitivity (SPS) in parenting. Due to deeper processing and stronger reactivity to internal and external stimuli, people high in SPS are prone to get easily overwhelmed, increasing the risk of parenting challenges but seem also to benefit more from regulatory individual factors. Mindfulness, involving present-moment awareness and a non-reactive attitude, has been shown to support highly sensitive (HS) non-parents. Here we aimed to investigate the interplay between SPS and maternal mindfulness in predicting self-reported mother-child interactions and maternal emotion regulation in caregiving. We surveyed online 323 mothers of toddlers (i.e., 1-3 years) and 214 mothers of preschoolers (i.e., 3-5 years). Multivariate moderation models suggested that mindfulness buffers the challenges for HS mothers of preschoolers, promoting more adaptive regulatory strategies and positive parent-child interactions. Implications for parenting programs are discussed.

Keywords: sensory processing sensitivity, mindfulness, parenting, emotion regulation, mother-child relationship

4.1 Introduction

Belsky's model (1984) suggests parenting as multiply shaped. Besides contextual and child-related sources, parental personality influences parenting behaviors, significantly impacting parent-child interactions and child development (Coplan et al., 2009; Root et al., 2016). Recently, the exploration of the role of the personality trait of Sensory Processing Sensitivity (SPS; Aron & Aron, 1997) for parenting is gaining interest.

SPS is a biologically based trait capturing individual differences in perception, processing, and responsiveness to internal and external stimuli. Individuals with high SPS (~30% of the population) (Lionetti et al., 2018) show a deeper processing of stimuli, resulting in overall stronger emotional reactivity and a greater risk of overwhelm, but seems also to benefit more from positive stimuli. According to a few recent studies, highly sensitive (HS) parents show greater risk of difficulties in parenting, reporting the use of harsh and permissive discipline, withdrawal, dysfunctional behaviors, and negative caregiving feelings (Aron et al., 2019; Branjerdporn et al., 2019; Goldberg & Scharf, 2020). However, preliminary observational studies also showed that certain individual regulatory factors may moderate the impact of SPS for caregiving behaviors in HS people (Lionetti et al., 2025), possibly due to their greater benefit from internal resources. In this study, we enlarge this focus exploring the role of a potentially key protective factor, such as mindfulness.

Mindfulness, involving the present-moment awareness of inner experiences with a non-reactive and accepting attitude (Kabat-Zinn, 2003), may support HS parents—who may be more vulnerable to overwhelm yet also more capable from inner strengths—by improving their self-regulation during the parenting experience. The only available study on SPS and mindfulness suggests that this could be the case, based on data on HS non-parents and anxiety (Bakker & Moulding, 2012). With the current contribution, we aim at investigating the interaction between SPS and mindfulness in predicting both mother-child interactions, as

perceived by the mother (i.e., self-reported maternal satisfaction, confidence and pleasure in interacting with the child) and maternal emotion regulation in caregiving. As mindfulness has been associated with positive parenting experiences (Fernandes et al., 2022; Passaquindici et al., 2024b), we expected mindfulness to decrease the risk of negative parenting in HS parents, with a flourishing effect (i.e., better parenting than less sensitive ones) (Belsky et al., 2007; Belsky & Pluess, 2009).

4.2 Method

4.2.1 Participants and Procedures

323 mothers of toddlers (*M* = 1.87 years, *SD* = 0.60, 1-3yy, 39 % F) and 214 mothers of preschoolers (*M* = 4.45 years, *SD* = 0.86, 3-6yy, 44 % F), recruited via social media were asked to complete an online anonymous self-report survey available for three months. All mothers had a medium-high educational level (Supplementary Materials of *Chapter 4*).

4.2.2 Measures

4.2.2.1 Highly Sensitive Person scale

The 12-item HSP (Pluess et al., 2023; Lionetti et al., 2024) assessed mothers' SPS on a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*extremely*) (e.g., "Do you seem to be aware of subtleties in your environment?", "Do you get rattled when you have a lot to do in a short amount of time?"). Higher total score indicates higher sensitivity (α = .80 and .78 for mothers of toddlers and preschoolers, respectively).

4.2.2.2 Five Facet Mindfulness Questionnaire Short Form (FFMQ-SF)

The 20-item FFMQ-SF (Wilkinson & Hao, 2021) measured maternal dispositional mindfulness on a 5-point Likert scale ranging from 1 (*never or rarely true*) to 5 (*very often or always true*) (e.g., "I watch my feelings without getting lost in them"). Higher total score indicates higher mindfulness (α = .83 and .85).

4.2.2.3 Parent Emotion Regulation Scale (PERS)

The 5 items of the Lack of Control subscale from the PERS (Pereira et al., 2017) measured the maternal difficulties in regulating emotions in parenting on a 5-point Likert scale ranging from 0 (*never or almost never*) to 4 (*always or almost always*) (e.g., "When I am sad, anxious or angry, I can reasonably control my feelings/emotions in front of my child"). We reversed scores as higher total score indicates greater emotion regulation (α = .60 for both age groups, in line with Pereira et al., 2017).

4.2.2.4 Maternal Postnatal Attachment Scale (MPAS)

The 19-item MPAS (Condon & Corkindale, 2007) assessed the quality of mother-child interactions on a 5-point Likert scale ranging from 1 (*never*) to 5 (*very frequently*) (e.g., When I am with the child, I am happy and satisfied). Higher total score indicates more positive mother-child interactions (α = .85 and .86).

4.3 Results

Bivariate associations showed that SPS and mindfulness were moderately associated— negatively and positively, respectively— with emotion regulation during parenting and with positive mother-child interactions in both groups. Additionally, SPS and mindfulness were

negatively and moderately associated in the toddler sample but not in preschoolers (see Table S1a and S1b in the supplementary material).

4.3.1 Multivariate Regression Models

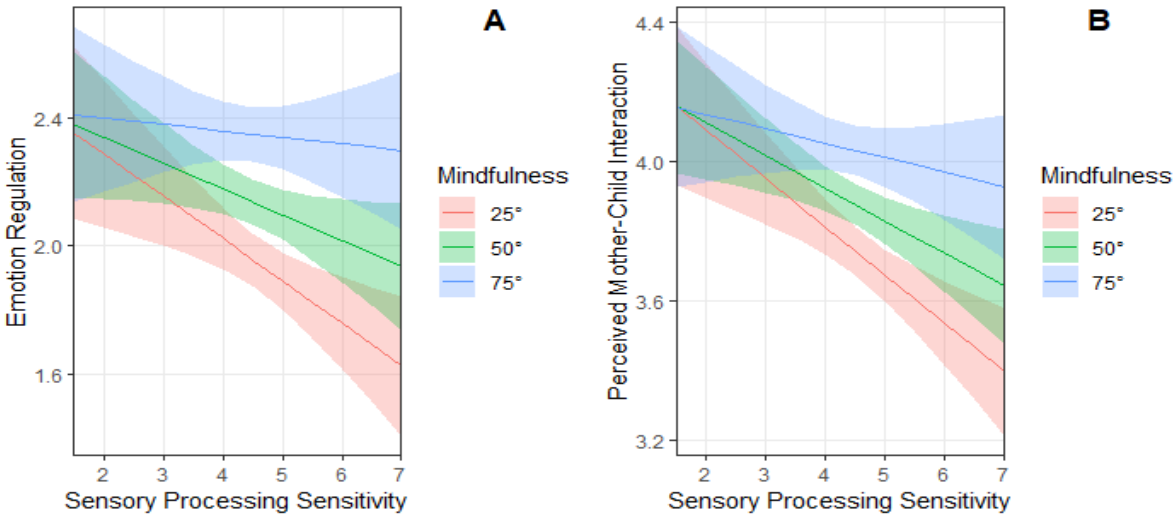
We run multivariate regression models for each age group, including main (i.e., SPS and mindfulness) and interaction (i.e. SPS x mindfulness) effects in predicting both maternal emotion regulation during parenting and mother-child relationship quality, controlling for maternal age and education. The interaction term was significant only in mothers of preschoolers. Mindfulness significantly interacted with SPS in predicting maternal emotion regulation and positive mother-child interactions as perceived by the mothers (Table 1). Significant interaction effects were graphically represented by plotting simple slopes (Figure 1). Follow-up plots suggest that mothers with higher levels of sensitivity showed less positive mother-child interactions and greater difficulties in emotion regulation, particularly when mindfulness was low. When supported by stronger mindfulness competences, HS mothers showed more positive mother-child interactions and better emotion regulation, comparable to less sensitive ones.

Table 4.1 *Estimated parameters for the mothers of preschoolers*

	Mother-child Interaction			Maternal emotion regulation in parenting		
	ß	*p*	R square	ß	*p*	R square
SPS	-1.18	<.01	.30	-1.09	<.01	.32
Mindfulness	-.23	.43		-.15	.60	
SPS * Mindfulness	1.16	.024		1.11	.017	
Maternal Age	.03	.65		.04	.45	
Maternal Education (years)	-.24	<.001		-.21	<.001	

Note. SPS = Maternal Sensory Processing Sensitivity trait; Mindfulness = Maternal Dispositional Mindfulness.

Figure 4.1 *SPS and mindfulness in predicting maternal emotion regulation in parenting (A) and mother-child interaction as perceived by the mother (B). The moderating variable of mindfulness was divided in low (below the first 25th quantile), medium, and high levels (above the forth – 75th – quantile).*



Note. Mindfulness = Maternal Dispositional Mindfulness; Emotion Regulation = Maternal Emotion Regulation during Parenting.

4.4 Discussion

This work provides first evidence on the association between SPS and maternal mindfulness in predicting parenting, considering both maternal perception of mother-child interactions and maternal emotion regulation during caregiving interactions.

Consistent with previous evidence (Branjerdporn et al., 2019; Goldberg & Scharf, 2020), we found that HS mothers tend to report greater difficulties in engaging in positive and satisfying interactions with their child. Interestingly, this stronger perception of distress when engaging with the child has been found in self-report data, but not in observational measures, suggesting that HS mothers may be more emotionally attuned (Lionetti et al., 2025). This discrepancy may indicate that their heightened emotional experience leads them to feel emotions more intensely, potentially resulting in a sense of overwhelm that may bias their perception in a more negative way.

This stronger perception of challenges when interacting with the child was especially true when mindfulness was low. Likely due to their heightened reactivity to internal stimuli, they may face more challenges in regulating their emotional states (e.g., anger or anxiety) during the interactions with a greater risk of getting overwhelmed, particularly in the absence of other regulatory resources. However, findings supported mindfulness as a protective factor for HS mothers, who reported overall a more positive parenting experience when supported by mindfulness-related regulatory skills. This pattern was evident in mothers of preschoolers but not in mothers of toddlers, suggesting that the protective role of mindfulness in parents increases as the child's age (Burke et al., 2020; Passaquindici et al., 2024a). One possible explanation is that as children's behavioral challenges and demands increase over time, parenting becomes potentially more stressful, making mindfulness particularly beneficial in this period. Greater parenting challenges may, in fact, be necessary to fully observe the

effects of mindfulness in HS parents, possibly explaining why HS mothers of preschoolers benefited more, demonstrating more adaptive parenting.

Overall, the role of mindfulness in buffering greater reactivity related to sensitivity may be understood by considering that while both SPS and mindfulness contribute to heightened reactivity to emotional and social cues, they operate at different levels, i.e., SPS at the sensory threshold and reactivity level, while mindfulness at a more regulatory and metacognitive level. HS parents with high mindfulness, aware of their emotional arousal, are also supported by a non-reactive attitude toward their present-moment heightened reactivity, observing it non-judgmentally. This, in turn, helps them in regulating their emotions more effectively, fostering greater emotional balance and adaptive parenting.

Notably and contrary to our expectations, no vantage effect emerged for HS mindful parents, as they did not flourish in parenting or exceed less sensitive ones but rather reached comparable levels.

This was a self-report and cross-sectional study, and further longitudinal observational research accounting for additional individual child variables (e.g., temperament) is needed. However, findings contribute to first interesting insights for applied settings, suggesting that sensitive parents could potentially benefit from mindfulness-based interventions

Chapter 5 | Mindfulness at Work: Buffering the Impact of Leadership on Employees' Well-Being, Performance and Team Cohesion

Passaquindici, I., Antonellis, E., Di Berardino, C., Palumbo, R., Fasolo, M., Spinelli M. (*submitted*). Mindfulness at work: Buffering the Impact of Leadership on Employees' Well-Being, Performance, and Team Cohesion. *Journal of Managerial Psychology*.

Abstract

Purpose: Despite the recognized importance of mindfulness in organizational settings, little is known about how dispositional mindfulness interacts with contextual factors to influence employees' intrapersonal and interpersonal adjustment at work. This study aims to explore the role of dispositional mindfulness in supporting employees navigate different leadership styles and its impact on their wellbeing, job performance and team cohesion.

Design/methodology/approach: A total of 191 employees from various companies completed an online self-reported questionnaire measuring the variables of interest. Moderation and multivariate moderation models were computed.

Findings: Results indicated that democratic leadership and mindfulness were positively associated with wellbeing, job performance and team cohesion, while authoritarian leadership was negatively related. Mindful employees experienced fewer negative emotions and maintained job performance in highly authoritarian environments, but they did not preserve team cohesion.

Originality/value: Organizations should acknowledge individual differences in employees' responses to workplace conditions. Mindfulness could serve as a valuable screening tool to identify those more vulnerable to the negative effects of strict authoritarian supervision, allowing for targeted support and interventions. Implications for research and practice are discussed.

Keywords: mindfulness, leadership, wellbeing, job performance, team cohesion

5.1 Introduction

Healthy workplaces and positive organizational climates have become critical topics for organizations, as they directly influence employee adjustment and well-being at work, with cascading consequences for overall organizational productivity and success (Moreira et al., 2023; Nielsen et al., 2017; Theorell et al., 2015).

Among the contextual factors that shape organizational climate, scholars recognize the pivotal role of leadership. Leaders' behaviors and the level of control they exert over employees have significant implications, influencing not only employee psychological well-being (Erschens et al., 2022; Onesti, 2023a) but also job-related outcomes at both the individual (e.g., job performance; Wen et al., 2019) and team levels (e.g., team learning and performance; Bucic et al., 2010).

Beyond workplace contextual factors, individual traits also play an essential role in employee adaptation and well-being at work. Mindfulness, which entails the present-moment awareness of inner experiences with a non-reactive and accepting attitude (Kabat-Zinn, 2003), has gained growing attention in organizational research. While some studies suggest that mindfulness is directly associated with improved employee psychological well-being (Michaelsen et al., 2023), as well as job performance and satisfaction (Mesmer-Magnus et al., 2017), and supportive relationships within teams (Eby et al., 2020), the research on mindfulness in organizational contexts remains limited, with mixed findings and several gaps requiring further exploration. Notably, there is a need for a better understanding of how mindfulness, as an individual trait, interacts with contextual factors to influence employee adjustment in the workplace.

This study seeks to contribute to the field by expanding the empirical evidence on the role of mindfulness in the workplace, particularly in helping employees navigate demanding work environments and maximize the benefits of supportive ones. Examining mindfulness as both

a buffer against challenges and a catalyst for positive outcomes in organizational settings may provide valuable insights into how individual differences shape employees' responses to workplace dynamics.

This understanding could help identify vulnerable employees and develop customized strategies to support them more effectively, ultimately fostering a healthier and more resilient workforce.

5.1.1 Leadership Styles and Employees Adjustment at the Workplace

Leadership, defined as the process of guiding and motivating individuals to achieve group objectives (Haslam, 2004), is a core focus of organizational research. Various leadership styles, characterized by distinct behavioral patterns in leader-subordinate interactions (Bass & Riggio, 2006; Mitonga-Monga, 2012), have been extensively studied. Contemporary research emphasizes transactional and transformational leadership, which focuses on performance-based rewards, visionary inspiration, creativity, and trust-based relationships. These models build upon the foundational framework of Lewin et al. (1939), later refined by Scheidlinger (1994), which categorizes leadership styles based on the balance between control and attentiveness to employees. Modern leadership theories often lack conceptual clarity and clear operationalization, making it difficult to assess their impact on employees' performance and well-being. Conversely, Lewin's model remains relevant due to its clarity and applicability. By offering a structured approach to leadership, it provides a foundation for later models while ensuring generalizability across different organizational contexts.

Within this framework, authoritarian leaders exert high levels of control with little attention to employees' well-being, centralizing decision-making, issuing orders without explanation, and prioritizing command over communication and collaboration. Scholars

highlight its detrimental effects on psychological well-being (Chu, 2014), job performance (Pizzolitto et al., 2023) and team communication (Kelly & MacDonald, 2019).

Conversely, democratic leaders balance structure with attentiveness to employees, fostering collaboration, open communication, and shared decision-making (Avolio et al., 2009; Gastil, 1994). They value employees' opinions, promoting autonomy and mutual respect. This style reduces stress and anxiety (Das & Pattanayak, 2023; Erschens et al., 2022; Skakon et al., 2010), enhances well-being (Onesti, 2023a), improves job satisfaction, performance (Wen et al., 2019), and team dynamics including cohesion, learning, and innovation (Bucic et al., 2010; Özaralli, 2003). While leadership styles have pros and cons and the most effective leaders adapt to situational needs (Maloş, 2012), these findings suggest that highly authority contexts poses challenges for employees and teams, whereas democratic leadership fosters engagement, well-being, and team effectiveness.

While leadership styles are widely recognized as key to employees' well-being, performance, and relationships, less is known about their interaction with individual traits to influence employee adjustment in the workplace.

5.1.2 Beyond Contextual Variables: The Role of Individual Differences and Mindfulness at the Workplace

Individual differences play a key role on how employees navigate workplace environments. Meta-analytic findings showed that personality traits like openness to experience and proactivity support job performance (Zell & Lesick, 2022), engagement (Young et al., 2018), and well-being, particularly in stressful contexts characterized by workplace bullying (Farley et al., 2023). Moreover, highly sensitive individuals – prone to a deeper processing and heightened reactivity – while more vulnerable to burnout (Sperati et al., 2024), benefit significantly from supportive leadership in high-stress workplaces (Onesti

et al., 2024). These findings suggest that certain traits may serve as protective buffering or promoting factors, helping individuals manage workplace challenges and thrive in more positive ones.

Among these traits, mindfulness has gained attention. Dispositional mindfulness— i.e., the awareness of sensations, thoughts, and emotions with a non-judgmental attitude (Kabat-Zinn, 2003)—varies among individuals but can be cultivated through practice (Brown et al., 2007). Research highlights its benefits in navigating challenges across various life domains, including parenting (e.g., Passaquindici et al., 2024) and work (e.g., Stuart-Edwards et al., 2023). By fostering awareness of physiological and psychological reactions, and reducing automatic reactions (Glomb et al., 2011), mindfulness enhances emotion regulation and adaptive responses to challenges (Snyder et al., 2012), improving mental health, task performance, and positive interpersonal relationships at work (Eby et al., 2020).

While mindfulness is directly associated with improved employee well-being (Michaelsen et al., 2023), job performance and satisfaction, and team cooperation (Eby et al., 2020; Hawkes & Neale, 2020; Mesmer-Magnus et al., 2017), research on its role in organizational contexts remains limited. . Understanding how mindfulness, as a dispositional trait, interacts with workplace environments can clarify how individual differences shape employees' responses. Identifying vulnerable individuals through screening could help tailor interventions and support strategies more effectively.

A recent review highlights the growing interest in mindfulness as a moderator in organizational contexts, highlighting its dual role as both a buffer in negative environments and an enhancer in positive ones (Stuart-Edwards et al., 2023). For instance, mindful employees better regulated negative emotions in bullying workplaces reducing counterproductive work behaviors (Alqhaiwi et al., 2024). Similarly, mindfulness mitigated the negative effects of workplace ostracism by reducing acquiescent silence and improving

job performance (Jahanzeb et al., 2020) while also fostering job satisfaction (Ramaci et al., 2020). These findings suggest that individual differences in dispositional mindfulness are key in shaping how employees experience and respond to workplace environments.

While mindfulness appears to mitigate the impact of adverse work conditions and enhances the benefits of supportive work environments, research in leadership contexts remains limited and yields mixed findings. Eisenbeiss & van Knippenberg (2015) found that in ethical leadership contexts - where leaders respect for the dignity and rights of subordinates - more mindful employees demonstrated greater work motivation and higher levels of altruism, assisting, and supporting coworkers. Similarly, mindfulness in transformational leadership contexts has been linked to enhanced employee psychological well-being (Walsh & Arnold, 2020) and increased work engagement (Zaw & Takahashi, 2022). However, Walsh & Arnold (2020) also found that mindfulness intensified the harmful effects of abusive supervision on employees' psychological health. This "dark side" of mindfulness in more demanding leadership situations was further supported by recent research, which found that mindful employees tend to be more sensitive to self-serving leadership - where leaders prioritize their own needs and interests over those of subordinates and the organization. Consequently, these employees may be more likely to engage in unethical behaviors (Yuan et al., 2024). The authors suggested this paradoxical effect may be explained by the heightened information processing of mindful individuals, which could exacerbate their sensitivity to negative treatment and, in turn, reduce psychological well-being. However, other studies found that in unsupportive and controlling work environments where leaders undermine autonomy, mindful employees were less likely to feel frustrated at work, resulting in lower levels of burnout, turnover intention, and absenteeism (Schultz et al., 2015). Moreover, mindfulness has been shown to buffer the negative impact of despotic leadership on employees' emotions (Mubarak et al., 2024) and to mitigate the detrimental

effects of less transformational leadership on intrinsic motivation at work (Kroon et al., 2017).

Taken together, these studies align with previous research identifying mindfulness as a factor that enhance positive individual and relational outcomes in supportive leadership contexts. However, its role in negative leadership situations remains inconclusive, making it difficult to draw definitive conclusions. While some studies suggest that mindful employees may encounter greater challenges, others suggest they may be better protected. This highlights the complexity of mindfulness as an individual trait and underscores the need for further research to unravel its nuanced interactions with workplace dynamics, particularly in relation to leadership styles.

5.1.3 The Current Study

The current study aims to address the identified gaps by examining how employees with varying levels of mindfulness respond to both positive (i.e., democratic) and negative (i.e., authoritarian) leadership contexts. Specifically, we investigated its effects on workplace adjustment, focusing on employees' psychological well-being (i.e., low negative affect), job performance, and team dynamics.

Building on previous research, we hypothesized that in positive leadership contexts (e.g., high democratic leadership) employees with higher dispositional mindfulness would demonstrate greater well-being, job performance, and stronger team dynamics. Given the limited research on mindfulness in leadership contexts and the evidence that mindfulness has been shown to protect individuals in challenging situations across various domains, we hypothesized that more mindful employees would be better equipped to maintain their well-being, performance, and team cohesion under authoritarian leadership.

5.2 Method

5.2.1 Participants and Procedure

226 workers completed an online survey that included various measures; of these, 191 employees (M_{age} = 37.26 years, *SD* = 9.45; range: 20-65 years) from various companies and regions across Italy completed the measures included in the present study. Participants had an average of 16.65 years of education (*SD* = 3.26; range: 8-21 years), indicating a high level of education (i.e., bachelor's degree or higher). 67% were female, 34% had minor children, 49% had three years of experience in the same company and 52% worked in teams of more than 6 members.

Recruitment was primarily conducted through social media platforms (e.g., Facebook advertisement posts). We asked employees to complete an anonymous online survey developed via Qualtrics software. Informed consent was obtained from all participants, who were fully informed about the study description and ethical conditions.

The study received approval from the Ethical Committee of University G. d'Annunzio of Chieti-Pescara.

5.2.2 Measures

5.2.2.1 Leadership Style

Employees' perceptions of leadership styles were measured using nine questions adapted from the Leadership Style Questionnaire by Northouse (2018). Participants rated their level of agreement with various statements on a 5-point Likert scale, ranging from 1 = *Strongly Disagree* to 5 = *Strongly Agree*. The original 18-item scale measured authoritarian, laissez-faire, and democratic leadership. To explore leadership in positive and negative contexts, we focused on democratic (e.g., "In my experience, employees in my team/company play an active role when it comes to making decisions") and authoritarian leadership (e.g., "In my

experience, within my team/company, employees are closely supervised to make sure they do their job"). Higher scores correspond to greater levels of democratic or authoritarian leadership.

A confirmatory factor analysis (CFA) conducted on a large preliminary sample (N = 693) revealed a poor fit for the two-factor model (RMSEA = .11, CFI = .77, TLI = .71, SRMR = .10). Therefore, exploratory factor analysis (EFA) was performed. Visual inspection of the scree plot and parallel analysis confirm the two-factor model but evidenced that three out of the total 12 items did not load onto any factor (< .30), exhibited cross-loadings on both factors, and/or had low communalities (< .30). These items were dropped, resulting in a refined 9-item scale (i.e., six items for the democratic leadership scale and three items for the authoritarian scale). A follow-up CFA was re-run on this revised model, which showed a significantly improved fit (RMSEA = .09, CFI = .88, TLI = .84, SRMR = .07).

Cronbach's α was .77 for democratic leadership, while the Sperman–Brown coefficient was .71 for authoritarian leadership, indicating an acceptable internal consistency.

5.2.2.2 Mindfulness

Dispositional mindfulness was measured using the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), that consists of 15 items on a 6-point Likert scale ranging from 1 = *almost always* to 6 = *almost never*. The scale assesses mindfulness as a single-faceted construct as the extent to which attention and awareness are focused on what is occurring in the present moment in daily life (e.g., "I find myself doing things without paying attention", "I could be experiencing some emotion and not be conscious of it until sometime later"). High scores indicate high levels of mindfulness. In the current study, Cronbach's α was .86, indicating good internal consistency.

5.2.2.3 Negative Affect

Negative affect was assessed using the Negative Affect subscale of the Positive and Negative Affect Scale (PANAS; Watson et al., 1988). Participants were asked to rate on 10 items on a 5-point Likert scale ranging from 1 = *not true at all* to 5 = *totally true* how they are feeling right now (e.g., anger, distress, fear). High scores indicate high negative affectivity. In the current study, Cronbach's α was .91, indicating an excellent internal consistency.

5.2.2.4 Job Performance

Job performance was assessed using the 5-items Task Performance subscale from the Individual Work Performance Questionnaire (IWPQ; Koopmans et al., 2014; Platania et al., 2023). Participants rated on a 5-point Likert scale ranging from 1 = *rarely* to 5 = *always* thinking about the last three months (e.g., "I was able to plan my work so that I finished it on time", "I was able to set priorities"). High scores indicate high job performance. In the current study, Cronbach's α was .85, indicating good internal consistency.

5.2.2.5 Team Cohesion

Team cohesion was assessed using the Intragroup Conflict Scale (Jehn, 1995). It consists of eight items on a 5-point Likert scale ranging from 1 = *none* to 5 = *a lot* (e.g., "How much tension is there among members in your work unit?", "To what extent are there differences of opinion in your work unit"). We reversed scores as higher total score indicates greater team cohesion. In the current study, Cronbach's α was .93, indicating an excellent internal consistency.

5.2.3 Analytic Plan

Descriptive statistics and bivariate correlations among the study variables were calculated. Next, we conducted a series of main effect models, considering leadership styles (i.e., authoritarian and democratic) and employees' dispositional mindfulness as the predictors of employees' well-being, job performance and team cohesion (in separating models for each leadership style).

Subsequently, two separate moderation models (one for each leadership style) were run to examine the moderating role of employees' dispositional mindfulness in the relationship between leadership style and negative affect, controlling for employees' age and education as these factors are relevant to emotion regulation and mindfulness.

Finally, two multivariate moderation models were tested, with leadership style (i.e., authoritarian or democratic) as the predictor, employees' dispositional mindfulness as the moderator and, job performance and team cohesion as the outcomes, controlling for employees' age and education.

Significant interaction models were compared with a main effect model, including leadership style as the predictor. Akaike weights (Wagenmakers & Farrell, 2004) and Akaike Information Criteria (AIC; Akaike, 1974) were used for model comparison, representing the probability that a model is the best fit for new data given the set of models considered; higher values for the weights and lower for the AIC provide evidence for a better fit of the model against the other examined.

All statistical analyses were run using the statistical software *R version 4.4.1* (R Core Team, 2020).

5.3 Results

5.3.1 Preliminary Analysis

Descriptive statistics and bivariate association among all study variables are presented in Table 5.1.

Overall, results indicated that the outcomes (i.e., employees' negative affect, job performance and team cohesion) were trivially to moderately associated with both authoritarian and democratic leadership style, with *r* ranging from |.20| to |.42|. Specifically, authoritarian leadership was positively associated with negative affect, and negatively associated with job performance, although the strength of these associations was trivial. Additionally, authoritarian leadership demonstrated a moderate and negative association with team cohesion.

In contrast, democratic leadership was negatively associated with negative affect, and positively associated with job performance, though these associations were also trivial in strength. Democratic leadership showed a moderate and positive association with team cohesion as well.

Employees' dispositional mindfulness was weakly and positively associated with democratic leadership style, whereas it was moderately and positive associated with job performance and team quality. Mindfulness was also moderately negatively associated with negative affect.

Lastly, employees' age showed moderate and positive association with tenure and dispositional mindfulness, whereas employees' educational level was weakly and negatively associated with job performance.

Table 5.1 *Descriptive Statistics and Bivariate Associations among the Study Variables*

	M(SD; range)	1	2	3	4	5	6	7	8	9	10
1. Age	37.26(9.45; 20-65)	-									
2. Education (years)	16.65(3.26; 8-21)	-.24***	-								
3. Team Size		.13	.05	-							
4. Tenure		.50***	-.10	.14*	-						
5. Democratic Leadership	2.98(.52; 1-4.33)	-.12	-.01	-.06	-.11	-					
6. Authoritarian Leadership	2.31(.74; 1-4)	.08	-.11	.19**	.23**	-.32***	-				
7. Mindfulness	4.32(.75; 1.53-5.80)	.29**	-.11	-.05	.12	.18*	-.08	-			
8. Job Performance	4.01(.76; 1.40-5)	.05	-.18*	-.06	.00	.23**	-.20**	.24**	-		
9. Negative Affect	2.10(.77; 1-4.9)	-.06	.13	.04	-.06	-.19**	.21**	-.30***	-.25***	-	
10. Team Cohesion	2.55(.93; 0-4)	-.12	-.04	-.23**	-.16*	.42***	-.41***	.25***	.27***	-.25***	-

5.3.2 Moderation Models (Outcome: Negative Affect)

5.3.2.1 Model 1: Authoritarian Leadership * Mindfulness

Results from the moderation model are summarized in Table 5.2. The estimated parameters revealed a significant main effect of authoritarian leadership and dispositional mindfulness on negative affect. Specifically, employees who perceived their leaders as authoritarian and those less mindful were more likely to experience negative emotions. When the interaction term was included in the model, the results indicated a significative interaction of authoritarian leadership style * mindfulness. The Akaike weights for the main effect model and the interaction model were .11 and .89, with corresponding AIC values of 428.0 and 423.8, respectively. Therefore, the model comparison demonstrated that the interaction effect model provided a better fit for the data. To represent the interaction effect, simple slopes were plotted for low (below the 25th percentile), medium (at the 50th percentile) and high level (above the 75th percentile) of employees' mindfulness (Figure 5.1). The plot suggests that under conditions of high authoritarian leadership, employees' dispositional mindfulness significantly influenced their well-being, with more mindful individuals exhibiting lower levels of negative emotions.

5.3.2.2 Model 2: Democratic Leadership * Mindfulness

The estimated parameters indicated a significant main effect of democratic leadership and dispositional mindfulness on employees' negative affect (see Table 5.2). Specifically, employees reported lower levels of negative affect when they were more mindful and worked in environments characterized by high democratic leadership. However, the introduction of the interaction term did not provide significant evidence to support the hypothesized promoting effect of mindfulness in the relationship between democratic leadership and negative affect.

Figure 5.1 *Authoritarian Leadership and Mindfulness in Predicting Employees' Negative Affect*

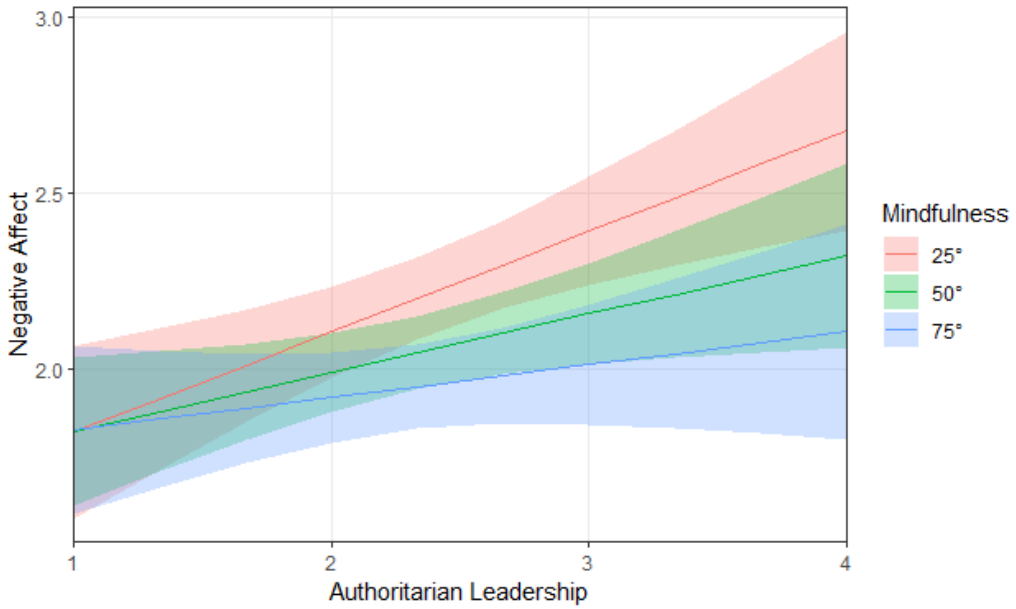


Table 5.2 *Estimated Parameters of the Moderation Models with Leadership Style (i.e., Authoritarian and Democratic) and Dispositional Mindfulness predicting Employees' Negative Affect* (N = 191)

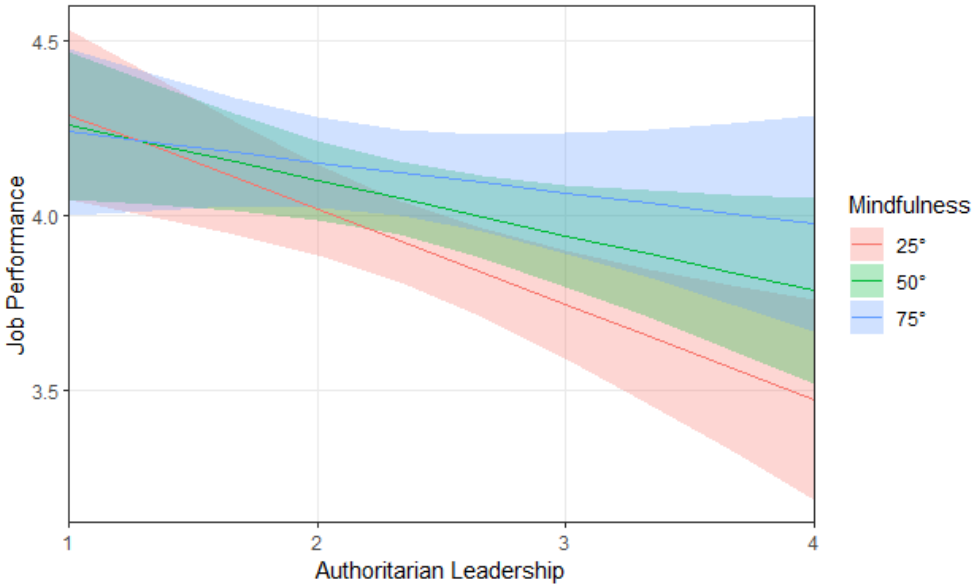
		Negative Affect	
Model 1	ß	*p*	R-squared
Authoritarian Leadership	**.20**	**.003**	.14
Mindfulness	**-.26**	**<.001**	
Authoritarian Leadership * Mindfulness	**- .16**	**.01**	
Employees' Age	-.01	.86	
Employees' Education	.12	.09	
Model 2	ß	*p*	R-squared
Democratic Leadership	**-.16**	**.03**	.10
Mindfulness	**-.27**	**<.001**	
Democratic Leadership * Mindfulness	-.05	.38	
Employees' Age	-.01	.88	
Employees' Education	.10	.17	

5.3.3 Multivariate Moderation Models (Outcomes: Job Performance and Team Cohesion)

5.3.3.1 Model 3: Authoritarian Leadership * Mindfulness

The estimated parameters indicated a significant main effect of authoritarian leadership and mindfulness on both job performance and team cohesion (see Table 5.3). Specifically, employees who perceived their leaders as more authoritarian reported lower levels of job performance and team cohesion, while those with higher mindfulness reported better job performance and stronger team cohesion. When the interaction term was included in the model, evidence supported the moderating role of the interaction of authoritarian leadership * mindfulness, but only for job performance. The Akaike weights for the main effect model and the interaction model were .13 and .87, respectively, with corresponding AIC values of 426.6 and 422.8. This model comparison demonstrated that the interaction model provided a better fit to the data. To represent the interaction effect, simple slopes were plotted for employees' mindfulness levels below the 25th percentile, at the 50th percentile and above the 75th percentile (Figure 5.2). The plot showed that under conditions of high authoritarian leadership, employees' dispositional mindfulness significantly influenced their job performance, with more mindful individuals exhibiting higher job performance than those less mindful.

Figure 2. *Authoritarian Leadership and Mindfulness in Predicting Employees' Job Performance*



5.3.3.2 Model 4: Democratic Leadership * Mindfulness

The estimated parameters revealed a significant main effect of democratic leadership on both job performance and team cohesion, with employees reporting higher levels of these outcomes in environments characterized by strong democratic leadership (see Table 5.3). However, the inclusion of the interaction term did not provide significant evidence to support the hypothesized promoting effect of mindfulness in the relationship between democratic leadership and job-related outcomes.

Table 5.3 *Estimated Parameters of Multivariate Moderation Models with Leadership Style (i.e., Authoritarian and Democratic) and Dispositional Mindfulness predicting Employees' Job Performance and Team Cohesion (N = 191)*

	Job Performance			Team Cohesion		
Model 3	ß	*p*	R-squared	ß	*p*	R-squared
Authoritarian Leadership	**-.20**	**.003**	.12	**-.39**	**<.001**	.24
Mindfulness	**.20**	**<.001**		**.24**	**<.001**	
Authoritarian Leadership * Mindfulness	**-.16**	**.02**		.05	.34	
Employees' Age	-.01	.92		**-.17**	**.02**	
Employees' Education	**-.18**	**.01**		-.09	.13	
Model 4						
Democratic Leadership	**.17**	**.04**	.12	**.37**	**<.001**	.22
Mindfulness	**.17**	**.01**		**.21**	**.01**	
Democratic Leadership * Mindfulness	-.07	.24		.02	.79	
Employees' Age	-.01	.92		**-.13**	**.05**	
Employees' Education	**-.15**	**.04**		-.05	.48	

5.4 Discussion

The current study investigated how individual differences in dispositional mindfulness influence employees' individual (i.e., psychological well-being and job performance) and relational (i.e., team cohesion) adjustment at work in both challenging and supportive leadership environments (i.e., authoritarian and democratic, respectively).

Results indicated that high authoritarian leadership was associated with lower psychological well-being, job performance, and team cohesion, while democratic leadership showed positive associations with these outcomes, supporting previous research on the detrimental effects of authoritarian leadership and the benefits of democratic leadership on

employees' individual and relational adjustment (e.g., Mesmer-Magnus et al., 2017; Onesti, 2023b; Pizzolitto et al., 2023). Leadership quality directly affects employees and their teams, with more challenging contexts linked to increased negative emotions, reduced productivity, and higher team conflicts..

Examining the role of mindfulness, we examined whether varying levels of employees' dispositional mindfulness moderated the relationship between leadership styles (i.e., authoritarian and democratic) and key outcomes (i.e., psychological well-being, job performance and team cohesion).

Findings partially confirmed our hypothesis. As expected, more mindful employees experienced fewer negative emotions and preserved job performance in highly authoritarian environments. Greater awareness of and connection to theirselves appeared to enchance resilience improving time management, planning, and task efficiency even under strict supervision. These findings align with prior studies on mindfulness as a buffer against workplace stress (e.g., Alqhaiwi et al., 2024; Ramaci et al., 2020) and as a factor supporting well-being and motivation in controlling environments (Schultz et al., 2015; Kroon et al., 2017). Overall mindfulness emerged as a potential buffer that helps employees navigate the challenges of demanding work environments andbetter cope with authoritarian settings.

Mixed findings regarding mindfulness as both a protective and a risk factor in negative leadership contexts may stem from differences in how leadership is conceptualized and measured. Studies that identify greater vulnerabilities in more mindful employees tend to examine more harmful forms of leadership. The dark side of mindfulness may become evident in these extreme and destructive leadership contexts, where leaders prioritize personal interests over team members (i.e., self-serving leadership; Yuan et al., 2024), ridicule employees and frequently judge their thoughts and emotions (i.e., abusive leadership; Walsh & Arnold, 2020). These forms of leadership may be so harmful that even mindfulness may

not be sufficient to mitigate their negative effects. It could be also suggested that, due to their greater sensitivity to emotions and social cues, mindful individuals may be more susceptible to these harmful forms of leadership (Walsh & Arnold, 2020). Additionally, individual differences not accounted for, such as variations in sensory processing sensitivity (Aron & Aron, 1997; Pluess, 2015), may influence individuals reactions in such challenging work environments. Future studies should explore this paradox by examining a broader range of leadership styles, across extreme versus less extreme contexts, and examining how mindfulness interacts with other traits to either buffer or negative outcomes.

Contrary to expectations, more mindful employees in our sample did not experience improved psychological well-being and job performance in contexts where leaders provide guidance without pressure and members are involved in decision-making (i.e., high democratic leadership). These findings contrast with previous studies that highlight the positive relationship between mindfulness and increased well-being and motivation at work, particularly in supportive environments characterized by high transformational (Walsh & Arnold, 2020) and ethical leadership (Zaw & Takahashi, 2022). As previously discussed, these discrepancies may arise from the use of different leadership frameworks. The type of positive leadership dimension we investigated - where leaders provide guidance without pressure and members are involved in decision-making - may not be strong enough to amplify the promotive effects of mindfulness. In contrast, the leadership styles explored in the other studies may likely capture stronger positive dimensions of leadership where leaders encourage diverse perspectives when facing challenges, engage in teaching and coaching, and treat employees as individuals rather than as mere members of a group. In such contexts, more mindful employees may particularly benefit from these supportive aspects.

Regarding employees' relational outcome (i.e., team cohesion), analyses showed that dispositional mindfulness was positively linked to team cohesion. This suggests that

employees who are more attuned to their inner experiences also tend to be more connected with others, perceiving fewer conflicts and tensions within their teams. This aligns with previous research on mindfulness and interpersonal functioning at work (Eby et al., 2020; Mesmer-Magnus et al., 2017). However, mindfulness did not moderate the relationship between leadership style and team cohesion, contradicting our initial hypothesis, based on previous studies suggesting that mindful employees are more inclined to support and assist coworkers in positive leadership environments (e.g., Eisenbeiss & van Knippenberg, 2015). A possible explanation for this result is that, while prior studies have focused on how mindfulness influences how individuals relate to others, our study examined team dynamics as a whole. In this context, the individual's mindfulness is unlikely to have a significant impact on overall team cohesion, as leadership style plays a more dominant role in shaping intragroup dynamics. Rather than directly impacting the entire team, mindfulness may affect how individuals interact with their colleagues, which may indirectly contribute to overall team functioning. Future studies should further explore how mindfulness shapes the individual's relational style, influencing how they communicate, provide support, and navigate social interactions within the team, such as in the context of team member exchange (TMX; Seers, 1989). Understanding how mindfulness affects both interpersonal behaviors and broader team dynamics could offer a more comprehensive perspective on its role in group settings, particularly in the context of different leadership styles.

5.5 Limitations and Strengths

These results should be interpreted considering some limitations. First, the data are based on online self-report questionnaires completed by self-selected employees, increasing the risk of common method bias. Second, the cross-sectional design and small sample size may limit generalizability. Future research should address these issues through longitudinal studies and

larger, more diverse samples. Moreover, although we conducted a factorial analysis to examine the factor structure of the leadership scale used, the measure itself was not previously validated in Italian sample. Additionally, interpersonal adjustment was assessed at team level, without accounting for individual interactions and communication dynamics within the team. Utilizing a validated leadership measure and assessing interpersonal adjustment based on employees' relational styles could provide a more refined understanding of mindfulness in organizational settings.

Despite these limitations, our study presents several strengths. To the best of our knowledge, this is the first study that examines the moderating role of mindfulness in the relationship between leadership styles, as defined by Lewin et al. (1939), and employees' adjustment both at individual and team levels. Our use of a widely applicable leadership model and data from employees across multiple companies enhances the relevance of our findings to various organizational contexts.

5.6 Conclusions and Implications

Overall, the results of the current work suggest that more mindful employees are better equipped to withstand a controlling and strict leadership environment, preserving their well-being and job performance. This underscores the protective role of dispositional mindfulness in demanding work settings and offers valuable insights for practical applications. Organizations should consider and recognize individual differences in how employees respond to workplace conditions. Mindfulness could serve as a useful screening tool to identify employees who may be more vulnerable to the negative effects of strict authoritarian supervision, enabling targeted support and interventions.

Additionally, our findings emphasize the impact of both negative (i.e., authoritarian leadership) and positive (i.e., democratic leadership) leadership styles on employees'

psychological and job-related adjustment, reinforcing the well-established importance of leadership environments. To enhance employee well-being and improve overall organizational health, companies should focus on both strengthening employees' personal resources to cope with stressful and challenging environments and fostering a supportive workplace climate. This approach can help reduce both individual and organizational costs associated with negative work conditions.

Chapter 6 | General Discussion

The primary aim of this set of studies was to investigate the role of mindfulness in navigating interpersonal challenges across various life contexts, with a particular focus on parenting and the workplace, thereby contributing new insights to this field of research. To achieve this, three empirical studies were conducted to explore how mindfulness supports parents in managing the demands of parenting and enhancing the quality of the mother-child relationship from infancy to preschool (i.e., *Chapter 2*, *Chapter 3* and *Chapter 4*). A fourth study extends this investigation to the workplace, examining how mindfulness may support employees' individual and relational adjustment in relation to different leadership styles (i.e., *Chapter 5*). Overall, this dissertation highlights the role of mindfulness as a protective factor in addressing the challenges of early childhood parenting and workplace adjustment.

In this concluding chapter, I will synthesize and discuss the key findings from the studies, along with the theoretical and practical implications. I will also critically examine the limitations and strengths of the dissertation. Finally, I will present the overarching conclusions drown from this body of work.

6.1 Overview of the Main Findings

Considering that parenting challenges evolve in response to child's developmental needs and trajectories, and the majority of existing studies have focused on older children (e.g., Kil & Grusec, 2020; Medeiros et al., 2016) or used broad age ranges (e.g., Potharst et al., 2021), (see *Chapter 1* for a detailed discussion), the first three studies in this dissertation examined how mindfulness supports parenting from infancy to preschool – a period marked by unique developmental challenges. This approach offers new insights into the role of mindfulness as a protective factor in parenting across different stages of early childhood and has the potential to inform the development of targeted parental support strategies.

The two observational studies presented in ***Chapter 2*** aimed to investigate the role of maternal mindfulness in supporting the quality of mother-infant interaction during the first year of life – a period in which a parent's primary challenge is to attune to and respond sensitively to their infant's affective cues and distress signals. Specifically, Study 1 investigated the role of maternal mindfulness in mother-infant physiological and behavioral attunement – measured in terms of face-to-face sharing of attention and affect– at 3 and 9 months of age, Study 2 explored the effect of a mindfulness-based intervention on mother-infant behavioral and physiological attunement as well as on maternal well-being at 9 months of age. Results showed that maternal mindfulness at 3 months was associated with stronger mother-infant physiological (i.e., stronger association between infant and maternal cardiac activation) and behavioral attunement (i.e., more moments of shared attention and affect along with fewer instances where the mother dominated the interaction). Collectively, these findings suggest that mothers who pay more attention to their own present-moment internal images, thoughts, sensations, and emotions, accepting them without judgment and without getting taken over by it (Kabat-Zinn, 2003) and/or more aware of what happens moment-by-moment during the interaction with their own infants (Pratscher et al., 2019) were more connected with both the physiological and behavioral cues of their infants. At 3 months, when interactions are characterized by face-to-face engagement and shared attention, mindfulness appears to be key in shaping these early social exchanges, aligning with the phase of primary intersubjectivity (Trevarthen & Aitken, 2001).

By 9 months, while maternal mindfulness was still associated with mother-infant physiological attunement, the associations with behavioral attunement were no longer observed. However, mindful mothers spent more time engaging in positive vocalizations with their 9-months old infants. Contrary to our hypothesis, mothers who participated in the mindfulness-based intervention did not show improved mother-infant attunement, but there

was a trend toward reduced parenting stress after the intervention. These results may indicate that while mindfulness may help with early face-to-face attunement based on affective sharing, later in infancy, as the child explores the environment more, attunement should be assessed through different interactive dimensions, e.g. maternal ability to follow the infant's focus of interest with appropriate verbal comments. This aligns with the transition to secondary intersubjectivity (Trevarthen & Aitken, 2001; Trevarthen & Hubley, 1978), during which infants become more interested in environmental exploration and start to share their focus of attention with others. More mindful mothers may be better able to adapt their interactive style to their infant's developmental needs, spending less time in face-to-face affective exchanges and more time communicating with an increasingly interactive and communicative child. For a more detailed discussion, see *Chapter 2*.

The study presented in ***Chapter 3*** not only investigated the association between maternal dispositional mindfulness and the mother-child relationship in a sample of toddlers and preschoolers but also examined emotion regulation in parenting as a potential mechanism underlying this association. Additionally, the study aimed to explore the moderating role of the child's age in the relationship between maternal mindfulness and emotion regulation in parenting. Findings indicated that mothers more aware of both their internal and external experiences reported better relationships with their toddlers and preschool-aged children, experiencing greater satisfaction, confidence, and enjoyment in their interactions. Consistent with previous studies showing a positive association between mindfulness and emotion regulation (e.g., Davis et al., 2019), our findings suggest that improved emotion regulation in parenting plays a key role in this connection. Mothers with higher dispositional mindfulness may be better able to manage their negative emotions in front of the child when they are sad, anxious and upset. This emotional control was linked to a higher quality of the mother-child relationship, reflected in greater happiness and satisfaction during shared activities. In line

with the idea that preschoolers present mothers with more behavioral challenges than toddlers (i.e., greater lively and disobedient behaviors and higher demands for attention), mothers of older children regulated their negative emotions during parenting worse than mothers of younger children (Moreira & Canavarro, 2018). However, the positive impact of maternal mindfulness on the ability to regulate own emotions during parenting was stronger for mothers of older children, evidencing the powerful protective role that mindfulness may have for these mothers (see *Chapter 3* for a more detailed discussion). This result is consistent with the overarching hypothesis of this dissertation, which posits that mindfulness may function differently across various phases of parenting, adapting to the specific challenges that arise at each developmental stage.

The study presented in ***Chapter 4*** investigated the role of mindfulness as a protective factor in navigating the challenges of parenting, with particular focus on individual differences in maternal resources, i.e., Sensory Processing Sensitivity (SPS; Aron & Aron, 1997; Pluess, 2015). Specifically, the study examined the interaction between SPS and mindfulness in predicting both the quality of the mother-child relationship and maternal emotion regulation in parenting. Considering that parenting tends to be more demanding for HS mothers (e.g., Goldberg & Scharf, 2020), we expected that mindfulness would mitigate the risk of negative parenting behaviors in these mothers. Our findings showed that HS mothers reported more difficulties in engaging in positive and satisfying interactions with their child, as well as more challenges in regulating their emotional states (e.g., anger or anxiety) during these interactions. This may be attributed to their heightened reactivity to internal stimuli, which can lead to feelings of overwhelm. Importantly, our findings supported mindfulness as a protective factor for HS mothers of preschoolers, suggesting that mothers with higher mindfulness maintained better emotion regulation during parenting and preserved high quality of mother-child relationship. However, this effect was not significant for mothers

of toddlers, confirming that the preschool years may represent a particularly challenging developmental stage. It may be suggested that while both high sensitivity and mindfulness contribute to heightened reactivity to emotional and social cues, they operate at different levels. SPS primarily functions at the level of sensory threshold and reactivity, whereas mindfulness operates at a metacognitive level, enabling individuals to observe and regulate their responses more effectively. HS individuals with a high level of mindfulness may develop greater awareness of their heightened reactivity to emotional and sensory stimuli. This awareness could enable them to observe their responses in a non-judgmental manner, recognizing emerging sensations simply as experiences rather than becoming overwhelmed by them. Consequently, they may be better able to regulate these responses, fostering greater emotional balance and more adaptive interpersonal interactions.

Overall, our findings suggest that maternal dispositional mindfulness plays a protective role in the quality of the mother-child relationship across different stages of early childhood, including infancy (*Chapter 2*), toddlerhood and preschool age (*Chapter 3* and *4*). As the child grows, maternal mindfulness continues to foster positive and nurturing mother-child interactions, drawing on interactive dimensions specific to each developmental phase. These insights highlight the potential of mindfulness as a valuable tool in screenings designed to identify at-risk dyads, offering a foundation for targeted interventions to support mother-child relationship. Mindfulness-based intervention for parents should take into account the unique challenges that parents face at each stage, designing interventions that address these specific needs. For example, mindfulness interventions may focus on enhancing parents' ability to attune to their infants' distress and affective cues during the first six months, shift to promoting the ability to follow the infants' focus of interest by the second part of the first year, and support parents in managing autonomy assertion and challenging behaviors starting from toddlerhood. Moreover, these interventions could equip parents with effective coping

strategies and practical tools that could be integrated into daily routines to deal with the challenges of parenting (e.g., deep breathing to stay calm during stressful moments and/or fully engaging in activities with the child). Because interventions based on mindfulness practices, especially those as our conducted with audios, are cheap and simple to implement, they may be particularly suitable for mothers who are already overburdened and have little time.

Interestingly, the protective effect of mindfulness appears to increase as the child grows, likely due to the increasing complexity of parenting challenges as children age. Although previous studies examined mother-child relationships across a wide age range, making direct comparisons difficult, our results are consistent with existing research that demonstrates the association between maternal mindfulness and more positive mother-child interactions throughout various stages of development (e.g., Duncan et al., 2015; Zeegers et al., 2019). This continuity highlights the potentially expanding protective role of mindfulness in fostering healthy mother-child relationships as children encounter more complex developmental challenges, suggesting that mindfulness-based interventions may be particularly beneficial for mothers of older children.

Finally, the study presented in ***Chapter 5*** investigated the role of mindfulness on employees' adjustment in the workplace, both at intrapersonal (i.e., job performance and psychological well-being) and interpersonal level (i.e., team cohesion). This investigation focused particularly on potentially challenging relational contexts, such as the impact of different leadership styles (i.e., authoritarian and democratic leadership). Results indicated that while mindfulness was positively directly associated with wellbeing, job performance and team cohesion, in highly authoritarian environments mindful employees experienced fewer negative emotions and maintained job performance, but they did not preserve team cohesion. This suggests that employees who are more attuned to their inner experiences also

tend to be more connected with others, perceiving fewer conflicts and tensions within their teams, which aligns with previous research on mindfulness and interpersonal functioning at work (Eby et al., 2020; Mesmer-Magnus et al., 2017). A possible explanation for the lack of impact on team cohesion is that, while mindfulness influences how individuals relate to others, it may not have a significant effect on overall team dynamics, particularly in authoritarian environments where leadership style plays a dominant role. Rather than directly impacting the entire team, mindfulness may affect how individuals interact with their colleagues, which may indirectly contribute to overall team functioning. Finally, more mindful employees in our sample did not experience improved psychological well-being, job performance and team cohesion in contexts where leaders provide guidance without pressure and members are involved in decision-making (i.e., high democratic leadership). Consistently with our findings on parenting, where the effects of mindfulness became stronger as parenting challenges increased with the child's age (see *Chapters 3* and *4*), it is possible that the impact of mindfulness is more pronounced in demanding workplace contexts. In environments characterized by high authoritarian leadership, mindfulness appears to serve as a buffer against negative emotional experiences and performance declines. However, in more supportive settings, where employees face fewer interpersonal and emotional challenges, its effects may be less evident. This suggests that mindfulness may be particularly valuable as a resilience resource in high-stress or demanding conditions. Organizations should consider and recognize individual differences in how employees respond to workplace conditions. Mindfulness could serve as a useful screening tool to identify employees who may be more vulnerable to the negative effects of strict authoritarian supervision, enabling targeted support and interventions.

6.2 Limitations and Strengths of this Dissertation

Although the present dissertation provides evidence of mindfulness as a protective factor both in parenting and the workplace, it is important to acknowledge several limitations that should be considered when interpreting the findings and that may be addressed in further research.

Most notably, although the studies presented in *Chapter 2* are part of a larger longitudinal project, all the data analyzed in this dissertation are cross-sectional, limiting the ability to establish causal relationships between mindfulness and the outcomes. Future longitudinal studies should investigate the same sample of participants to examine whether mindfulness not only serves as a protective factor in parenting, considering the unique challenges posed at each developmental stage, but also extends its benefits to the workplace (e.g., by focusing on a subsample of working parents), providing a more comprehensive understanding of its role across different life domains.

Additionally, participants across all studies were self-selected, highly educated, with medium to high socioeconomic status, and drawn from non-clinical samples, limiting the generalizability of the findings to populations experiencing cultural, socioeconomic, and other disadvantages. Future studies should replicate these findings on larger samples and on high-risk populations to examine whether the protective role of mindfulness extends to individuals facing greater adversity, providing a more inclusive and representative understanding of its benefits.

While the studies in *Chapter 2* are observational and focus on how mothers attune to their infants, the other three studies are based on online self-report questionnaires, capturing the overall quality of the relationship without addressing how individuals relate to others specifically (i.e., satisfaction and enjoyment in interactions with the child in *Chapter 3* and *4* and team dynamics in *Chapter 5*). Future observational studies should investigate

mindfulness as a protective factor by considering the typical challenges of parenting at specific stages of early childhood (e.g., the mother's ability to follow the child's focus of interest at the end of the first year of life, and the mother's ability to manage challenging behaviors during the toddler and preschool periods). Similarly, studies in the workplace should explore how mindfulness influences the way individuals relate to others, particularly in the context of team dynamics and interpersonal interactions.

Finally, it is important to note that the studies on parenting (i.e., *Chapters 2, 3* and *4*) focused exclusively on mothers, which limits the generalizability of the findings to fathers. Future research should aim to explore the role of mindfulness both in mothers and fathers to provide a more comprehensive understanding of its effects across both parental figures. Additionally, the mindfulness-based intervention was tested only during the first year of life. Extending this intervention to the toddler and preschool stages, where parenting challenges become more pronounced, could potentially yield more significant effects. The increased demands of parenting during these stages, characterized by the emergence of greater autonomy and more complex behavioral challenges, may provide a unique opportunity to assess the broader impact of mindfulness. By addressing the specific challenges of each developmental stage, future interventions could be better tailored to the needs of parents at different phases of early childhood, ultimately creating more effective, context-specific strategies for supporting positive parenting practices.

Despite these limitations, this set of studies presents several strengths and makes important contributions to the study of mindfulness as a protective factor in interpersonal functioning.

First, while previous research has typically focused on isolated contexts, particularly on intimate partner relationships (e.g., Karremans et al., 2020), this dissertation—despite its cross-sectional design—is the first to investigate the role of mindfulness in navigating

challenges across multiple domains, focusing on two of the most critical contexts in an individual's life.

Second, within this dissertation we investigated the role of mindfulness as a protective factor in parenting through early childhood (i.e., during infancy, toddlerhood and the preschool years), recognizing the rapid developmental changes that define this period. During this time, both the child's needs and the parenting demands evolve swiftly, necessitating that parents adjust their approaches to effectively navigate these transitions. Previous studies examining early childhood have often relied on broad age ranges (e.g., Potharst et al., 2021; Zeegers et al., 2019). By using samples with narrower age ranges, these studies addresses this gap and account for the specific challenges parents may encounter at different stages of their child's development, offering a more nuanced understanding of how mindfulness may support adaptive parenting during these critical periods. Third, the mixed-method design employed in the studies on parenting, which combines behavioral observation, physiological measures and individual perceptions, represents a key strength. The inclusion of physiological data, particularly in the early stages of life, adds a unique and crucial dimension to understanding the physiological underpinnings of parenting. This approach allows for a comprehensive understanding of parenting, capturing both objective (i.e., behavioral and physiological) and subjective dimensions (i.e., maternal perceptions), offering valuable insights into the complex interplay of factors influencing parenting during early childhood.

6.3 General Conclusions

Overall, the present set of studies underscore the role of mindfulness as a protective factor in addressing the challenges of early childhood parenting, considering both the distinct characteristics of relational environments and individual differences in personal resources. Mindfulness emerges as a key factor in workplace adjustment as well. These results suggest

that individuals with higher levels of mindfulness may be better equipped to navigate the unique challenges presented by each of these environments.

From an applied perspective, these findings highlight the potential of mindfulness as a screening tool to identify individuals at greater risk, and the importance of designing context-specific interventions tailored to the unique challenges of each environment.

By examining mindfulness across different developmental stages of early childhood and within workplace dynamics, these findings contribute to a more nuanced understanding of how mindfulness supports individuals in navigating the evolving challenges within both parenting and professional settings. This work not only reinforces the relevance of mindfulness in psychological research and intervention but also lays the foundation for future studies to refine and expand upon these insights.

References

Abidin, R., Flens, J. R., & Austin, W. G. (2006). *The parenting stress index*. Lawrence Erlbaum Associates Publishers.

Abney, D. H., daSilva, E. B., & Bertenthal, B. I. (2021). Associations between infant–mother physiological synchrony and 4-and 6-month-old infants' emotion regulation. *Developmental Psychobiology*, *63*(6), e22161. https://doi.org/10.1002/dev.22161

Ainsworth, M. D. (1985). Patterns of infant-mother attachments: antecedents and effects on development. *Bulletin of the New York Academy of Medicine*, 61(9), 771-79.

Akaike, H. (1974). A New Look at the Statistical Model Identification. *IEEE Transactions on Automatic Control*, *19*(6), 716–723. https://doi.org/10.1109/TAC.1974.1100705

Alqhaiwi, Z. O., Djurkovic, N., Luu, T., & Gunasekara, A. (2024). The self-regulatory role of trait mindfulness in workplace bullying, hostility and counterproductive work behaviours among hotel employees. *International Journal of Hospitality Management*, *122*, 103843. https://doi.org/10.1016/j.ijhm.2024.103843

Anand, L., Sadowski, I., Per, M., & Khoury, B. (2023). Mindful parenting: a Meta-analytic review of intrapersonal and interpersonal parental outcomes. *Current Psychology*, *42*(10), 8367–8383. https://doi.org/10.1007/s12144-021-02111-w

Aron, E. N., & Aron, A. (1997). Sensory-Processing Sensitivity and Its Relation to Introversion and Emotionality. *Journal of Personality and Social Psychology*, *73*(2), 345–368. https://doi.org/10.1037/0022-3514.73.2.345

Aron, E. N., Aron, A., Nardone, N., & Zhou, S. (2019). Sensory Processing Sensitivity and the Subjective Experience of Parenting: An Exploratory Study. *Family Relations*, *68*(4), 420–435. https://doi.org/10.1111/fare.12370

Avolio, B. J., Walumbwa, F. O., & Weber, T. J. (2009). Leadership: Current theories, research, and future directions. *Annual Review of Psychology, 60(1), 421-449*. https://doi.org/10.1146/annurev.psych.60.110707.163621

Bass, B. M., & . Riggio, R. E. (2006). *Transformational leadership. Psychology press.*

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, *10*(2), 125–143. https://psycnet.apa.org/buy/2003-03824-001

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, *13*(1), 27–45. https://doi.org/10.1177/1073191105283504

Bakker, K., & Moulding, R. (2012). Sensory-processing sensitivity, dispositional mindfulness and negative psychological symptoms. *Personality and individual differences*, *53*(3), 341-346. https://doi.org/10.1016/j.paid.2012.04.006

Bear, K. A., Barber, C. C., & Medvedev, O. N. (2022). The impact of a mindfulness app on postnatal distress. *Mindfulness, 13*(11), 2765-2776. https://doi.org/10.1007/s12671-022-01992-7

Beebe, B., Lachmann, F., Jaffe, J., Markese, S., Buck, K. A., Chen, H., Cohen, P., Feldstein, S., & Andrews, H. (2012). Maternal postpartum depressive symptoms and 4-month mother-infant interaction. *Psychoanalytic Psychology*, *29*(4), 383–407. https://doi.org/10.1037/a0029387

Belsky, J. (1984). The Determinants of Parenting: A Process Model. *Child Development*, *55*(1), 83. https://doi.org/10.2307/1129836

Ben Uriel-Maoz, L., Lavy, S., & Berkovich-Ohana, A. (2023). The effects of mindfulness on mother–child relationships and maternal well-being during the first COVID-19 lockdown in Israel. *Child and Family Social Work*, *28*(4), 932–948. https://doi.org/10.1111/cfs.13013

Bird, A. L., Russell, S., Pickard, J. A., Donovan, M., Madsen, M., & Herbert, J. S. (2021). Parents' Dispositional Mindfulness, Child Conflict Discussion, and Childhood Internalizing Difficulties: A Preliminary Study. *Mindfulness*, *12*, 1624-1638. https://doi.org/10.1007/s12671-021-01625-5

Bishop, S. R. (2002). What Do We Really Know About Mindfulness-Based Stress Reduction? *Psychosomatic Medicine*, *64*(1), 71–83.

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

Bornstein, M. H. (2022). Mother-Infant Attunement. *Parenting: Selected Writings of Marc H. Bornstein*, 280.

Bowlby, J. (1988). A Secure Base. Parent-Child Attachment and Healthy Human Development. *Basic Books*.

Braeken, M. A. K. A., Jones, A., Otte, R. A., Nyklíček, I., & Van den Bergh, B. R. H. (2017). Potential benefits of mindfulness during pregnancy on maternal autonomic nervous system function and infant development. *Psychophysiology*, *54*(2), 279–288. https://doi.org/https://doi.org/10.1111/psyp.12782

Branjerdporn, G., Meredith, P., Strong, J., & Green, M. (2019). Sensory sensitivity and its

relationship with adult attachment and parenting styles. *PLoS ONE*, *14*(1), e0209555. https://doi.org/10.1371/journal.pone.0209555

Bränström, R., Duncan, L. G., & Moskowitz, J. T. (2011). The association between dispositional mindfulness, psychological well-being, and perceived health in a Swedish population-based sample. *British journal of health psychology*, *16*(2), 300-316. https://doi.org/10.1348/135910710X501683

Brassel, A., Townsend, M. L., Pickard, J. A., & Grenyer, B. F. S. (2020). Maternal perinatal mental health: Associations with bonding, mindfulness, and self-criticism at 18 months' postpartum. *Infant Mental Health Journal*, *41*(1), 69–81. https://doi.org/10.1002/imhj.21827

Brown, K. W., & Ryan, R. M. (2003). The Benefits of Being Present: Mindfulness and Its Role in Psychological Well-Being. *Journal of Personality and Social Psychology*, *84*(4), 822–848. https://doi.org/10.1037/0022-3514.84.4.822

Brown, K. W., Ryan, R. M., & David Creswell, J. (2007). Addressing fundamental questions about mindfulness. *Psychological inquiry*, *18*(4), 272-281. https://doi.org/10.1080/10478400701703344

Bucic, T., Robinson, L., & Ramburuth, P. (2010). Effects of leadership style on team learning. *Journal of Workplace Learning*, *22*(4), 228–248. https://doi.org/10.1108/13665621011040680

Burke, L. K., McGill, J., & Adler-Baeder, F. (2020). Exploring the Links between Facets of Mindfulness and Parenting Efficacy and Stress. *Journal of Child and Family Studies*, *29*(6), 1679–1691. https://doi.org/10.1007/s10826-019-01692-2

Bürkner, P. C. (2017). brms: An R package for Bayesian multilevel models using

Stan. *Journal of statistical software*, *80*, 1-28. https://doi.org/10.18637/jss.v080.i01

Bürkner P (2018). Advanced Bayesian Multilevel Modeling with the R Package brms. *The R Journal*, *10*(1), 395- 411. https://doi.org/10.32614/RJ-2018-017).

Cha, J., Kim, Y., Lee, J. Y., & Bachrach, D. G. (2015). Transformational Leadership and Inter-Team Collaboration. *Group & Organization Management*, *40*(6), 715–743. https://doi.org/10.1177/1059601114568244

Chu, L. C. (2014). The moderating role of authoritarian leadership on the relationship between the internalization of emotional regulation and the well-being of employees. *Leadership*, *10*(3), 326–343. https://doi.org/10.1177/1742715013498403

Ciciolla, L., Addante, S., Shreffler, K. M., & Croff, J. M. (2023). Effects of a Mindfulness-Based Parental Reflection Intervention on Pregnancy-Related Distress: A Pilot Study. *Women's Health Reports*, *4(1), 78-83*. https://doi.org/10.1089/whr.2022.0090

Coatsworth, J. D., Duncan, L. G., Greenberg, M. T., & Nix, R. L. (2010). Changing parent's mindfulness, child management skills and relationship quality with their youth: Results from a randomized pilot intervention trial. *Journal of Child and Family Studies*, *19*(2), 203–217. https://doi.org/10.1007/s10826-009-9304-8

Coatsworth, J. D., Timpe, Z., Nix, R. L., Duncan, L. G., & Greenberg, M. T. (2018). Changes in mindful parenting: Associations with changes in parenting, parent–Youth relationship quality, and youth behavior. *Journal of the Society for Social Work and Research*, *9*(4), 511–529.

https://doi.org/10.1086/701148

Cohen, J. S. (2010). *Mindfulness and Self-Compassion in the Transition to Motherhood: A Prospective Study of Postnatal Mood and Attachment*. Columbia University.

Condon, J. T., & Corkindale, C. J. (2007). The assessment of parent-to-infant attachment: Development of a self-report questionnaire instrument. *Journal of Reproductive and Infant Psychology, 16*(1), 57-76. https://doi.org/10.1080/02646839808404558

Cooke, J. E., Kochendorfer, L. B., Stuart-Parrigon, K. L., Koehn, A. J., & Kerns, K. A. (2019). Parent-child attachment and children's experience and regulation of emotion: A meta-analytic review. *Emotion*, *19*(6), 1103–1126. https://doi.org/10.1037/emo0000504

Coplan, R. J., Reichel, M., & Rowan, K. (2009). Exploring the associations between maternal personality, child temperament, and parenting: A focus on emotions. *Personality and individual differences*, *46*(2), 241-246. https://doi.org/10.1016/j.paid.2008.10.011

Cowling, C., & Van Gordon, W. (2018). Effects of a brief online mindfulness intervention on mindfulness, psychological distress and parenting stress in preschool parents. *Mindfulness & Compassion*. https://www.researchgate.net/publication/324058569

Das, S. S., & Pattanayak, S. (2023). Understanding the effect of leadership styles on employee well-being through leader-member exchange. *Current Psychology*, *42*(25), 21310–21325. https://doi.org/10.1007/s12144-022-03243-3

Davis, E. L., Lundwall, C. L., Fairborn, S. K., Quinones-Camacho, L. E., & Estep, J. C. (2019). Self-Regulation Mechanisms Explain How Dispositional Mindfulness Promotes

Well-Being. *Journal of Positive Psychology and Wellbeing*, *3*(2), 153–164. https://journalppw.com/index.php/jppw/article/view/37

De Los Reyes, A. (2017). Inaugural editorial: Making the journal of clinical child & adolescent psychology your "Home Journal". *Journal of Clinical Child & Adolescent Psychology*, *46*(1), 1-10. https://doi.org/10.1080/15374416.2016.1266649

Deater-Deckard, K., Li, M., & Bell, M. A. (2016). Multifaceted emotion regulation, stress and affect in mothers of young children. *Cognition and Emotion*, *30*(3), 444-457. https://doi.org/10.1080/02699931.2015.1013087

Depasquale, C. E. (2020). A systematic review of caregiver-child physiological synchrony across systems: Associations with behavior and child functioning. *Development and Psychopathology*, *32*(5), 1754–1777. https://doi.org/10.1017/S0954579420001236

Derakhshanpour, V., Pasha Sharif, H., & Kadivar, P. (2022). The effects of Mindfulness Training on Primiparous Pregnant women's Emotion Control and the formation of secure attachment style among their infants. *International Journal of Pediatrics, 10(2), 15389-15398*. https://doi.org/10.22038/ijp.2021.54732.4319

Doba, K., Pezard, L., & Nandrino, J. L. (2022). How do maternal emotional regulation difficulties modulate the mother–infant behavioral synchrony? *Infancy*, *27*(3), 582–608. https://doi.org/10.1111/infa.12461

Duncan, L. G. (2007). *Assessment of mindful parenting among parents of early adolescents: Development and validation of the Interpersonal Mindfulness in Parenting scale*. The Pennsylvania State University.

Duncan, L. G. (2023). Interpersonal Mindfulness in Parenting (IM-P) Scale. *Handbook of*

Assessment in Mindfulness Research, 1–25. Cham: Springer International Publishing. https://doi.org/110.1007/978-3-030-77644-2_30-1

Duncan, L. G., Coatsworth, J. D., Gayles, J. G., Geier, M. H., & Greenberg, M. T. (2015). Can mindful parenting be observed? Relations between observational ratings of mother-youth interactions and mothers' self-report of mindful parenting. *Journal of Family Psychology*, *29*(2), 276–282. https://doi.org/10.1037/a0038857

Eby, L. T., Robertson, M. M., & Facteau, D. B. (2020). Mindfulness and relationships: An organizational perspective. *Research in Personnel and Human Resources Management*, *38*, 57–102. https://doi.org/10.1108/S0742-730120200000038004

Eisenbeiss, S. A., & van Knippenberg, D. (2015). On ethical leadership impact: The role of follower mindfulness and moral emotions. *Journal of Organizational Behavior*, *36*(2), 182–195. https://doi.org/10.1002/job.1968

Erschens, R., Seifried-Dübon, T., Stuber, F., Rieger, M. A., Zipfel, S., Nikendei, C., Genrich, M., Angerer, P., Maatouk, I., Gündel, H., Rothermund, E., Peters, M., & Junne, F. (2022). The association of perceived leadership style and subjective well-being of employees in a tertiary hospital in Germany. *PloS one*, *17*(12), e0278597. https://doi.org/10.1371/journal.pone.0278597

Evans, C. A., & Porter, C. L. (2009). The emergence of mother-infant co-regulation during the first year: Links to infants' developmental status and attachment. *Infant Behavior and Development*, *32*(2), 147–158. https://doi.org/10.1016/j.infbeh.2008.12.005

Farley, S., Mokhtar, D., Ng, K., & Niven, K. (2023). What influences the relationship

between workplace bullying and employee well-being? A systematic review of moderators. *Work and Stress*, *37*(3), 345–372. https://doi.org/10.1080/02678373.2023.2169968

Feldman, R. (2006). From biological rhythms to social rhythms: Physiological precursors of mother-infant synchrony. *Developmental Psychology*, *42*(1), 175–188. https://doi.org/10.1037/0012-1649.42.1.175

Feldman, R. (2007). Parent–infant synchrony: Biological foundations and developmental outcomes. *Current directions in psychological science*, *16*(6), 340-345. https://doi.org/10.1111/j.1467-8721.2007.00532.x

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., & Eidelman, A. I. (2005). Does a Triplet Birth Pose a Special Risk for Infant Development? Assessing Cognitive Development in Relation to Intrauterine Growth and Mother-Infant Interaction Across the First 2 Years. *Pediatrics*, *115*(2), 443–452. https://doi.org/10.1542/peds.2004-1137

Feldman, R., Greenbaum, C. W., Yirmiya, N., & Mayes, L. C. (1996). Relations Between Cyclicity and Regulation in Mother-Infant Interaction at 3 and 9 Months and Cognition at 2 Years. *Journal of Applied Developmental Psychology*, *17*(3), 347-365. https://doi.org/10.1016/S0193-3973(96)90031-3

Fernandes, D. V., Canavarro, M. C., & Moreira, H. (2021a). Postpartum during COVID-19 pandemic: Portuguese mothers' mental health, mindful parenting, and mother–infant bonding. *Journal of Clinical Psychology*, *77*(9), 1997-2010. https://doi.org/10.1002/jclp.23130

Fernandes, D. V., Canavarro, M. C., & Moreira, H. (2021b). The role of mothers' self-compassion on mother–infant bonding during the COVID-19 pandemic: A longitudinal study exploring the mediating role of mindful parenting and parenting stress in the postpartum period. *Infant Mental Health Journal*, *42*(5), 621–635. https://doi.org/10.1002/imhj.21942

Fernandes, D. V., Martins, A. R., Canavarro, M. C., & Moreira, H. (2022). Mindfulness-and compassion-based parenting interventions applied to the postpartum period: A systematic review. *Journal of Child and Family Studies*, *31*(2), 563-587. https://doi.org/10.1007/s10826-021-02175-z

Ferris, G. R., Liden, R. C., Munyon, T. P., Summers, J. K., Basik, K. J., & Buckley, M. R. (2009). Relationships at work: Toward a multidimensional conceptualization of dyadic work relationships. *Journal of Management*, *35*(6), 1379–1403. https://doi.org/10.1177/0149206309344741

Fogel, A. (1993). *Developing through relationships*. University of Chicago Press.

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*.

Frosch, C. A., Schoppe-Sullivan, S. J., & O'Banion, D. D. (2021). Parenting and child development: A relational health perspective. *American journal of lifestyle medicine*, *15*(1), 45-59. https://doi.org/10.1177/1559827619849028

Galante, J., Friedrich, C., Dawson, A. F., Modrego-Alarcón, M., Gebbing, P., Delgado-Suárez, I., Gupta, R., Dean, L., Dalgleish, T., White, I. R., & Jones, P. B. (2021). Mindfulness-based programmes for mental health promotion in adults in nonclinical settings: A systematic review and meta-analysis of randomised controlled trials. *PLOS*

Medicine, *18*(1), e1003481. https://doi.org/10.1371/JOURNAL.PMED.1003481

Gao, M., Vlisides-Henry, R. D., Kaliush, P. R., Thomas, L., Butner, J., Raby, K. L., Conradt, E., & Crowell, S. E. (2023). Dynamics of mother-infant parasympathetic regulation during face-to-face interaction: The role of maternal emotion dysregulation. *Psychophysiology*, *60*(6), e14248. https://doi.org/10.1111/psyp.14248

Gastil, J. (1994). A Definition and Illustration of Democratic Leadership. *Human Relations*, *47*(8), 953–975. https://doi.org/10.1177/001872679404700805

Glomb, T. M., Duffy, M. K., Bono, J. E., & Yang, T. (2011). Mindfulness at work. In *Research in Personnel and Human Resources Management* (pp. 115-157). Emerald Group Publishing Limited. https://doi.org/10.1108/S0742-7301(2011)0000030005

Goldberg, A., & Scharf, M. (2020). How do highly sensitive persons parent their adolescent children? The role of sensory processing sensitivity in parenting practices. *Journal of Social and Personal Relationships*, *37*(6), 1825-1842. https://doi.org/10.1177/0265407520911101

Goldberg, S. B., Tucker, R. P., Greene, P. A., Davidson, R. J., Wampold, B. E., Kearney, D. J., & Simpson, T. L. (2018). Mindfulness-based interventions for psychiatric disorders: A systematic review and meta-analysis. *Clinical psychology review*, *59*, 52-60. https://doi.org/10.1016/j.cpr.2017.10.011

Golmakani, N., Shaghaghi, F., Ahmadi, Z., Gholami, M., Kamali, Z., & Mohebbi-Dehnavi, Z. (2021). Investigating the relationship between the dimensions of mindfulness and maternal attachment to the fetus during pregnancy. *Journal of Education and Health*

Promotion, *10*(1), 433. https://doi.org/10.4103/jehp.jehp_1513_20

Goodrich, B., Gabry, J., & Ali, I. (2022). Brilleman S. rstanarm: Bayesian applied regression modeling via Stan. R package version 2.21.3. Available at: https://mc-stan.org/rstanarm

Grecucci, A., Pappaianni, E., Siugzdaite, R., Theuninck, A., & Job, R. (2015). Mindful emotion regulation: Exploring the neurocognitive mechanisms behind mindfulness. *BioMed research international*, *2015*(1), 670724. https://doi.org/10.1155/2015/670724

Gross, J. J. (2014). Emotion regulation: Conceptual and empirical foundations. *Handbook of emotion regulation*, 2, 3-20.

Gu, J., Strauss, C., Bond, R., & Cavanagh, K. (2015). How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. *Clinical psychology review*, *37*, 1-12. https://doi.org/10.1016/j.cpr.2015.01.006

Guarino, A., Laghi, F., Serantoni, G., Di Blasio, P., Camisasca, E. (2016) Parenting Stress Index – Fourth Edition (PSI-4)*, Giunti O.S., FIRENZE -- ITA: 134* http://hdl.handle.net/10807/96058

Guendelman, S., Medeiros, S., & Rampes, H. (2017). Mindfulness and emotion regulation: Insights from neurobiological, psychological, and clinical studies. *Frontiers in Psychology*, *8*, 220. https://doi.org/10.3389/fpsyg.2017.00220

Haas, A. S., & Langer, E. J. (2014). Mindful attraction and synchronization: Mindfulness and regulation of interpersonal synchronicity. *NeuroQuantology*, *12*(1). https://doi.org/10.14704/nq.2014.12.1.728

Hayes, A. F. (2017). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. *Guilford publications.*

Harrington, R., Loffredo, D. A., & Perz, C. A. (2014). Dispositional mindfulness as a positive predictor of psychological well-being and the role of the private self-consciousness insight factor. *Personality and Individual Differences*, *71*, 15-18. https://doi.org/10.1016/j.paid.2014.06.050

Haslam, S. A. (2012). *Psychology in organizations: The social identity approach*. SAGE Publications Ltd. https://doi.org/10.4135/9781446278819

Hawkes, A. J., & Neale, C. M. (2020). Mindfulness beyond wellbeing: Emotion regulation and team-member exchange in the workplace. *Australian Journal of Psychology*, *72*(1), 20–30. https://doi.org/10.1111/ajpy.12255

He, Q., Liu, X., & Jiang, F. (2024). Why Do People with High Mindfulness Experience Greater Eudaimonic Well-Being? Integrating Self-Determination Theory and the Mindfulness Reperceiving Model. *The Journal of Psychology*, 1-19. https://doi.org/10.1080/00223980.2024.2431198

Herawati, H., Setyadi, D., Michael, M., & Hidayati, T. (2023). The Effect of Workload, Supervisor, and Coworker Supports on Job Performance through Job Satisfaction. *International Journal of Finance, Economics and Business*, *2*(1), 13–33. https://doi.org/10.56225/ijfeb.v2i1.168

Hicks, L. M., Dayton, C. J., Brown, S., Muzik, M., & Raveau, H. (2018). Mindfulness Moderates Depression and Quality of Prenatal Attachment in Expectant Parents. *Mindfulness*, *9*, 1604-1614. https://doi.org/10.1007/s12671-018-0907-2

Ho, R. T., Lo, H. H., Fong, T. C., & Choi, C. W. (2020). Effects of a mindfulness-based intervention on diurnal cortisol pattern in disadvantaged families: A randomized controlled trial. *Psychoneuroendocrinology*, *117*, 1-7. https://doi.org/10.1016/j.psyneuen.2020.104696

Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science, 6*(6), 537–559. https://doi.org/10.1177/1745691611419671

Hulsbosch, L. P., Potharst, E. S., Schwabe, I., Boekhorst, M. G. B. M., Pop, V. J. M., & Nyklíček, I. (2023). Online mindfulness-based intervention for women with pregnancy distress: A randomized controlled trial. *Journal of Affective Disorders*, *332*, 262–272. https://doi.org/10.1016/j.jad.2023.04.009

Iani, L., Lauriola, M., Chiesa, A., & Cafaro, V. (2019). Associations between mindfulness and emotion regulation: The key role of describing and nonreactivity. *Mindfulness*, *10*(2), 366-375. https://doi.org/10.1007/s12671-018-0981-5

Jahanzeb, S., Fatima, T., Javed, B., & Giles, J. P. (2020). Can mindfulness overcome the effects of workplace ostracism on job performance? *Journal of Social Psychology*, *160*(5), 589–602. https://doi.org/10.1080/00224545.2019.1707465

Jehn, K. A. (1995). A Multimethod Examination of the Benefits and Detriments of Intragroup Conflict. *Administrative Science Quarterly*, *40*(2), 256-282. https://doi.org/10.2307/2393638

Juffer, F., Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2018). *Video-feedback*

intervention to promote positive parenting and sensitive discipline. Handbook of attachment-based interventions. New York: Guilford.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice, 10*(2), 144–156. https://doi.org/10.1093/clipsy.bpg016

Kabat-Zinn, J. (2023). *Wherever you go, there you are: Mindfulness meditation in everyday life*. Hachette UK.

Kakhki, Z. B., Mashhadi, A., Yazdi, S. A. A., & Saleh, S. (2022). The effect of mindful parenting training on parent–child interactions, parenting stress, and cognitive emotion regulation in mothers of preschool children. *Journal of Child and Family Studies*, *31*(11), 3113-3124. https://doi.org/10.1007/s10826-022-02420-z

Karremans, J. C., Kappen, G., Schellekens, M., & Schoebi, D. (2020). Comparing the effects of a mindfulness versus relaxation intervention on romantic relationship wellbeing. *Scientific reports*, *10*(1), 21696. https://doi.org/10.1038/s41598-020-78919-6

Kelly, S., & MacDonald, P. (2019). A Look at Leadership Styles and Workplace Solidarity Communication. *International Journal of Business Communication*, *56*(3), 432–448. https://doi.org/10.1177/2329488416664176

Khaddouma, A., Gordon, K. C., & Bolden, J. (2015). Zen and the art of dating: Mindfulness, differentiation of self, and satisfaction in dating relationships. Couple and Family Psychology: Research and Practice, *4*(1), 1–13. https://doi.org/10.1037/cfp0000035

Kil, H., & Grusec, J. E. (2020). Links among Mothers' Dispositional Mindfulness, Stress, Perspective-Taking, and Mother-Child Interactions. Mindfulness, *11*(7), 1710–1722.

https://doi.org/10.1007/s12671-020-01387-6

Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., De Vet, H. C. W., & Van Der Beek, A. J. (2014). Construct validity of the individual work performance questionnaire. *Journal of Occupational and Environmental Medicine*, *56*(3), 331–337. https://doi.org/10.1097/JOM.0000000000000113

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

Kroon, B., van Woerkom, M., & Menting, C. (2017). Mindfulness as substitute for transformational leadership. *Journal of Managerial Psychology*, *32*(4), 284–297. https://doi.org/10.1108/JMP-07-2016-0223

Lampinen, E., Karolaakso, T., Karvonen, A., Kaartinen, J., Kykyri, V. L., Seikkula, J., & Penttonen, M. (2018). Electrodermal activity, respiratory sinus arrhythmia, and heart rate variability in a relationship enrichment program. *Mindfulness*, *9*, 1076-1087. https://doi.org/10.1007/s12671-017-0843-6

Laurent, H. K., Duncan, L. G., Lightcap, A., & Khan, F. (2017b). Mindful parenting predicts mothers' and infants' hypothalamic-pituitary-adrenal activity during a dyadic stressor. *Developmental Psychology*, *53*(3), 417–424. https://doi.org/10.1037/dev0000258

Laurent, H. K., Wright, D., & Finnegan, M. (2018). Mindfulness-related differences in neural response to own infant negative versus positive emotion contexts. *Developmental cognitive neuroscience*, *30*, 70-76. https://doi.org/10.1016/j.dcn.2018.01.002

Lewin, K., Lippitt, R., & White, R. K. (1939). Patterns of aggressive behavior in experimentally created "social climates". *The Journal of social psychology*, *10*(2), 269-

299. https://doi.org/10.1080/00224545.1939.9713366

Lionetti, F., Aron, A., Aron, E. N., Burns, G. L., Jagiellowicz, J., & Pluess, M. (2018). Dandelions, tulips and orchids: Evidence for the existence of low-sensitive, medium-sensitive and high-sensitive individuals. *Translational Psychiatry*, *8*(1), 1–11. https://doi.org/10.1038/s41398-017-0090-6

Lionetti, F., Dumpfrey, R. S. C., Richetin, J., Fasolo, M., Nocentini, A., Penolazzi, B., ... & Preti, E. (2024). Is environmental sensitivity a unique trait? A multi-sample study on the association between sensitivity, personality, and psychological adjustment. *Personality and Individual Differences*, *217*, 112463. https://doi.org/10.1016/j.paid.2023.112463

Lionetti, F., Spinelli, M., Bosmans, G., D'Urso, G., Fasolo, M., & Pluess, M. (2025). Is environmental sensitivity relevant to understand parenting? Observational studies with mothers of young children. *Journal of Family Psychology.* Advance online publication. https://doi.org/10.1037/fam0001329

Lionetti, F., Spinelli, M., Moscardino, U., Ponzetti, S., Garito, M. C., Dellagiulia, A., Aureli, T., Fasolo, M., & Pluess, M. (2023). The interplay between parenting and environmental sensitivity in the prediction of children's externalizing and internalizing behaviors during COVID-19. *Development and Psychopathology*, *35*(3), 1390–1403. https://doi.org/10.1017/S0954579421001309

Lomas, T., Medina, J. C., Ivtzan, I., Rupprecht, S., & Eiroa-Orosa, F. J. (2019). Mindfulness-based interventions in the workplace: An inclusive systematic review and meta-analysis of their impact upon wellbeing. *Journal of Positive Psychology*, *14*(5), 625–640. https://doi.org/10.1080/17439760.2018.1519588

Lönnberg, G., Niemi, M., Salomonsson, B., Bränström, R., Nissen, E., & Jonas, W. (2021). Exploring the Effects of Mindfulness-Based Childbirth and Parenting on Infant Social-Emotional Development. *Mindfulness*, *12*(8), 2009–2020. https://doi.org/10.1007/s12671-021-01658-w

Lundwall, C., Fairborn, S., Quinones-Camacho, L., Estep, J., & Davis, E. (2019). Self-regulation mechanisms explain how dispositional mindfulness promotes well-being. *Journal of Positive Psychology and Wellbeing*, *3*(2), 153-164.

Maloş, R. (2012). The Most Important Leadership Theories. *Annals of Eftimie Murgu University Resita, Fascicle II, Economic Studies*, 413–420.

Maxwell, S. E., & Cole, D. A. (2007). Bias in Cross-sectional Analyses of Longitudinal Mediation. *Psychological Methods*, *12*(1), 23-44. https://doi.org/10.1037/1082-989X.12.1.23

McDonald, H.M., Sherman, K.A. & Kasparian, N.A. (2022). How Mindful Awareness and Psychological Distress Influence Mother-Infant Bonding and Maternal Perceptions of Infant Temperament. *Mindfulness*, *13*, 955–966. https://doi.org/10.1007/s12671-022-01848-0

Medeiros, C., Gouveia, M. J., Canavarro, M. C., & Moreira, H. (2016). The Indirect Effect of the Mindful Parenting of Mothers and Fathers on the Child's Perceived Well-Being Through the Child's Attachment to Parents. *Mindfulness*, *7*(4), 916–927. https://doi.org/10.1007/s12671-016-0530-z

Medvedev, O. N., Norden, P. A., Krägeloh, C. U., & Siegert, R. J. (2018). Investigating unique contributions of dispositional mindfulness facets to depression, anxiety, and stress in general and student populations. *Mindfulness*, *9*(6), 1757-1767. https://doi.org/10.1007/s12671-018-0917-0

Mesmer-Magnus, J., Manapragada, A., Viswesvaran, C., & Allen, J. W. (2017). Trait

mindfulness at work: A meta-analysis of the personal and professional correlates of trait mindfulness. *Human Performance*, *30*(2–3), 79–98. https://doi.org/10.1080/08959285.2017.1307842

Michaelsen, M. M., Graser, J., Onescheit, M., Tuma, M. P., Werdecker, L., Pieper, D., & Esch, T. (2023). Mindfulness-Based and Mindfulness-Informed Interventions at the Workplace: A Systematic Review and Meta-Regression Analysis of RCTs. *Mindfulness*, *14*(6), 1271–1304. https://doi.org/10.1007/S12671-023-02130-7/TABLES/6

Miller, J. G., Armstrong-Carter, E., Balter, L., & Lorah, J. (2023). A meta-analysis of mother–child synchrony in respiratory sinus arrhythmia and contextual risk. *Developmental Psychobiology*, *65*(1), 1-12. https://doi.org/10.1002/dev.22355

Min, W., Jiang, C., Li, Z., & Wang, Z. (2023). The effect of mindfulness-based interventions during pregnancy on postpartum mental health: A meta-analysis. *Journal of Affective Disorders*, *331*, 452–460. https://doi.org/10.1016/j.jad.2023.03.053

Mitonga-Monga, J., Coetzee, M., & Cilliers, F. V. N. (2012). Perceived leadership style and employee participation in a manufacturing company in the democratic republic of Congo. *African Journal of Business Management*, *6*(15), 5389–5398. https://doi.org/10.5897/ajbm11.2443

Moreira, H., & Canavarro, M. C. (2018). Does the association between mindful parenting and adolescents' dispositional mindfulness depend on the levels of anxiety and depression symptomatology in mothers? *Journal of Adolescence*, *68*, 22-31. https://doi.org/10.1016/j.adolescence.2018.07.003

Mubarak, N., Khan, J., Bashir, S., & Safdar, S. (2024). Dark side of leadership and

information technology project success: the role of mindfulness. *Journal of Managerial Psychology*, *39*(3), 304–322. https://doi.org/10.1108/JMP-04-2022-0182

Nielsen, K., Nielsen, M. B., Ogbonnaya, C., Känsälä, M., Saari, E., & Isaksson, K. (2017). Workplace resources to improve both employee well-being and performance: A systematic review and meta-analysis. *Work and Stress*, *31*(2), 101–120. https://doi.org/10.1080/02678373.2017.1304463

Noroña-Zhou, A. N., Coccia, M., Epel, E., Vieten, C., Adler, N. E., Laraia, B., Jones-Mason, K., Alkon, A., & Bush, N. R. (2022). The Effects of a Prenatal Mindfulness Intervention on Infant Autonomic and Behavioral Reactivity and Regulation. *Psychosomatic Medicine*, *84*(5), 525-535. https://doi.org/10.1097/psy.0000000000001066

Northouse, P. G. (2014). *Introduction to leadership: Concepts and practice*. Sage.

Nyklíček, I. (2011). *Mindfulness, Emotion Regulation, and Well-Being*. In: Nyklíček, I., Vingerhoets, A., Zeelenberg, M. (eds) Emotion Regulation and Well-Being. Springer, New York, NY. https://doi.org/10.1007/978-1-4419-6953-8_7

Onesti, G. (2023). Exploring the Impact of Leadership Styles, Ethical Behavior, and Organizational Identification on Workers' Well-Being. *Administrative Sciences*, *13*(6). https://doi.org/10.3390/admsci13060149

Onesti, G., Bellante, F., Lionetti, F., Fasolo, M., & Palumbo, R. (2024). The interplay among environmental sensitivity, job stressors, and leadership styles on employee well-being. *Scientific Reports*, *14*(1), 27397. https://doi.org/10.1038/s41598-024-78562-5

Ostlund, B. D., Olavson, K., Brown, M. A., Shakiba, N., Saenz, C., Crowell, S. E., Conradt,

E., & Brendan Ostlund, C. D. (2021). Maternal mindfulness during pregnancy predicts newborn neurobehavior. *Developmental Psychobiology*, *63*(6), e22131-e22139. https://doi.org/10.1002/dev.22131

Özaralli, N. (2003). Effects of transformational leadership on empowerment and team effectiveness. *Leadership & Organization Development Journal*, *24*(6), 335–344. https://doi.org/10.1108/01437730310494301

Parent, J., McKee, L. G., N. Rough, J., & Forehand, R. (2016). The Association of Parent Mindfulness with Parenting and Youth Psychopathology Across Three Developmental Stages. *Journal of Abnormal Child Psychology*, *44*(1), 191–202. https://doi.org/10.1007/s10802-015-9978-x

Passaquindici, I., Nardozza, O., Sperati, A., Lionetti, F., D'Urso, G., Fasolo, M., & Spinelli, M. (2024). Maternal dispositional mindfulness and mother–child relationship: The mediating role of emotional control during parenting. *Child: Care, Health and Development*, *50*(3), e13264. https://doi.org/10.1111/cch.13264

Passaquindici, I., Pastore, M., Nardozza, O., Lionetti, F., D'Urso, G., Palumbo, R., Fasolo, M., & Spinelli, M. (2024). From inner to dyadic connection: the role of mindfulness in mother–infant interaction during the first year of life. *Frontiers in Behavioral Neuroscience*, *18*, 1398042. https://doi.org/10.3389/fnbeh.2024.1398042

Pepping, C. A., Davis, P. J., & O'Donovan, A. (2013). Individual differences in attachment and dispositional mindfulness: The mediating role of emotion regulation. *Personality and Individual Differences*, *54*(3), 453–456. https://doi.org/10.1016/J.PAID.2012.10.006

Pepping, C. A., O'Donovan, A., Zimmer-Gembeck, M. J., & Hanisch, M. (2014). Is emotion

regulation the process underlying the relationship between low mindfulness and psychosocial distress? *Australian Journal of Psychology*, *66*(2), 130–138. https://doi.org/10.1111/AJPY.12050

Per, M., Spinelli, C., Sadowski, I., Schmelefske, E., Anand, L., & Khoury, B. (2020). Evaluating the Effectiveness of Mindfulness-Based Interventions in Incarcerated Populations: A Meta-Analysis. *Criminal Justice and Behavior*, *47*(3), 310–330. https://doi.org/10.1177/0093854819891457

Pereira, A. I., Barros, L., Roberto, M. S., & Marques, T. (2017). Development of the Parent Emotion Regulation Scale (PERS): Factor structure and psychometric qualities. *Journal of Child and Family Studies*, *26*, 3327-3338. https://doi.org/10.1007/s10826-017-0847-9

Pickard, J. A., Townsend, M., Caputi, P., & Grenyer, B. F. (2017). Observing the influence of mindfulness and attachment styles through mother and infant interaction: A longitudinal study. *Infant Mental Health Journal, 38*(3), 343–350. https://doi.org/10.1002/imhj.21645

Pickard, J. A., Townsend, M. L., Caputi, P., & Grenyer, B. F. (2018). Top-down and bottom-up: The role of social information processing and mindfulness as predictors in maternal–infant interaction. *Infant Mental Health Journal*, *39*(1), 44–54. https://doi.org/10.1002/imhj.21687

Pizzolitto, E., Verna, I., & Venditti, M. (2023). Authoritarian leadership styles and performance: a systematic literature review and research agenda. *Management Review Quarterly*, *73*(2), 841–871. https://doi.org/10.1007/s11301-022-00263-y

Platania, S., Morando, M., Gruttadauria, S. V., & Koopmans, L. (2023). The individual work performance questionnaire: Psychometric properties of the Italian version. *European*

Journal of Investigation in Health, Psychology and Education, *14*(1), 49-63. https://doi.org/10.3390/EJIHPE14010004

Pluess, M. (2015). Individual Differences in Environmental Sensitivity. *Child Development Perspectives*, *9*(3), 138–143. https://doi.org/10.1111/cdep.12120

Pluess, M., Lionetti, F., Aron, E. N., & Aron, A. (2023). People differ in their sensitivity to the environment: An integrated theory, measurement and empirical evidence. *Journal of Research in Personality*, *104*, 104377. https://doi.org/10.1016/j.jrp.2023.104377

Porges, S. W. (2001). The polyvagal theory: phylogenetic substrates of a social nervous system. *International Journal of Psychophysiology*, *42*(2), 123–146. https://doi.org/10.1016/S0167-8760(01)00162-3

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology*, *74*(2), 116–143. https://doi.org/10.1016/j.biopsycho.2006.06.009

Porges, S.W., Bohrer, R.E., 1990. Analyses of periodic processes in psycho- physiological research. In: Cacioppo, J.T., Tassinary, L.G. (Eds.), *Principles of Psychophysiology: Physical, Social, and Inferential Elements*. Cambridge University Press, New York, pp. 708–753.

Porges, S. W., & Furman, S. A. (2011). The Early Development of the Autonomic Nervous System Provides a Neural Platform for Social Behaviour: A Polyvagal Perspective. *Infant and Child Development*, *20*(1), 106–118. https://doi.org/10.1002/icd.688

Potharst, E. S., Aktar, E., Rexwinkel, M., Rigterink, M., & Bögels, S. M. (2017). Mindful with your baby: Feasibility, acceptability, and effects of a mindful parenting group training for mothers and their babies in a mental health context. *Mindfulness*, *8,* 1236-

1250. https://doi.org/10.1007/s12671-017-0699-9

Potharst, E. S., Leyland, A., Colonnesi, C., Veringa, I. K., Salvadori, E. A., Jakschik, M., Bögels, S. M., & Zeegers, M. A. J. (2021). Does Mothers' Self-Reported Mindful Parenting Relate to the Observed Quality of Parenting Behavior and Mother-Child Interaction? *Mindfulness*, *12*(2), 344–356. https://doi.org/10.1007/S12671-020-01533-0

Potharst, E. S., Veringa-Skiba, I., van Broekhuizen, E., & Bögels, S. M. (2022). Mindful with your baby for mothers of infants with (parental) stress in a non-clinical setting: a wait-list controlled pilot trial. *BMC Pregnancy and Childbirth*, *22*(1), 1–11. https://doi.org/10.1186/S12884-022-04640-z

Powell, D., Dunlap, G., & Fox, L. (2006). Prevention and intervention for the challenging behaviors of toddlers and preschoolers. *Infants and Young Children*, *19*(1), 25–35. https://doi.org/10.1097/00001163-200601000-00004

Pratscher, S. D., Rose, A. J., Markovitz, L., & Bettencourt, A. (2018). Interpersonal Mindfulness: Investigating Mindfulness in Interpersonal Interactions, co-Rumination, and Friendship Quality. *Mindfulness*, *9*(4), 1206–1215. https://doi.org/10.1007/s12671-017-0859-y

Pratscher, S. D., Wood, P. K., King, L. A., & Bettencourt, B. A. (2019). Interpersonal Mindfulness: Scale Development and Initial Construct Validation. *Mindfulness*, *10*(6), 1044–1061. https://doi.org/10.1007/s12671-018-1057-2

Preacher, K. J., Hayes, A. F., & Preacher, K. J. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879–891.

https://doi.org/10.3758/BRM.40.3.879

Quaglia, J. T., Goodman, R. J., & Brown, K. W. (2015). From mindful attention to social connection: The key role of emotion regulation. *Cognition and Emotion*, *29*(8), 1466–1474. https://doi.org/10.1080/02699931.2014.988124

Querstret, D., Morison, L., Dickinson, S., Cropley, M., & John, M. (2020). Mindfulness-based stress reduction and mindfulness-based cognitive therapy for psychological health and well-being in nonclinical samples: A systematic review and meta-analysis. *International Journal of Stress Management*, *27*(4), 394–411. https://doi.org/10.1037/STR0000165

Ramaci, T., Rapisarda, V., Bellini, D., Mucci, N., De Giorgio, A., & Barattucci, M. (2020). Mindfulness as a protective factor for dissatisfaction in HCWS: The moderating role of mindful attention between climate stress and job satisfaction. *International Journal of Environmental Research and Public Health*, *17*(11), 1–16. https://doi.org/10.3390/ijerph17113818

Raugh, I. M., Berglund, A. M., & Strauss, G. P. (2024). Implementation of Mindfulness-Based Emotion Regulation Strategies: A Systematic Review and Meta-analysis. *Affective Science*, 1-30. https://doi.org/10.1007/s42761-024-00281-x

R Core Team (2021). R: A Language and Environment for Statistical Computing. Vienna, Austria: R Foundation for Statistical Computing. Available at: https://www.R-project.org/.

Rocha, N. A. C. F., dos Santos Silva, F. P., dos Santos, M. M., & Dusing, S. C. (2020). Impact of mother–infant interaction on development during the first year of life: A systematic review. *Journal of Child Health Care*, *24*(3), 365–385.

https://doi.org/10.1177/1367493519864742

Roemer, L., Williston, S. K., & Rollins, L. G. (2015). Mindfulness and emotion regulation. *Current Opinion in Psychology*, *3*, 52-57. https://doi.org/10.1016/j.copsyc.2015.02.006

Root, A. E., Hastings, P. D., & Rubin, K. H. (2016). The Parenting Behaviors of Shy–Anxious Mothers: The Moderating Role of Vagal Tone. *Journal of Child and Family Studies*, *25*(4), 1325–1333. https://doi.org/10.1007/s10826-015-0296-2

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

Sansavini, A., Zavagli, V., Guarini, A., Savini, S., Alessandroni, R., & Faldella, G. (2015). Dyadic co-regulation, affective intensity and infant's development at 12 months: A comparison among extremely preterm and full-term dyads. *Infant Behavior and Development*, *40*, 29–40. https://doi.org/10.1016/J.INFBEH.2015.03.005

Scheidlinger, S. (1994). Brief report: The Lewin, Lippitt and White study of leadership and "social climates" revisited. *International Journal of Group Psychotherapy*, *44*(1), 123–127. https://doi.org/10.1080/00207284.1994.11490737

Schermuly, C. C., & Meyer, B. (2016). Good relationships at work: The effects of Leader–Member Exchange and Team–Member Exchange on psychological empowerment, emotional exhaustion, and depression. *Journal of Organizational Behavior*, *37*(5), 673–691. https://doi.org/10.1002/JOB.2060

Schultz, P. P., Ryan, R. M., Niemiec, C. P., Legate, N., & Williams, G. C. (2015). Mindfulness, Work Climate, and Psychological Need Satisfaction in Employee Well-being. *Mindfulness*, *6*(5), 971–985. https://doi.org/10.1007/s12671-014-0338-7

Seers, A. (1989). Team-member exchange quality: A new construct for role-making research. *Organizational Behavior and Human Decision Processes*, *43*(1), 118–135. https://doi.org/10.1016/0749-5978(89)90060-5

Shah, P. E., Hirsh-Pasek, K., Spinelli, M., Ozor, J., Weeks, H. M., McCaffery, H., & Kaciroti, N. (2023). Ecological contexts associated with early childhood curiosity: Neighborhood safety, home and parenting quality, and socioeconomic status. *Frontiers in Psychology*, *14*, 1–14. https://doi.org/10.3389/fpsyg.2023.986221

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of clinical psychology*, *62*(3), 373-386. https://doi.org/10.1002/jclp.20237

Shreffler, K. M., Tiemeyer, S., Ciciolla, L., & Croff, J. M. (2019). Effect of a mindfulness-based pilot intervention on maternal-fetal bonding. *International Journal of Women's Health*, 377-380. http://doi.org/10.2147/IJWH.S203836

Siegel, D. J. (2007). *The mindful brain: Reflection and attunement in the cultivation ofwell-being.* New York, NY: Norton.

Siegel, D. J., & Hartzell, M. (2013). *Parenting from the inside out: How a deeper self-understanding can help you raise children who thrive*. Penguin.

Siu, A. F., Ma, Y., & Chui, F. W. (2016). Maternal mindfulness and child social behavior: The mediating role of the mother-child relationship. *Mindfulness*, *7*, 577-583.

https://doi.org/10.1007/s12671-016-0491-2

Skakon, J., Nielsen, K., Borg, V., & Guzman, J. (2010). Are leaders' well-being, behaviours and style associated with the affective well-being of their employees? A systematic review of three decades of research. *Work and Stress*, *24*(2), 107–139. https://doi.org/10.1080/02678373.2010.495262

Skoranski, A., Coatsworth, J. D., & Lunkenheimer, E. (2019). A dynamic systems approach to understanding mindfulness in interpersonal relationships. *Journal of Child and Family Studies*, *28*, 2659-2672. https://doi.org/10.1007/s10826-019-01500-x

Snyder, R., Shapiro, S., & Treleaven, D. (2012). Attachment Theory and Mindfulness. *Journal of Child and Family Studies*, *21*(5), 709–717. https://doi.org/10.1007/s10826-011-9522-8

Sperati, A., Persico, M. E., Palumbo, R., Fasolo, M., Spinelli, M., Pluess, M., D'Urso, G., & Lionetti, F. (2024). The role of individual differences in environmental sensitivity in teachers' stress and burnout at work. *Stress and Health*, *40*(6), e3491. https://doi.org/10.1002/smi.3491

Spijkerman, M. P. J., Pots, W. T. M., & Bohlmeijer, E. (2016). Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials. *Clinical psychology review*, *45*, 102-114. https://doi.org/10.1016/j.cpr.2016.03.009

Spinelli, M., Lionetti, F., Garito, M. C., Shah, P. E., Logrieco, M. G., Ponzetti, S., Cicioni, P., Di Valerio, S., & Fasolo, M. (2022). Infant-Directed Speech From a Multidimensional Perspective: The Interplay of Infant Birth Status, Maternal Parenting Stress, and Dyadic Co-regulation on Infant-Directed Speech Linguistic and Pragmatic Features. *Frontiers in Psychology*, *13*, 804792.

https://doi.org/10.3389/fpsyg.2022.804792

Spinelli, M., & Mesman, J. (2018). The Regulation of Infant Negative Emotions: The Role of Maternal Sensitivity and Infant-Directed Speech Prosody. *Infancy*, *23*(4), 502–518. https://doi.org/10.1111/infa.12237

Srivastava, U. R., & Singh, V. (2015). Individual and Group Level Antecedents of Team-Member Exchange (TMX) and its Associated Outcomes. *International Journal of Management Excellence (ISSN: 2292-1648)*, *5*(1), 567–583. https://doi.org/10.17722/IJME.V5I1.796

Stan Development Team (2022). *STAN for Markov Chain Monte Carlo (MCMC)*. Available at: https://mc-stan.org/about/team/

Staples, A. D., & Bates, J. E. (2018). Parenting of infants and toddlers. In *Handbook of parenting and child development across the lifespan* (pp. 585-607). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-94598-9_26

Stern, D. N., Hofer, L., Haft, W., & Dore, J. (1985). Affect attunement: The sharing of feeling states between mother and infant by means of inter-modal fluency. *Social perception in infants*, 249-268.

Stewart, N. (1985). *Winning friends at work*. Ballantine Books.

Stuart-Edwards, A., MacDonald, A., & Ansari, M. A. (2023). Twenty years of research on mindfulness at work: A structured literature review. *Journal of Business Research*, *169*, 114285. https://doi.org/10.1016/j.jbusres.2023.114285

Theorell, T., Hammarström, A., Aronsson, G., Träskman Bendz, L., Grape, T., Hogstedt, C., Marteinsdottir, I., Skoog, I., & Hall, C. (2015). A systematic review including meta-analysis of work environment and depressive symptoms. *BMC Public Health*, *15*(1), 1–

14.
https://doi.org/10.1186/s12889-015-1954-4

Trevarthen, C., & Aitken, K. J. (2001). Infant intersubjectivity: Research, theory, and clinical applications. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, *42*(1), 3–48. https://doi.org/10.1017/S0021963001006552

Trevarthen, C., & Hubley, P. (1978). Secondary intersubjectivity. *Action, Gesture and Symbol.*, 183–229. https://doi.org/10.1002/cd.23219790406

Tronick, E. Z., Messinger, D. S., Weinberg, M. K., Lester, B. M., LaGasse, L., Seifer, R., , Bauer, C. R., Shankaran, S., Bada, H., Wright, L. L., Poole, & Liu, J. (2005). Cocaine exposure is associated with subtle compromises of infants' and mothers' social-emotional behavior and dyadic features of their interaction in the face-to-face still-face paradigm. *Developmental psychology*, *41*(5), 711.

Turpyn, C. C., & Chaplin, T. M. (2016). Mindful Parenting and Parents' Emotion Expression: Effects on Adolescent Risk Behaviors. *Mindfulness*, *7*(1), 246–254. https://doi.org/10.1007/s12671-015-0440-5

Valeri, L., & VanderWeele, T. J. (2013). Mediation analysis allowing for exposure–mediator interactions and causal interpretation: theoretical assumptions and implementation with SAS and SPSS macros. *Psychological Methods*, *18*(2), 137 –150. https://doi.org/10.1037/a0031034

Verhoeven, M., van Baar, A. L., & Deković, M. (2019). Parenting toddlers. In *Handbook of parenting* (pp. 56-80). Routledge. https://doi.org/10.4324/9780429440847-2

Vernon, J. R., & Moretti, M. M. (2022). Parent emotion regulation, mindful parenting, and

Youth attachment: Direct and Indirect Associations with Internalizing and externalizing problems. *Child Psychiatry & Human Development*, 1-12. https://doi.org/10.1007/s10578-022-01446-0

Wagenmakers, E. J., & Farrell, S. (2004). AIC model selection using Akaike weights. *Psychonomic Bulletin and Review*, *11*(1), 192–196. https://doi.org/10.3758/BF03206482/METRICS

Walsh, M. M., & Arnold, K. A. (2020). The bright and dark sides of employee mindfulness: Leadership style and employee well-being. *Stress and Health*, *36*(3), 287–298. https://doi.org/10.1002/smi.2926

Wang, S. L., Sun, M. Y., Huang, X., Zhang, D. M., Li, Y., Tao, X. U., Pao, X.P. & Zheng, R. M. (2023). Benefits of Mindfulness Training on the Mental Health of Women During Pregnancy and Early Motherhood: A Randomized Controlled Trial. *Biomedical and Environmental Sciences*, *36*(4), 353-366. https://doi.org/10.3967/bes2023.041

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and Validation of Brief Measures of Positive and Negative Affect: The PANAS Scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Weigold, A., Weigold, I. K., & Russell, E. J. (2013). Examination of the equivalence of self-report survey-based paper-and-pencil and internet data collection methods. *Psychological Methods*, *18*(1), 53-70. https://doi.org/10.1037/a0031607

Weinberg, M. K., & Tronick, E. Z. (1999). Infant and caregiver engagement phases, revised 7/99 (ICEP). *Unpublished scoring manual. Boston, MA: Boston Children's Hospital/Harvard Medical School*.

Wen, T. B., Theresa, C. F. H., Kelana, B. W. Y., Othman, R., & Syed, O. R. (2019). Leadership Styles in Influencing Employees' Job Performances. *International Journal of Academic Research in Business and Social Sciences*, *9*(9). https://doi.org/10.6007/ijarbss/v9-i9/6269

Wickham, H. (2016). ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York. Available at: https://ggplot2.tidyverse.org.

Wilkinson, R., & Hao, J. (2021). Development of a 20-item Five Facet Mindfulness Questionnaire Short Form: Factorial confirmation, validity and reliability. *Journal of Psychology and Behavioral Science*, *9*(2), 1-18. https://doi.org/10.15640/jpbs.v9n2a1

Williams, A. M., & Cano, A. (2014). Spousal mindfulness and social support in couples with chronic pain. *Clinical Journal of Pain*, *30*(6), 528–535. https://doi.org/10.1097/ajp.0000000000000009

Young, H. R., Glerum, D. R., Wang, W., & Joseph, D. L. (2018). Who are the most engaged at work? A meta-analysis of personality and employee engagement. *Journal of Organizational Behavior*, *39*(10), 1330–1346. https://doi.org/10.1002/job.2303

Yuan, X., Yang, Y., Wang, F., Ding, Q., Deng, M., Shi, W., & Zhao, X. (2024). The relationship between self-serving leadership and employees' expediency: a moderated mediation model. *Personnel Review*, *54*(1), 1–19. https://doi.org/10.1108/PR-10-2023-0835

Zaw, P. P., & Takahashi, Y. (2022). Effect of Transformational Leadership on Contextual Performance Mediated by Work Engagement and Moderated by Mindful Awareness. *Merits*, *2*(4), 241–257. https://doi.org/10.3390/merits2040017

Zeegers, M. A. J., Potharst, E. S., Veringa-Skiba, I. K., Aktar, E., Goris, M., Bögels, S. M., & Colonnesi, C. (2019). Evaluating mindful with your baby/toddler: Observational changes in maternal sensitivity, acceptance, mind-mindedness, and dyadic synchrony. *Frontiers in Psychology*, *10*, 1-14. https://doi.org/10.3389/fpsyg.2019.00753

Zell, E., & Lesick, T. L. (2022). Big five personality traits and performance: A quantitative synthesis of 50+ meta-analyses. *Journal of Personality*, *90*(4), 559–573. https://doi.org/10.1111/jopy.12683

Zenner, C., Herrnleben-Kurz, S., & Walach, H. (2014). Mindfulness-based interventions in schools-A systematic review and meta-analysis. *Frontiers in psychology*, *5*, 603. https://doi.org/10.3389/FPSYG.2014.00603

Zhang, D., Lee, E. K., Mak, E. C., Ho, C. Y., & Wong, S. Y. (2021). Mindfulness-based interventions: an overall review. *British medical bulletin*, *138*(1), 41-57. https://doi.org/10.1093/bmb/ldab005

Zhang, W., Wang, M., & Ying, L. (2019). Parental Mindfulness and Preschool Children's Emotion Regulation: the Role of Mindful Parenting and Secure Parent-Child Attachment. *Mindfulness*, *10*(12), 2481–2491. https://doi.org/10.1007/s12671-019-01120-y

Zhang, X., Li, Y., Wang, J., Mao, F., Wu, L., Huang, Y., Sun, J., & Cao, F. (2023). Effectiveness of Digital Guided Self-help Mindfulness Training During Pregnancy on Maternal Psychological Distress and Infant Neuropsychological Development: Randomized Controlled Trial. *Journal of Medical Internet Research*, *25*(1), 1–15. https://doi.org/10.2196/41298

Supplementary Materials of Chapter 2

S.1. Study 1 Priors Specification

For both types of models (linear and beta), we utilized non-informative priors. More specifically, the priors for regression coefficients in linear models were set as Normal (0, 2.5), and for residual standard deviations, Exponential (1) was used. In beta models, the priors for regression coefficients were set as in linear models, Normal (0, 2.5), for residual standard deviations were set as truncated Student's t (3, 0, 2.5) and the priors for the φ parameters were set as Gamma (0.01, 0.01).

S.2. Study 1 Models Analysis Plan

For the analyses we proceeded with the following steps:

1. Fitting models. We fitted all models using the specified priors. For MCMC sampling we adopted 4 chains of 8000 replicates each, with 4000 as warmup. Consequently, the effective number of posterior samples was 16000. MCMC convergences were assessed by means of the Potential Scale Reduction Statistic (PSRF or Rhat; Gelman & Rubin, 1992).
2. Diagnostics. In addition to the traditional residuals diagnostics plots (for linearity, normality and homoscedasticity), we adopted the Posterior Predictive Check (PPC), this latter is a graphical comparison between data simulated from the posterior predictive distribution and real-world observations; if a model is a good fit then generated data looks a lot like the observed data (Gabry, Simpson, Vehtari, Betancourt, & Gelman, 2019).
3. Model comparison. We used the following indices: Leave-one-out cross validation criterion (LOO; Vehtari, Gelman, & Gabry, 2017), model weights (W; Yao, Vehtari, Simpson, & Gelman, 2018) and R^2 – one for each response variable – with 90% credible intervals. Credible intervals are intervals containing a specific portion of posterior distribution; in our

case, they represent the set of more plausible values for R^2, with a chosen probability. As all Information Criteria, LOO estimates the model predictive capability; the lower the value, the better will be the model. Model weights are values ranging from zero to one that can be interpret as an estimate of the probability that the model will make the best predictions on new data, conditional on the set of models considered (Burnham & Anderson, 2002). Therefore, in the set of considered models, the best will be the one with lowest LOO and highest W.

4. Best Model analysis. Finally, we selected the best model and analysed it in detail. In particular, we analysed the model parameters and predictions based on the parameters posterior distributions.

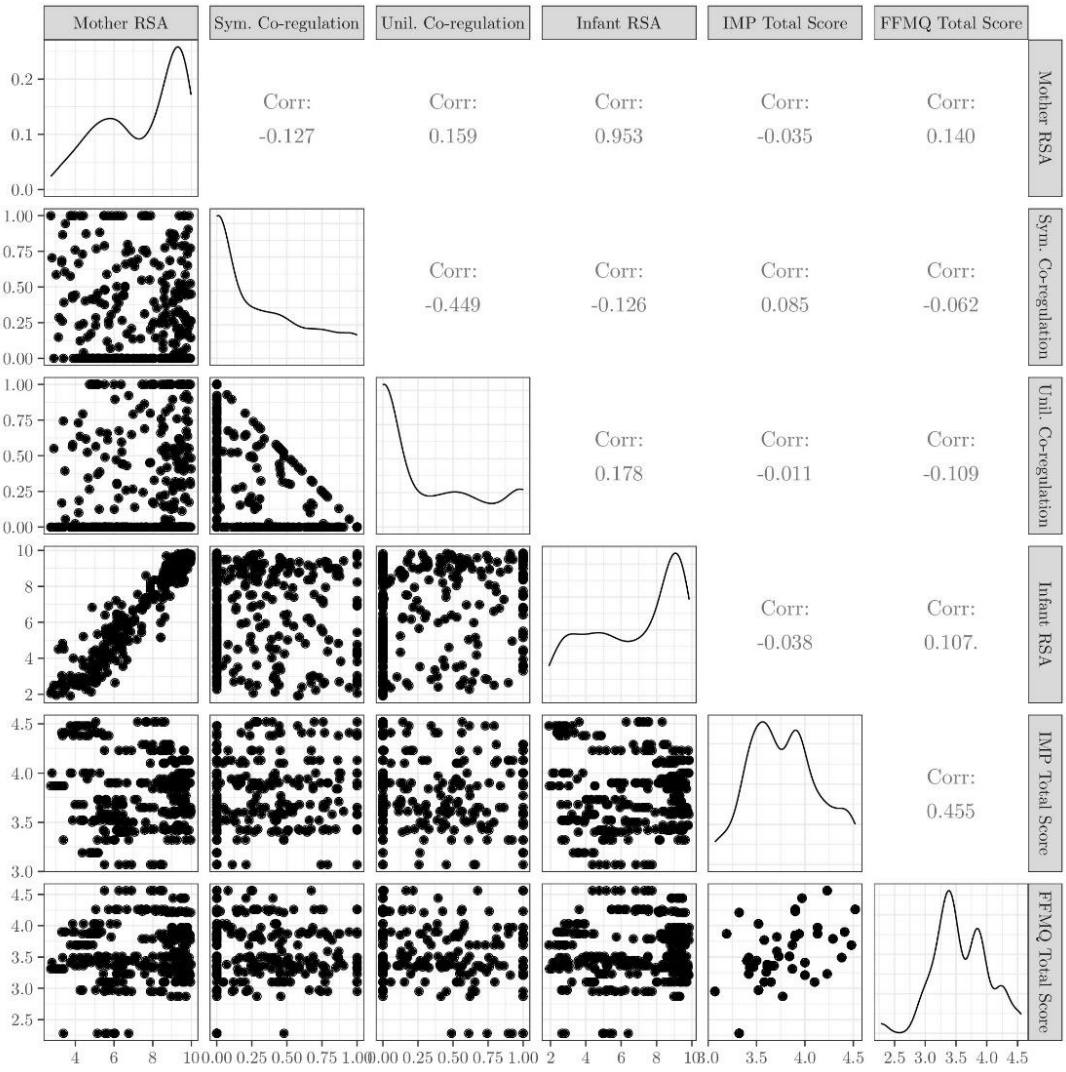
S.3. Study 1 Descriptives

In this section, we report univariate (Table S1) and bivariate (Figure S1) descriptive statistics of the target variables.

Table S1. *Univariate Descriptives Statistics of the Target Variables.*

	M	*SD*	*Median*	*Trimmed*	*Mad*	*Min*	*Max*	*Range*	*Skew*	*Kurtosis*	*se*
Mother RSA	7.43	2.06	8.07	7.59	2.28	2.73	9.99	7.26	-0.49	-1.10	0.11
Symmetrial Co-regulation	0.28	0.33	0.15	0.23	0.22	0.00	1.00	1.00	0.90	-0.50	0.02
Unilateral Co-regulation	0.29	0.37	0.00	0.24	0.00	0.00	1.00	1.00	0.86	-0.81	0.02
Infant RSA	6.77	2.48	7.46	6.94	2.82	1.91	9.85	7.93	-0.43	-1.28	0.14
IMP Total Score	3.79	0.36	3.73	3.78	0.36	3.07	4.52	1.45	0.22	-0.66	0.02
FFMQ Total Score	3.59	0.45	3.49	3.58	0.44	2.28	4.56	2.28	-0.05	0.23	0.02

Figure S1. *Pairs Plot of Target Variables.*



Note. On the main diagonal, univariate densities are depicted. On the other graphs, below the diagonal, pairwise bivariate scatterplots are shown. Above the diagonal, correlation coefficients are reported.

S.4. Study 1 Models' Diagnostics: Outcome Mother RSA

Table S1 presents the comparisons for models with Mother RSA as outcome.

Figures S2 and S3 represent the diagnostic plots for the two models discussed in section 2.2.2.

The four panels represent: 1) Residuals vs Fitted values, where in a good model, reference lines should be at and horizontal; 2) Normal Q-Q plot, where in a good model, dots should fall along the line; 3) Scale-Location plot, where reference lines should be at and horizontal;

4) Posterior Predictive Check, where model predicted densities should resemble the observed density line.

Table S2. *Model Comparison for Mother RSA.*

	Model	LOO	SE	W	R^2
M09a	Infant RSA x IMP Total Score + (1|ID)	600.26	42.57	0.23	0.92
M10a	Infant RSA x FFMQ Total Score + (1|ID)	600.35	43.26	0.22	0.92
M06a	Infant RSA + FFMQ Total Score + (1|ID)	600.99	43.37	0.15	0.92
M01a	Infant RSA + (1|ID)	601.53	43.02	0.12	0.92
M05a	Infant RSA +IMP Total Score + (1|ID)	601.87	42.94	0.10	0.92
M11a	Infant RSA x IMP Total Score + Time + (1|ID)	602.73	42.57	0.07	0.92
M12a	Infant RSA x FFMQ Total Score + Time + (1|ID)	602.87	43.252	0.06	0.92
M04a	Infant RSA + Time + (1|ID)	603.55	43.06	0.044	0.92
M07a	FFMQ Total Score + Time + (1|ID)	761.15	45.56	2.64	0.88
M08a	IMP Total Score + Time + (1|ID)	761.20	45.39	2.57	0.88
M02a	IMP Total Score + (1|ID)	772.48	48.06	9.12	0.87
M00a	(1|ID)	772.62	48.10	8.52	0.87
M03a	FFMQ Total Score + (1|ID)	772.78	47.68	7.86	0.87

Note. Each row provides information on the model formula, LOO (with standard errors), model weights (W), and R^2. ID = subject ID code.

Figure S2. *Model M09a Diagnostics Plots.*

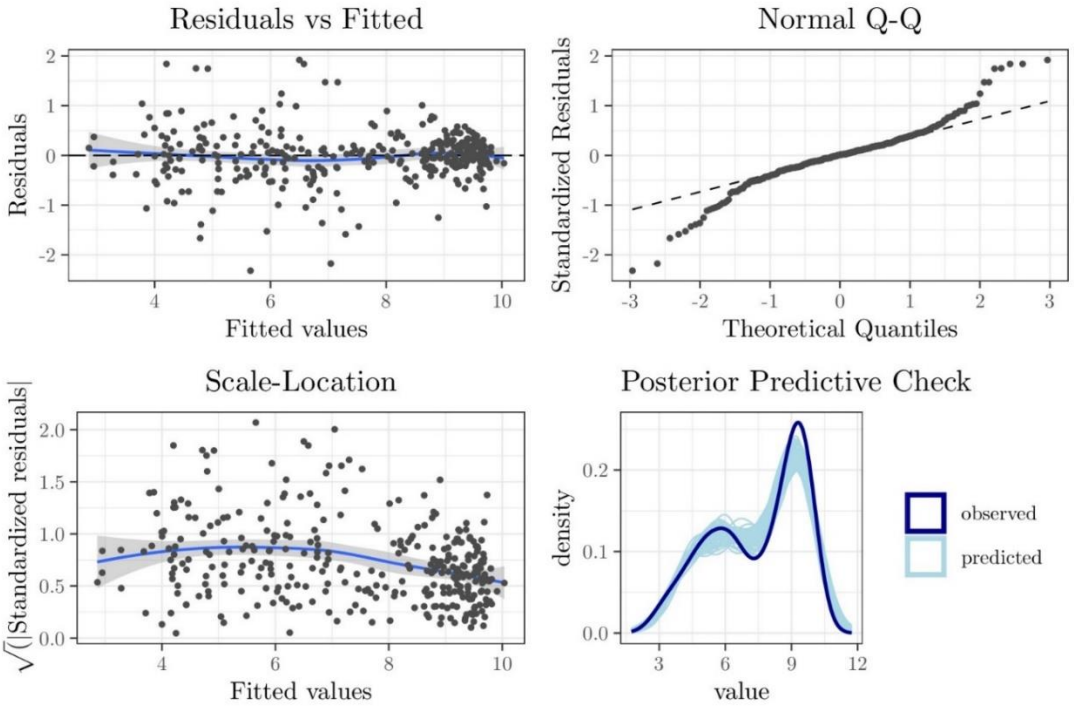
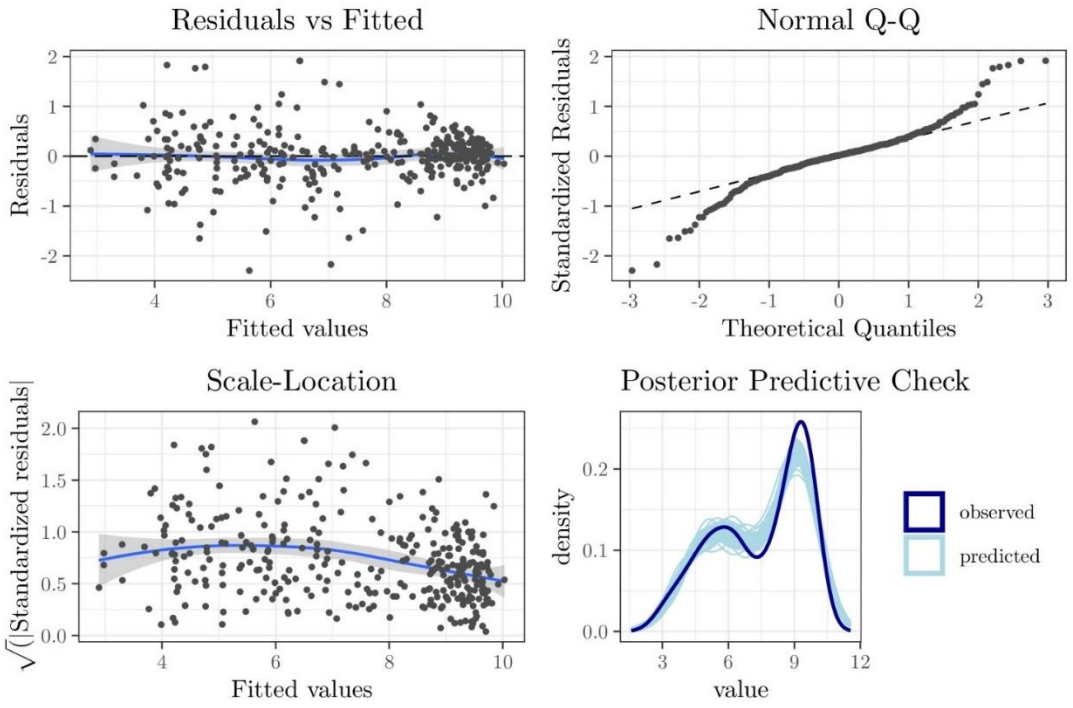


Figure S3. *Model M10a Diagnostics Plots.*



S.5. Study 1 Models' Diagnostics: Outcome Symmetrical and Unilateral Co-regulation

Table S3 presents the comparisons for models with Mother RSA as outcome.

Figures S4, S5, S6, and S7 represent the diagnostic plots for the two models discussed in section 2.2.3.

The four panels represent: 1) Residuals vs Fitted values, where in a good model, reference lines should be at and horizontal; 2) Normal Q-Q plot, where in a good model, dots should fall along the line; 3) Scale-Location plot, where reference lines should be at and horizontal; 4) Posterior Predictive Check, where model predicted densities should resemble the observed density line.

Table S3. *Model Comparison for Symmetrical and Unilateral Co-regulation.*

	Model	LOO	SE	W	Symmetrical	Unilateral
M08b	IMP Total Score + Time + (1|ID)	-13027.30	510.44	0.34	0.30	0.36
M07b	FFMQ Total Score + Time + (1|ID)	-13026.48	510.40	0.22	0.30	0.36
M14b	FFMQ Total Score x Infant RSA + Time + (1|ID)	-13025.64	510.49	0.15	0.30	0.36
M06b	Mother RSA + Time + (1|ID)	-13024.46	510.52	0.08	0.30	0.37
M05b	Infant RSA + Time + (1|ID)	-13023.48	510.57	0.05	0.30	0.37
M18b	Mother RSA x Infant RSA + Time + (1|ID)	-13022.60	510.45	0.03	0.32	0.36
M16b	FFMQ Total Score x Mother RSA + Time + (1|ID)	-13022.46	510.31	0.03	0.32	0.36
M15b	IMP Total Score x Infant RSA + Time + (1|ID)	-13021.46	510.56	0.02	0.32	0.37
M00b	(1|ID)	-13021.21	510.62	0.02	0.33	0.37
M03b	FFMQ Total Score + (1|ID)	-13020.99	510.63	0.01	0.30	0.38
M04b	IMP Total Score + (1|ID)	-13020.70	510.60	0.01	0.30	0.37
M17b	IMP Total Score x Mother RSA + Time + (1|ID)	-13020.57	510.53	0.01	0.31	0.37
M09b	FFMQ Total Score x Infant RSA + (1|ID)	-13019.63	510.68	0.01	0.31	0.37
M02b	Mother RSA + (1|ID)	-13019.23	510.70	0.01	0.31	0.37
M01b	Infant RSA + (1|ID)	-13018.65	510.80	0.00	0.33	0.38
M11b	FFMQ Total Score x Mother RSA + (1|ID)	-13017.14	510.47	0.00	0.33	0.37
M13b	Mother RSA x Infant RSA + (1|ID)	-13017.06	510.58	0.00	0.33	0.37
M10b	IMP Total Score x Infant RSA + (1|ID)	-13015.00	510.72	0.00	0.33	0.37
M12b	IMP Total Score x Mother RSA + (1|ID)	-13014.67	510.75	0.00	0.34	0.36

Note. Each row provides information on the model formula, LOO (with standard errors), model weights (W), and R2, one for each dependent variable. ID = subject ID code.

Figure S4. *Model M08b Diagnostics Plots (for Symmetrical Co-regulation).*

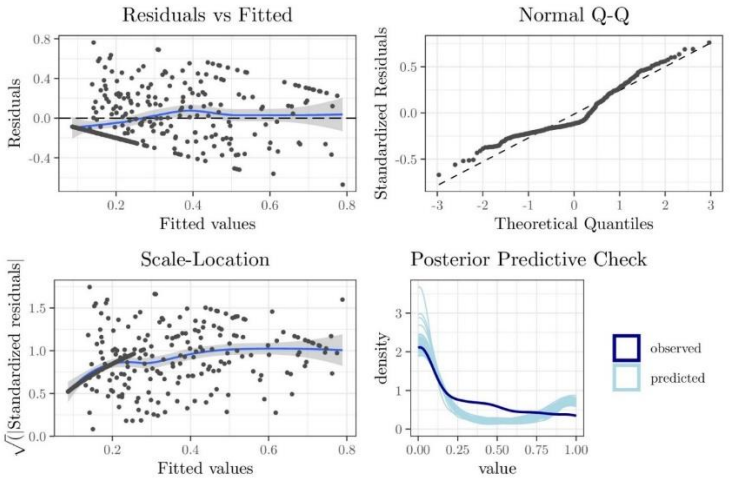


Figure S5. *Model M08b Diagnostics Plots (for Unilateral Co-regulation).*

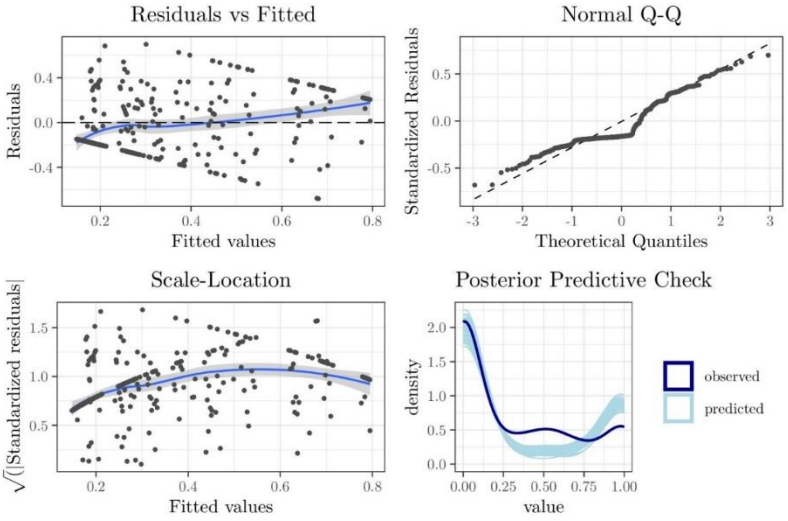


Figure S6. *Model M07b Diagnostics Plots (for Symmetrical Co-regulation).*

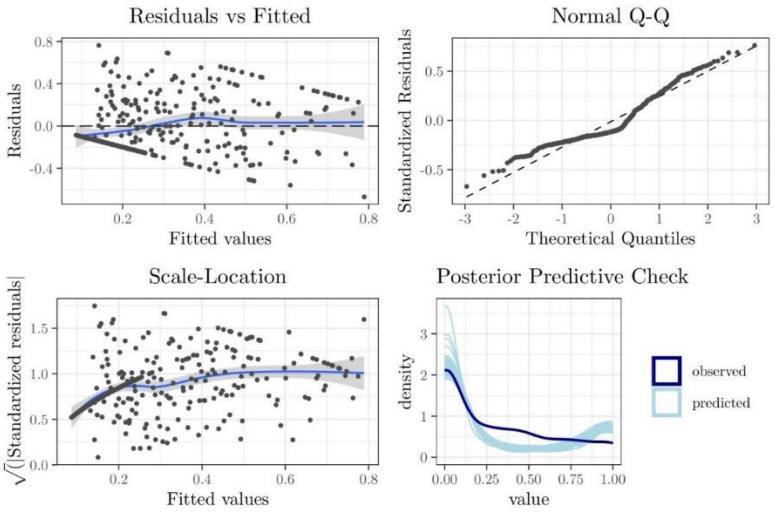
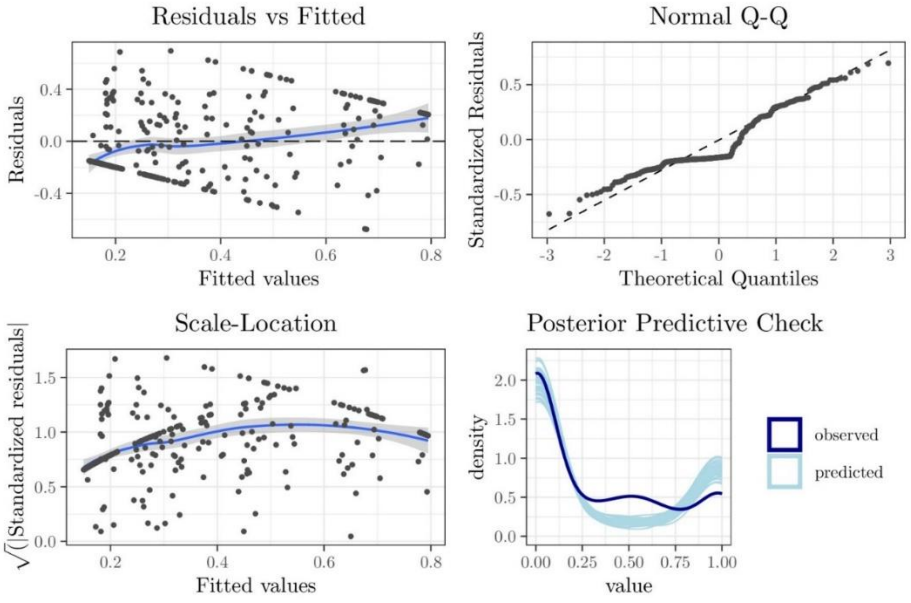


Figure S7. *Model M07b Diagnostics Plots (for Unilateral Co-regulation).*



S.6. Study 2 Univariate Statistics

Table S4 shows univariate statistics (means, standard deviations, and correlations) among study 2 variables at T1. Statistics are computed on 55 dyads (37 dyads for RSA correlations).

Table S4. *Univariate statistics of mindfulness, parenting stress, and mother-infant interaction variables at T1 (N = 55).*

		M	*SD*	1	2	3	4	5	6	7	8	9	10	11
1	RSA corr.	0.50	0.49	—										
2	Mother Positive	0.44	0.18	.077	—									
3	Mother Positive Voc.	0.40	0.12	-.033	-.747	—								
4	M. Positive-I. Positive	0.10	0.08	-.102	.605	-.503	—							
5	M. Positive Voc-I. Positive	0.02	0.03	-.139	.111	-.065	.518	—						
6	Attentive Match	0.31	0.18	.084	.447	-.247	.634	.420	—					
7	Affective Match	0.48	0.16	.138	-.358	.326	.097	.206	.239	—				
8	IMP Total Score	3.75	0.40	.177	-.100	.210	-.063	.173	.075	.035	—			
9	FFMQ Total Score	3.45	0.47	.156	-.071	.287	-.167	-.021	-.006	-.013	.672	—		
10	PSI PD	2.19	0.62	-.047	-.028	-.033	-.148	-.279	-.253	-.261	-.426	-.398	—	

Note. RSA corr: RSA correlation; Mother Positive Voc: Mother Positive Vocalization; M. Positive-I. Positive: Mother Positive-Infant Positive; M. Positive Voc-I. Positive: Mother Positive Vocalization-Infant Positive; IMP Total Score: Interpersonal Mindfulness in Parenting Total Score; FFMQ Total Score: Five Facet Mindfulness Questionnaire Total Score; PSI PD: Parenting Stress Index Parental Distress.

Table S5. *Univariate Descriptives Statistics of the Target Variables*

	n	*M*	*SD*	*Median*	*Trimmed*	*Mad*	*Min*	*Max*	*Range*	*Skew*	*Kurtosis*	*se*
IMP Total Score	101.00	3.76	0.40	3.77	3.76	0.43	2.94	4.65	1.71	0.01	- 0.61	0.04
FFMQ Total Score	99.00	3.48	0.49	3.41	3.47	0.49	2.38	4.68	2.30	0.26	- 0.19	0.05
PSI PD	105.00	2.18	0.66	2.17	2.14	0.62	1.00	4.00	3.00	0.51	- 0.01	0.06
RSA corr.	78.00	0.54	0.46	0.69	0.62	0.31	- 1.00	0.98	1.98	- 1.62	2.23	0.05
Mother Positive	104.00	0.44	0.18	0.45	0.44	0.21	0.09	0.89	0.80	0.18	- 0.73	0.02
Mother Positive Voc.	104.00	0.41	0.13	0.41	0.42	0.14	0.08	0.69	0.61	- 0.18	- 0.67	0.01
M. Positive-I. Positive	103.00	0.10	0.08	0.09	0.09	0.08	0.00	0.38	0.38	1.03	0.99	0.01
M. Positive Voc-I. Positive	103.00	0.02	0.02	0.01	0.01	0.01	0.00	0.16	0.16	3.08	13.71	0.00
Attentive Match	103.00	0.33	0.18	0.29	0.31	0.16	0.03	0.81	0.78	0.61	- 0.29	0.02
Affective Match	103.00	0.47	0.16	0.47	0.48	0.17	0.10	0.82	0.71	- 0.14	- 0.32	0.02

S6. Study 2 Priors Specification

For interaction parameters, we adopted a Student's t distribution, specifically t(3, 0.15, 0.41) (Figure S8(A)) for mindfulness and parenting stress variables and t(3, 0.05, 0.198) (Figure S8(B)) for mother-infant interaction variables, where the parameters represent degrees of freedom, location, and scale, respectively. We choose these distributions to define specific prior probabilities for two target intervals of interaction parameters: specifically, $P(\beta \in [-0.05; 0.3]) \approx 0.3$ for mindfulness and parenting stress variables (IMP Total Score, FFMQ Total Score, and PSI PD) and $P(\beta \in [-0.01; 0.1]) \approx 0.2$ for mother-infant interaction variables, where β represents the interaction parameter. The target intervals, [-0.05; 0.3] and [-0.01; 0.1, respectively, were selected under the hypothesis that expected interactions would be small. For the other regression coefficients, we employed a weakly informative prior, specifically a Student's t(3, 0, 1) distribution (Figure S8[C]).

S.6. Study 2 Outcome: Mindfulness and Parenting Stress Variables

Table S6. *Outcome Mindfulness and Parenting Stress Variables: Interaction (Intervention Condition X Session) Parameter Estimates with 90% Credibility Interval (CI).*

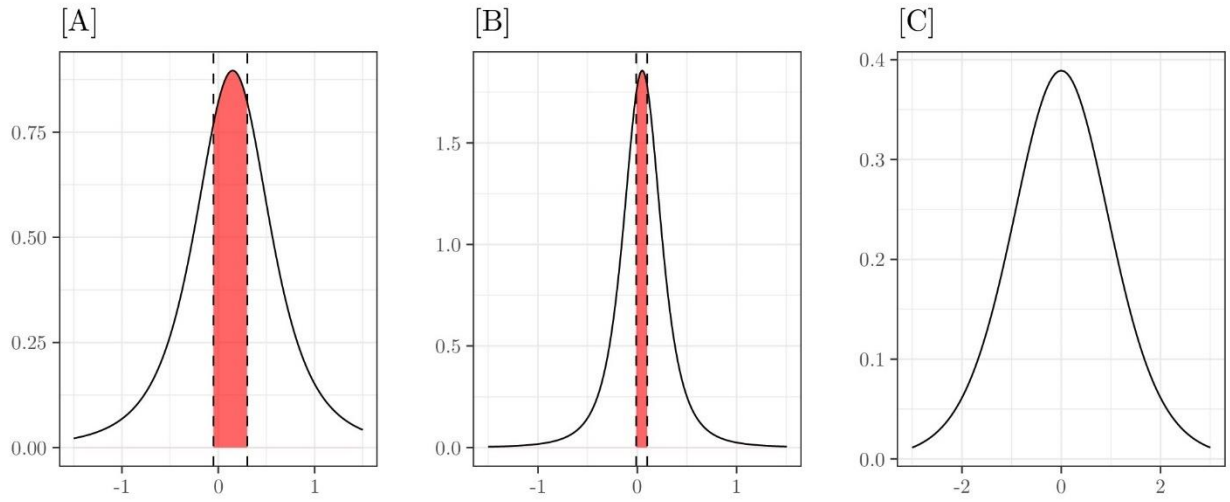
Model	*Estimate*	*95% C.I.*	R^2
IMP Total Score	0.01	-0.12 - 0.14	0.78
FFMQ Total Score	0.11	-0.06 - 0.29	0.73
PSI PD	-0.14	-0.37 - 0.1	0.69

S.7. Study 2 Outcome: Mother-Infant Interaction Variables

Table S7. *Outcome Behavioral Variables: Interaction (Intervention Condition X Session) Parameter Estimates with 90% Credibility Interval (CI).*

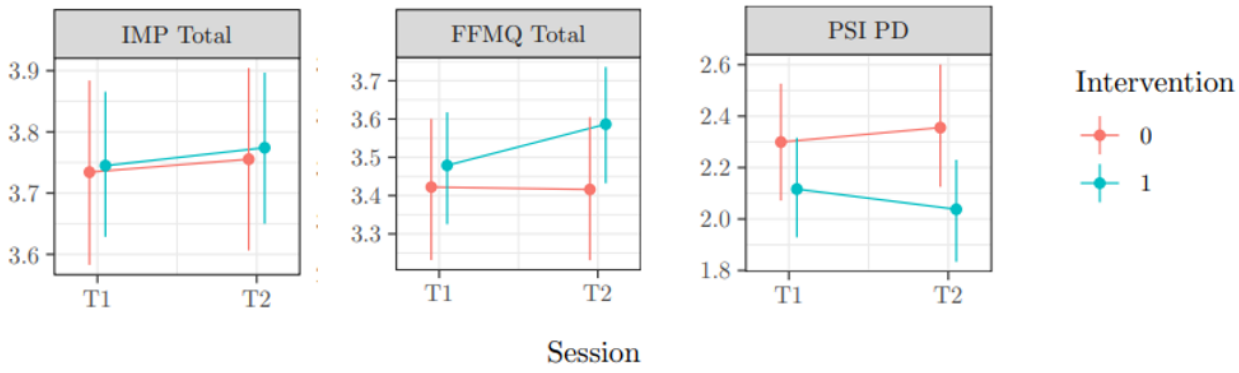
Model	*Estimate*	*95% C.I*	R^2
RSA corr.	0.08	-0.164 - 0.323	0.10
Mother Positive	-0.04	-0.126 - 0.042	0.51
Mother Positive Voc.	0.03	-0.32 - 0.102	0.43
M. Positive-I. Positive	-0-02	-0.061 - 0.014	0.53
M Positive Voc-I. Positive	0.00	-0.013 - 0.016	0.12
Attentive Match	-0.01	-0.084 - 0.063	0.61
Affective Match	0.08	-0-01 - 0.159	0.33

Figure S8. *Priors Distributions for Regression Parameters.*



Note. [A] Prior of interaction parameter for mindfulness variables, [B] Prior of interaction parameter for behavioural variables, and [C] Prior for other regression parameters. The red area in panels [A] and [B] represents the prior probability assigned to the target intervals for the interaction parameter, namely 0.3 and 0.2, respectively.

Figure S9. *Mindfulness and Parenting Stress Variables. Expected Values (with 90% HDI) of the Models as a Function of Session (in Abscissa) and Intervention condition (Colors).*



Note. IMP Total: IMP Total Score; FFMQ Total: FFMQ Total Score; PSI PD: PSI Parental Distress

Figure S10. *Mindfulness Variables. Posterior of Interactions (Black Lines) compared with Prior (Red Lines).*

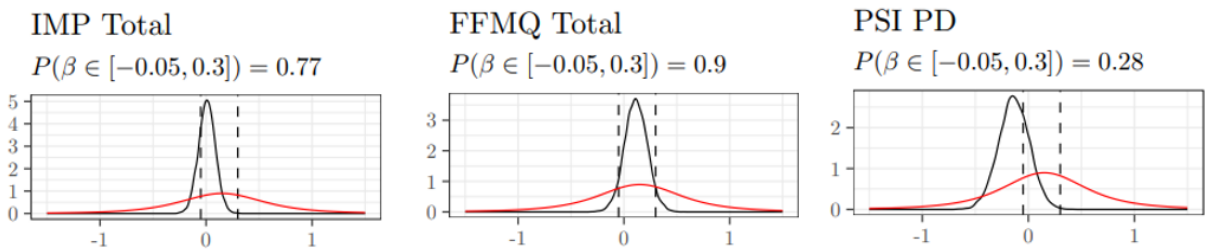


Figure S11. *IMP Total Score Model Diagnostics.*

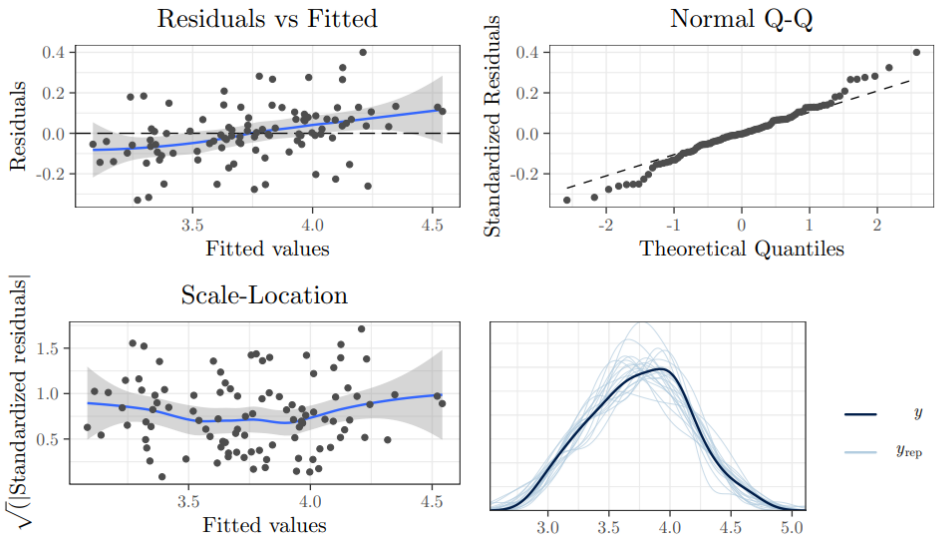


Figure S12. *FFMQ Total Score Model Diagnostics.*

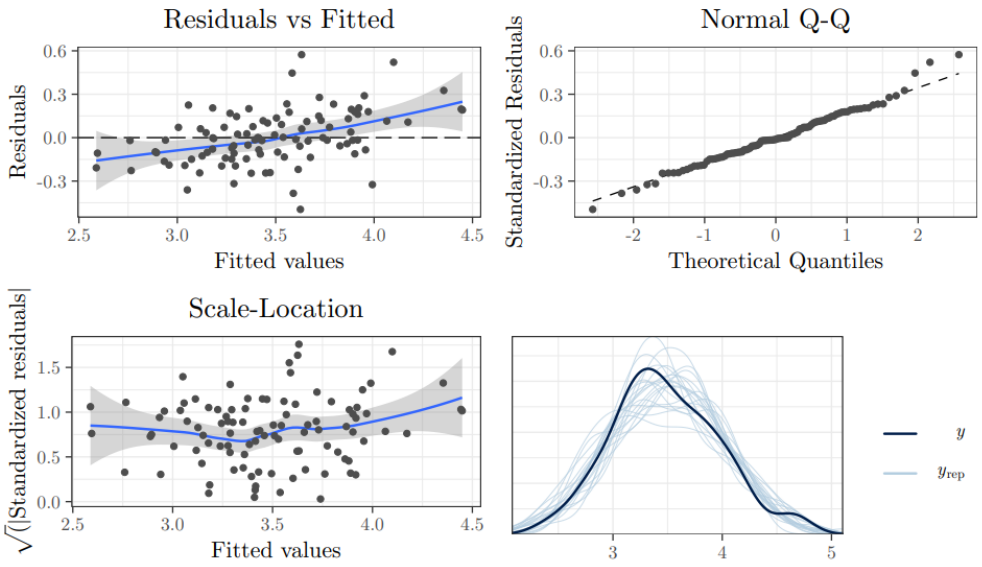


Figure S13. *PSI PD Model Diagnostics.*

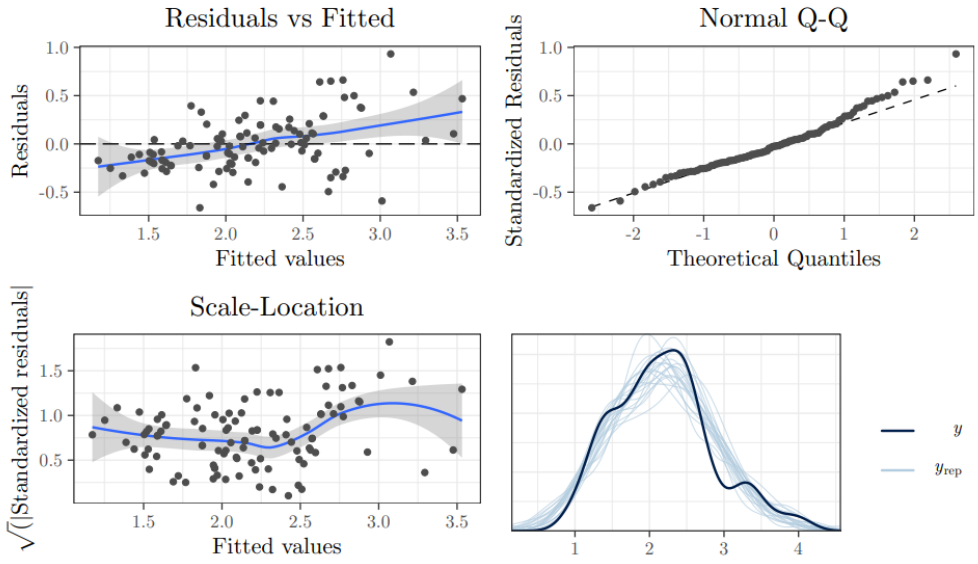


Fig. S14. *Behavioural Variables. Expected Values (with 90% HDI) of the Models as a Function of Session (in Abscissa) and Intervention Condition (Colors).*

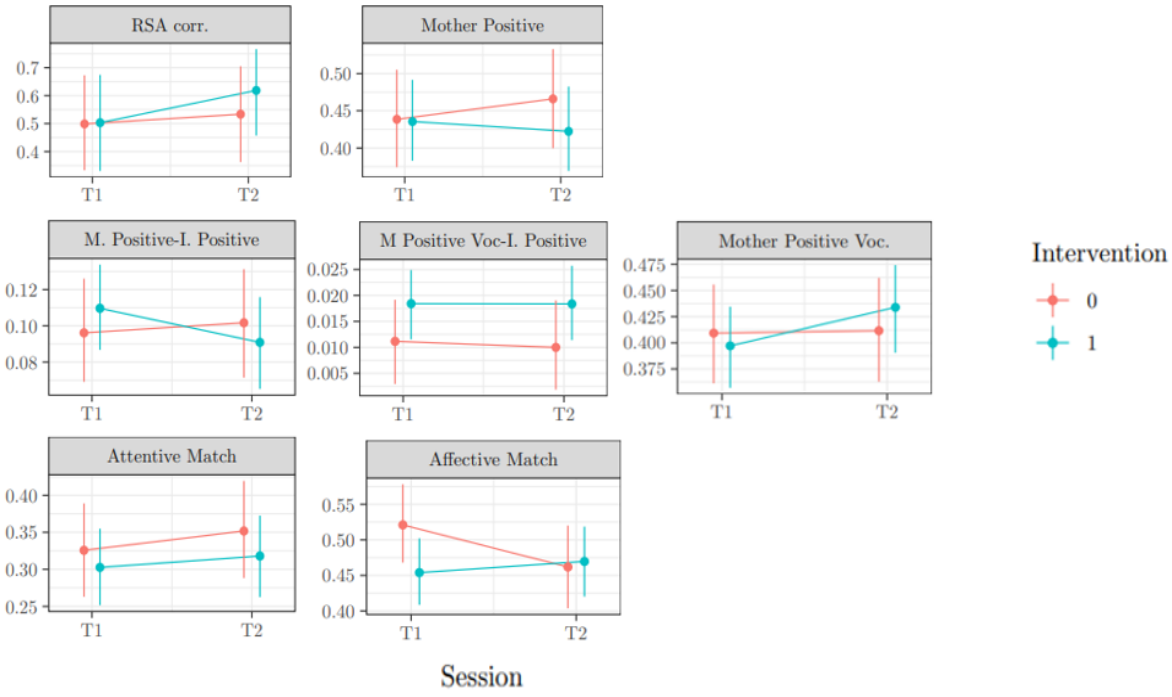


Fig. S15. *Behavioural Variables. Posterior of Interactions (Black Lines) compared with Prior (Red Lines).*

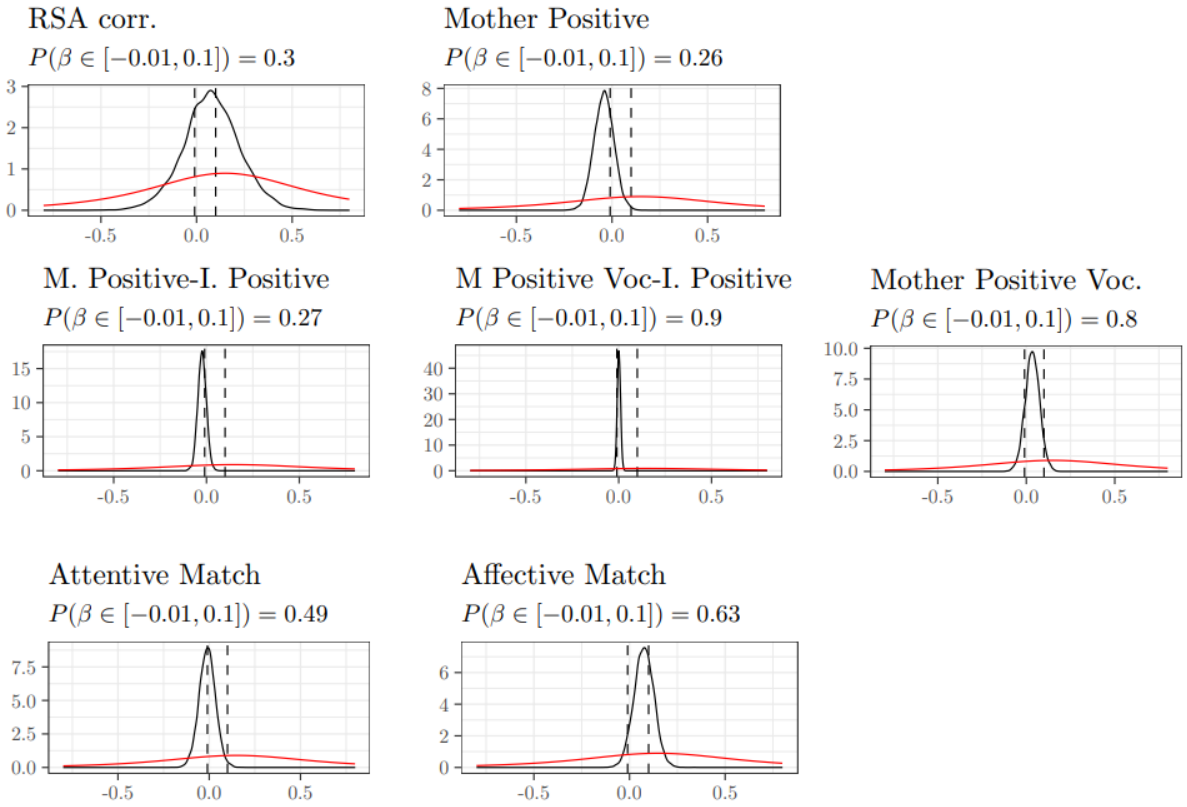


Figure S16. *RSA Correlations Model Diagnostics.*

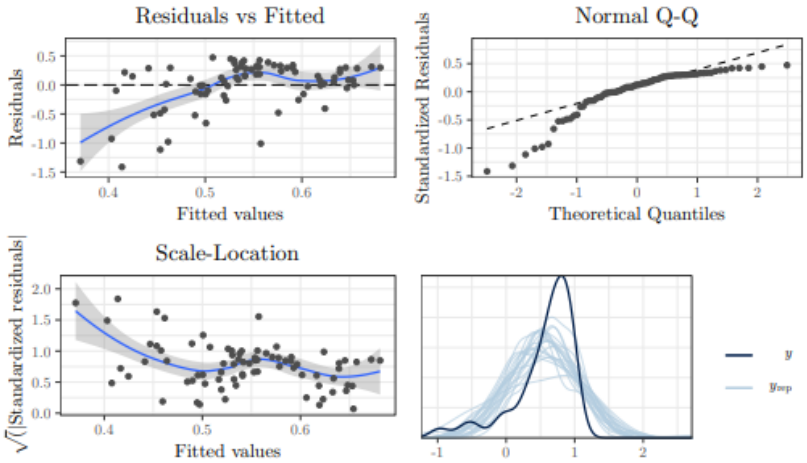


Figure S17. *Mother Positive Correlations Model Diagnostics.*

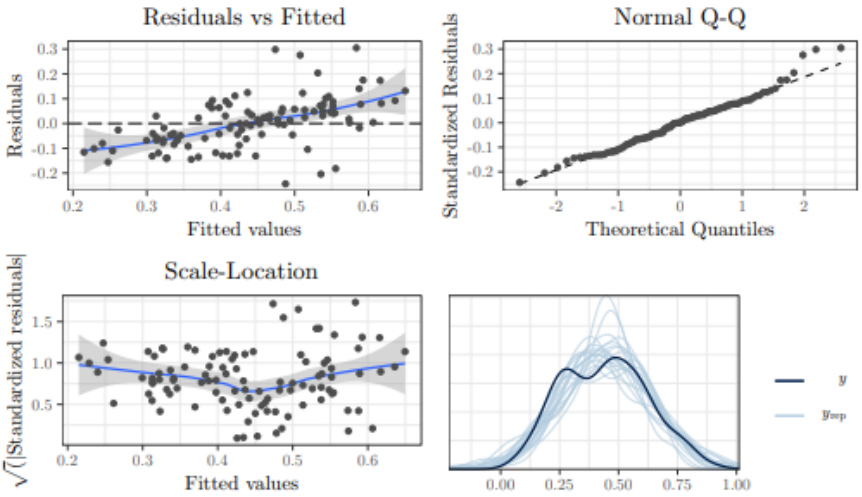


Figure S18. *Mother Positive Voc. Correlations Model Diagnostics.*

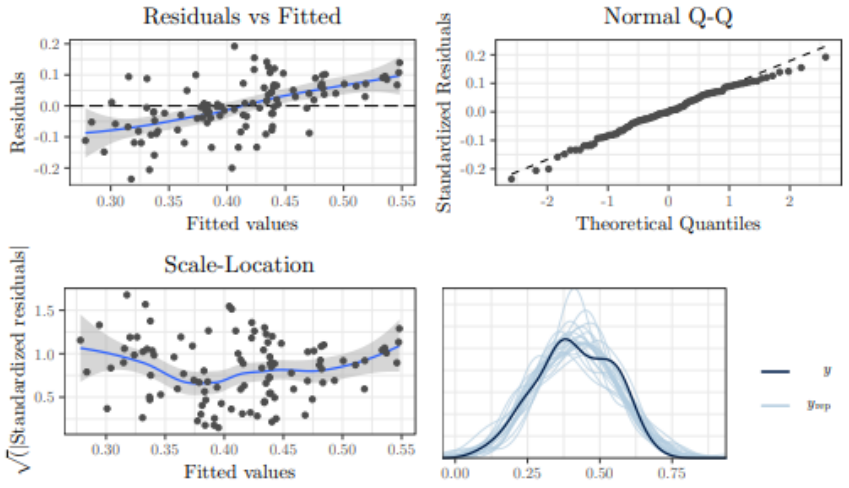


Figure S19. *M. Positive-I. Positive Correlations Model Diagnostics.*

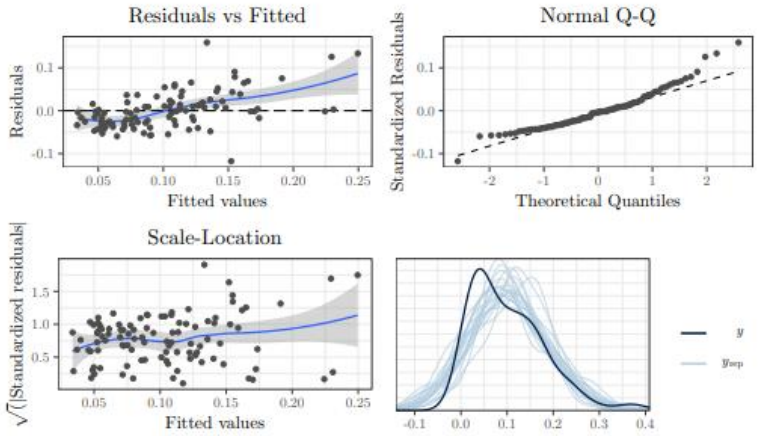


Figure S20. *M. Positive Voc.-I. Positive Correlations Model Diagnostics.*

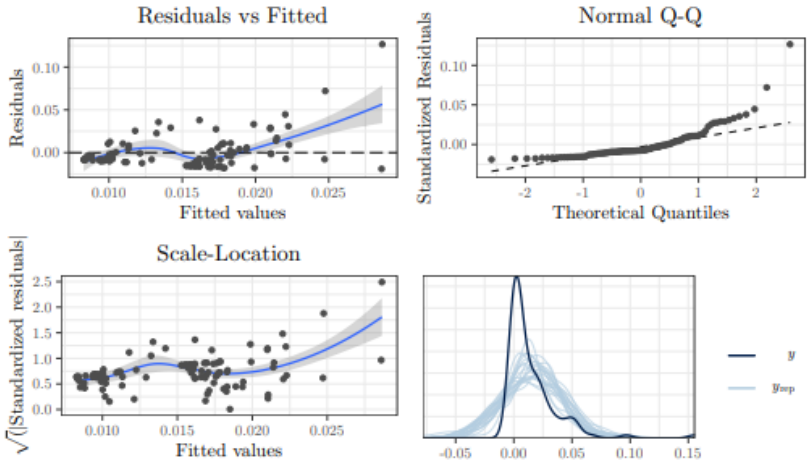


Figure S21. *Attentive Match Correlations Model Diagnostics.*

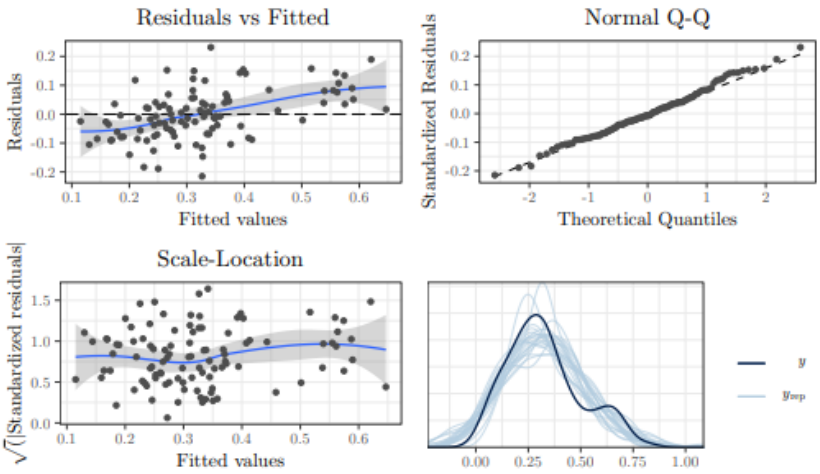
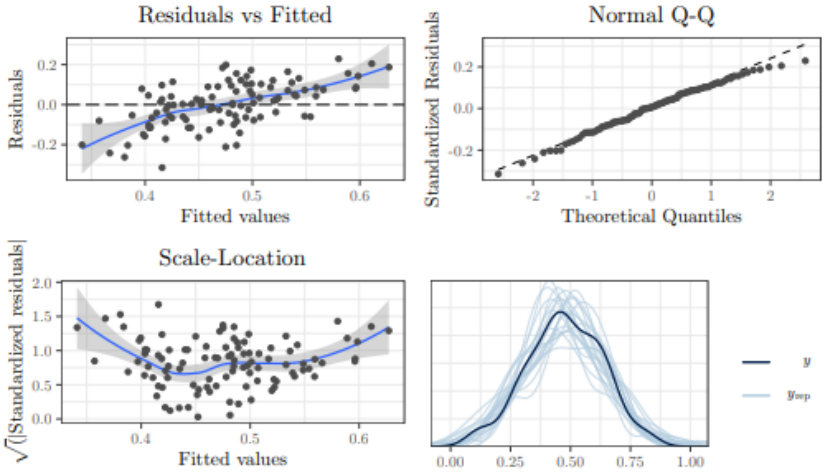


Figure S22. *Affective Match Correlations Model Diagnostics.*



Supplementary Materials of Chapter 4

Descriptive Statistics and Bivariate Associations

Table S1a. Descriptive Statistics and Bivariate Associations in Toddlerhood

	M (SD)	*Range*	1	2	3	4	5	6	7	8
1 Ch. Age	1.87 (0.60)	1.00 - 3.00	-							
2 Mat. Age	36.12 (4.71)	21.00 - 50.00	.10							
3 Mat. Ed.	15.57 (3.33)	8.00 - 21.00	-.06	**.16****						
4 Fam. In.	2.64 (0.79)	1.00 - 5.00	-.07	**.17****	**.24*****					
5 SPS	4.47 (0.96)	1.75 - 6.67	-.03	.00	-.05	**-.13***				
6 Mindf.	3.40 (0.51)	1.95 - 4.70	.10	**.22*****	**.22*****	.09	**-.24*****			
7 MC Int.	3.93 (0.48)	2.24 - 4.96	-.08	-.01	**-.14****	.02	**-.23*****	**.38*****		
8 Em. Reg.	2.31 (0.54)	0.40 - 3.40	**-.17****	.01	-.01	.06	**-.34*****	**.36*****	**.59*****	-

Table S1a. Ch. Age = Child Age (years); Mat. Age = Maternal Age (years); Mat. Ed. = Maternal Education (years) Fam. In. = Family Income (monthly); SPS = Maternal Sensory Processing Sensitivity; Mindf. = Maternal Dispositional Mindfulness; MC Int. = Mother-Child Interaction as Perceived by the Mother; Em. Reg. = Maternal Emotion Regulation in Parenting.
***p < 0.001
**p < 0.01

Table S1b. Descriptive Statistics and Bivariate Associations in Preschool

	M (SD)	*Range*	1	2	3	4	5	6	7	8
1 Ch. Age	4.45 (0.87)	3.08 - 6.00	-							
2 Mat. Age	38.35 (4.65)	25.00 - 51.00	.11							
3 Mat. Ed.	15.66 (3.59)	8.00 - 21.00	.11	**.14***						
4 Fam. In.	2.74 (0.81)	1.00 - 5.00	-.04	.07	.08					
5 SPS	4.48 (0.96)	1.67 - 7.00	-.03	.10	.11	-.11				
6 Mindf.	3.51 (0.51)	2.30 - 4.65	-.12	.12	**.19****	.08	-.09			
7 MC Int	3.88 (0.51)	2.23 - 4.81	-.09	.03	**-.17***	-.03	**-.25*****	**.43*****		
8 Em. Reg.	2.14 (0.61)	0.20 - 3.20	-.10	.06	-.12	.08	**-.20*****	**.49*****	**.61*****	-

Table S1b. Ch. Age = Child Age (years); Mat. Age = Maternal Age (years); Mat. Ed. = Maternal Education (years) Fam. In. = Family Income (monthly); SPS = Maternal Sensory Processing Sensitivity; Mindf. = Maternal Dispositional Mindfulness; MC Int = Mother-Child Interaction as Perceived by the Mother; Em. Reg. = Maternal Emotion Regulation in Parenting.
Significant correlations are marked in bold
***p < 0.001
**p < 0.01
*p < 0.05

Estimated parameters

Table S2a. *Estimated parameters of main effect models (Toddlerhood)*

	Mother-child dyad quality			Maternal emotion regulation in parenting		
	ß	*p*	R square	ß	*p*	R square
SPS	-.14	<.01	.23	-.26	<.001	.21
Mindfulness	.41	<.001		.32	<.001	
Maternal Age	-.06	.19		-.04	.40	
Maternal Education (years)	-.23	<.001		-.09	.08	

Note. SPS = Maternal Sensory Processing Sensitivity trait; Mindfulness = Maternal Dispositional Mindfulness.

Table S2b. *Estimated parameters of interaction effect models (Toddlerhood)*

	Mother-child dyad quality			Maternal emotion regulation in parenting		
	ß	*p*	R square	ß	*p*	R square
SPS	-.05	.87	.22	-.43	.20	.21
Mindfulness	.48	.051		.20	.42	
SPS*Mindfulness	-.09	.80		.18	.61	
Maternal Age	-.06	.20		-.04	.42	
Maternal education (years)	-.23	<.001		-.09	.08	

Note. SPS = Maternal Sensory Processing Sensitivity trait; Mindfulness = Maternal Dispositional Mindfulness.

Table S2b. *Estimated parameters of main effect models (Preschool)*

	Mother-child dyad quality			Maternal emotion regulation in parenting		
	ß	*p*	R square	ß	*p*	R square
SPS	-.19	<.01	.28	-.14	.04	.29
Mindfulness	.45	<.001		.51	<.001	
Maternal Age	.03	.67		.04	.47	
Maternal Education (years)	-.24	<.001		-.20	<.01	

Note. SPS = Maternal Sensory Processing Sensitivity trait; Mindfulness = Maternal Dispositional Mindfulness.

Used R packages

Cowplot. Wilke C (2024). _cowplot: Streamlined Plot Theme and Plot Annotations for 'ggplot2'_. R package version 1.1.3,
https://CRAN.R-project.org/package=cowplot

dplyr. Wickham H, François R, Henry L, Müller K, Vaughan D (2023). _dplyr: A Grammar of Data Manipulation_. R package version 1.1.4,
https://CRAN.R-project.org/package=dplyr

ggeffects. Lüdecke D (2018). "ggeffects: Tidy Data Frames of Marginal Effects from Regression Models." _Journal of Open Source Software_, *3*(26), 772. doi:10.21105/joss.00772
https://doi.org/10.21105/joss.00772

ggplot2. H. Wickham. ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York, 2016.

ggpubr. Kassambara A (2023). _ggpubr: 'ggplot2' Based Publication Ready Plots_. R package version 0.6.0,
https://CRAN.R-project.org/package=ggpubr

gridExtra. Auguie B (2017). _gridExtra: Miscellaneous Functions for "Grid" Graphics_. R package version 2.3,
https://CRAN.R-project.org/package=gridExtra

lavaan. Yves Rosseel (2012). lavaan: An R Package for Structural Equation Modeling. Journal of Statistical Software, 48(2), 1-36.
https://doi.org/10.18637/jss.v048.i02

psych. William Revelle (2024). _psych: Procedures for Psychological, Psychometric, and Personality Research_. Northwestern University,
Evanston, Illinois. R package version 2.4.6,
https://CRAN.R-project.org/package=psych

R. R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.
https://www.R project.org/.

sjplot. Lüdecke D (2024). _sjPlot: Data Visualization for Statistics in Social Science_. R package version 2.8.16,
https://CRAN.R-project.org/package=sjPlot

UNIONE EUROPEA
Fondo Sociale Europeo
Ministero dell'Università e della Ricerca
PON RICERCA E INNOVAZIONE 2014 - 2020
REACT EU

La borsa di dottorato è stata cofinanziata con risorse del
Programma Operativo Nazionale Ricerca e Innovazione 2014-2020, risorse FSE REACT-EU
Azione IV.4 "Dottorati e contratti di ricerca su tematiche dell'innovazione"
e Azione IV.5 "Dottorati su tematiche Green"