Aus der Kinderklinik und Kinderpoliklinik im Dr. von Haunerschen Kinderspital

Klinik der Ludwig-Maximilians-Universität München

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# Negative childhood experiences of parents and parenting stress: A dyadic analysis of couple interdependence and the mediating effects of perinatal depressive mood

Dissertation
zum Erwerb des Doktorgrades der Humanbiologie
an der Medizinischen Fakultät der
Ludwig-Maximilians-Universität zu München

vorgelegt von

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aus

München

Jahr

2021

Mit Genehmigung der Medizinischen Fakultät
der Universität München

| | |
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| Tag der mündlichen Prüfung: | 05.11.2021 |

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# Abstract

*Background:* The intergenerational transmission of negative childhood experiences (NCEs) causes great harm to individuals and a financial burden to societies. Therefore, it is important that research uncovers factors exacerbating the effect of NCEs on both mothers' and fathers' parenting behavior. Parenting stress is among the risk factors for maladaptive parenting behavior and child abuse. Based on the theoretical background of *family systems theory* and the *ecological model of parenting*, the study's aim was to analyze the direct and indirect effects of the intraindividual processes of *spillover* and dyadic processes of *crossover* of NCEs on parenting stress, via perinatal depressive symptoms. *Method:* Analyses were conducted using an Actor Partner Interdependence Mediation Model (APIMeM) in a subsample of 112 expecting couples taking part in a randomized controlled trial of an attachment-based prevention program. Participants reported on NCEs (assessed by TAQ) and depressive symptoms (BDI) prenatally, on depressive symptoms at approximately 6 months postnatally, and on parent-related and child-related parenting stress (PSI) approximately 1 year postnatally. *Results:* At the intra-individual level, NCE predicted parent-related parenting stress in both parents, as well as child-related parenting stress in mothers. Effects on parent-related stress were mediated by perinatal depressive symptoms for both fathers and mothers, and by child-related stress in fathers (trend toward an association in mothers). At the dyadic level, maternal NCE predicted paternal parent-related stress via paternal depressive symptoms and child-related stress via maternal depressive symptoms. Paternal NCE predicted maternal parent-related parenting stress via paternal depressive symptoms. *Conclusion:* NCEs played a substantial role in the parenting experiences of the next generation, for both the individual and their partner. The results illustrate the urgent need for the inclusion of both parents in prevention programs addressing the NCEs and well-being of parents during the transition to parenthood.

# Deutsche Zusammenfassung

*Theoretischer Hintergrund:* Die transgenerationale Weitergabe negativer Kindheitserfahrungen stellt für Individuen eine hohe persönliche Belastung und für die gesamte Gesellschaft eine finanzielle Last dar. Daher ist es von großer Bedeutung, dass Forschungsarbeiten Faktoren aufdecken, die den nachteiligen Effekt von negativen Kindheitserfahrungen auf das Elternverhalten von sowohl Müttern als auch Vätern in der nächsten Generation vermitteln oder verstärken. Elterliches Stresserleben stellt einen möglichen Risiko-Indikator für dysfunktionales Elternverhalten bis hin zu Kindesmisshandlung dar. Vor dem theoretischen Hintergrund der *Family Systems Theory* und des *Ecological Model of Parenting*, verfolgt diese Studie das Ziel intra-individuelle Prozesse des „Spillover“ und dyadische Prozesse des „Crossover“ von negativen Kindheitserfahrungen auf das elterliche Stresserleben unter Berücksichtigung der Frage, ob die Transmission direkt erfolgt oder über perinatale depressive Symptome vermittelt ist, zu untersuchen. *Methode:* Die Daten von 112 werdenden Elternpaaren, eine Teilstichprobe einer randomisiert-kontrollierten Studie eines bindungsorientierten Präventionsprogramms, wurden mittels Actor-Partner-Interdependenz Mediations Model (APIMeM) analysiert. Die Studienteilnehmer machten Angaben zu eigenen negativen Kindheitserfahrungen (vorgeburtlich erhoben mit dem TAQ), zu depressiven Symptomen pränatal sowie circa sechs Monate postnatal (BDI) und dem elterlichen Stresserleben auf Eltern- und Kindebene (PSI) am Ende des ersten Lebensjahres des Kindes. *Ergebnisse:* Auf der intra-individuellen Ebene zeigte sich, dass negative Kindheitserfahrungen das elterliche Stresserleben auf Eltern-Ebene beider Elternteile und das Stresserleben auf Kindebene der Mutter signifikant, sowie des Vaters tendenziell signifikant, vorhersagten. Perinatale depressive Symptome mediierten den Effekt auf elternbezogenes Stresserleben für beide Elternteile, als auch für kindbezogenes Stresserleben in Vätern und tendenziell in Müttern. Auf der dyadischen Ebene, stellten die negativen Kindheitserfahrungen der Mütter einen wichtigen Faktor im elternbezogenen und kindbezogenen Stress des Vaters dar. Dieser Effekt wurde für die Elternebene durch die perinatale depressive Symptomatik des Vaters vermittelt, während die depressive Symptomatik der Mütter den Effekt auf die Kindebene mediierte. Ebenso die Kindheitserfahrungen des Vaters prädizierten das elternbezogene Stresserleben der Mutter, vermittelt durch die depressive Symptomatik des Vaters. *Schlussfolgerungen:* Sowohl eigene, als auch negative Kindheitserfahrungen des Partners spielten eine substantielle Rolle für das eigene Elternverhalten und damit das Erleben der kommenden Generation. Die Ergebnisse sprechen dringend für den Einbezug beider Elternteile

in Präventionsprogramme, die den Eltern im Umgang mit negativen Kindheitserfahrungen und der Verbesserung ihres Wohlbefindens Unterstützung im Übergang zur Elternschaft anbieten.

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# List of abbreviations

A – actor effect

ACE – adverse childhood experiences

APIM – Actor Partner Interdependence Model

APIMeM - Actor Partner Interdependence Mediation Model

BDI – Beck Depression Inventory

CD – Child Domain of Parenting Stress Index

CFI comparative fit index

CI – confidence interval

CTQ – Childhood Trauma Questionnaire

F/f – father

ICQ – Infant Characteristic Questionnaire

IE – indirect effect

LMU – Ludwig Maximilian University Munich

*M* – mean

M/m – mother

M1 / M2 – mediator 1 or 2

MLR – maximum likelihood estimator with robust standard errors

NCEs – Negative Childhood Experiences

P – partner effect

PD – Parent Domain of Parenting Stress Index

Post – postnatal

Pre – prenatal

PSI – Parenting Stress Index

PSI PD-DP – modified Parent Domain excluding the Depression subscale of the Parenting Stress Index

$R^2$ – explained variance

RMSEA – root mean square error of approximation

*SD* – standard deviation

SRMR –standardized root mean square residual

T1/T2/T3 – time of assessment 1/2/3

TAQ – Trauma Antecedents Questionnaire

X – predictor / independent variable

Y – outcome / dependent variable

$\chi^2$ - Chi-square

# 1. Introduction

Feeling that everyday challenges in rearing a child exceed personal capacities and abilities can elicit feelings of stress during the transition to parenthood. Perceiving great stress during parenting has been shown to be associated with more negative and dysfunctional parenting behaviors (Le, Fredman, & Feinberg, 2017; Ponnet, Wouters, et al., 2013), lower well-being of the parents (Crnic & Greenberg, 1990), and poorer partnership functioning (Lavee, Sharlin, & Katz, 1996; Timmons, Arbel, & Margolin, 2017; Zemp, Nussbeck, Cummings, & Bodenmann, 2017), which may undermine healthy social and emotional development of the child (Barroso, Mendez, Graziano, & Bagner, 2018; Creasey & Jarvis, 1994; Hadadian & Merbler, 1996; Harewood, Vallotton, & Brophy-Herb, 2017).

Much is known about factors contributing to maternal perception of stress in parenting, whereas less is known about paternal parenting stress and predictors thereof. Nevertheless, it is reasonable to assume that the stress experienced by fathers in their role as a parent might pose similar risks to child development as that in mothers (e.g. Bronte-Tinkew, Horowitz, & Carrano, 2010; Harewood et al., 2017). Consequently, it is important to examine the factors that contribute to both partners' parenting stress, and processes of emotional contagion and buffering between partners (Barnett, Deng, Mills-Koonce, Willoughby, & Cox, 2008).

I was especially interested in how far one parent's negative childhood experiences (NCEs) impact the experience of parenting stress in that parent, and in his or her partner. The impact of childhood experiences on parenting stress is of great interest, as parenting stress was found to mediate the effect of parents' childhood experiences on sensitive parenting (Pereira et al., 2012), and to be associated with child abuse potential in parents (Gonzalez & MacMillan, 2008; Rodriguez & Green, 1997). Thus, this might be an important consideration for interventions aiming to reduce the well-documented negative impact of adverse childhood experiences on the next generation (Assink et al., 2018; Madigan et al., 2019; O'Brien, Creaner, & Nixon, 2019; Simons, Whitbeck, Conger, & Wu, 1991). As NCEs are known to impact adult mental health (Dunn, Nishimi, Powers, & Bradley, 2017), I further analyzed whether pre- and postnatal depressive symptomatology mediated the impact of NCEs on parenting stress 1 year postnatally, both intra-individually and dyadically. Depressive mood was found to be an important factor in the parenting

stress of mothers and fathers (Le et al., 2017; Leigh & Milgrom, 2008; Saisto, Salmela-Aro, Nurmi, & Halmesmäki, 2008; Vismara et al., 2016).

As couples live through the transition to parenthood together, it is important to consider their interdependence in affect and coping with parenting a new-born child. The direction and extent of interdependence in partners regarding parenting is still not fully understood.

Thus, I included both mothers and fathers in a dyadic analysis of the effect of NCEs on parenting stress using the *Actor Partner Interdependence Mediation Model (APIMeM)*, informed by the theoretical framework of family systems theory and the ecological model of parenting. To the best of my knowledge, no previous study has examined the impact of negative, potentially traumatizing childhood experiences on the perinatal depressive symptoms and parenting stress of both mothers and fathers in a dyadic analysis.

# 2. Theoretical background

## 2.1 The need for a dyadic perspective on parents during the transition to parenthood: Family systems theory and the ecological model of parenting

*"Any understanding of individual behavior divorced from relationship aspects will be seriously incomplete—both because of the influences of relationships and relationship histories on behavior and because of the prominent role of social relations in evaluating individual adaptation" (Sroufe 1989, p. 104)*

The birth of a child is a significant transition in life circumstances, which places stress on the individual and the couple relationship (Cowan & Cowan, 2000); existing patterns of the partnership, as well as individual affect and behavior, must be adapted (Cox & Paley, 1997).

In the majority of studies on the transition to parenthood and parenting stress, mothers are either the sole subject of investigation (e.g Misri et al., 2010; Misri, Reebye, Milis, & Shah, 2006) or are analyzed separately from fathers (e.g. Camisasca, Miragoli, & Di Blasio, 2014; Saisto et al., 2008; Vismara et al., 2016). Therefore, results on interdependencies between mothers' and fathers' emotional well-being and stress levels are sparse (one exception: Le et al., 2017). The impact of negative childhood experience in one person on their partner has been examined in a few studies (e.g. Godbout, Briere, Sabourin, & Lussier, 2014; Godbout, Dutton, Lussier, & Sabourin, 2009; W. L. Johnson, Taylor, Mumford, & Liu, 2019; Riggs, Cusimano, & Benson, 2011; Riggs & Kaminski, 2010), but data on the dyadic effect of childhood adversities, on parenting generally or parenting stress specifically, are still lacking (the one expection is Bai & Han, 2016).

However, both methodological (see e.g. Salmela-Aro, Aunola, Saisto, Halmesmäki, & Nurmi, 2006) and theoretical considerations (see e.g. Camisasca et al., 2014) show the necessity of taking into account the fact that partners share a mutual experience and environment (Kenny, Kashy, & Cook, 2006) during the transition to parenthood (e.g., having the same child and being nested in the same relationship). Including fathers in research on parenting, and thus looking at the whole family system and understanding "the family as a relational environment with systems qualities" (Cox & Paley, 1997, p. 245), is therefore vital to understand the way partners interact and are interdependent in terms of their well-being and parenting (Belsky, 1981, 1984; Cox &

Paley, 1997). By including fathers, we can better understand factors important for healthy social and emotional development of their children (Cox & Paley, 2003).

Important theoretical frameworks for studying partners and families in the transition to parenthood are *family systems theory* and the *ecological model of parenting.* Both frameworks are outlined below.

*Family systems theory* (Belsky, 1981) postulates the importance of adding the dyadic systems of the parents' marital relationship and the father-infant-relationship to the mother-infant-relationship in the study of infant development. The family should be seen as "the central unit of concern for investigations of early experiences" (Belsky, 1981, p. 5). This approach brings research on family sociology and developmental psychology (Belsky, 1981), as well as theory and experience pertaining to family therapy approaches, as noted by Cox and Paley (1997), together. It shifts the focus from individuals to the interdependence of all dyadic relations as parts of the system of family relations in which there are direct and indirect influences.[1]

To form hypotheses on how family systems are organized, structured and react to changes, Cox and Paley (1997) evoked certain aspects of *general systems theory.* Cox and Paley (1997) refer to von Bertalanffy (1968) and point out how the family system has similar characteristics: 1) Systems in their wholeness create or constitute more than what is expected by the attributes of the individuals, and thus the interrelations need to be understood. Consequently, no family member can be fully understood in terms of his behavior and inner states independent of the family system as a whole. 2) Systems comprise subsystems, which are systems in themselves. The family consists of subsystems, such as the parental and/or marital dyad, the different parent-child-dyads and the subsystem of siblings. Boundaries between subsystems allow for partial independence of subsystems. 3) Systems tend to stabilize, in terms of their structure and inner relations, via coordinated changes to the organization of the system; and 4) systems adapt to internal or external changes or challenges. Characteristics 3) and 4) are relevant in transitional periods, such as when first becoming parents and the beginning of creche for the child. To a certain extent, successful and even maladaptive patterns of interactions in families will be maintained as long as

[1] The approach was prompted by results on second-order-effects in mother-father-child-interactions (Parke & O'Leary, 1976), where changes in mother-infant-interactions were observed when the father was present.

possible. However, if challenges or changes are too far-reaching, adaptive shifts in the organization of the family system will occur.

Additionally, Belsky's (1984) *ecological model of parenting* gives us a framework regarding how different contextual factors, such as family of origin experiences and the partner, impact parental functioning. The model looks back on the parenting of the individual, but from a systems perspective. It proposes that the quality of parenting[2] is determined by three main factors: "1) the parents' ontogenic origins and personal psychological resources, 2) the child's characteristics of individuality, and 3) contextual sources of stress and support" (Belsky, 1984, p. 83). Further, Belsky (1984) proposed a hierarchy of influences, such that the personal psychological resources of parents are the most important aspect in insulating the parent-child relationship from the effects of stress. These are more effective than the support available and the child's temperament. According to Belsky (1984), the impact of more distal factors, such as the parents' experiences in their family of origin, is indirect, shaping other more proximal factors such as the parents' romantic relationship, and the social and work context, which in turn shape mental well-being of parents and, ultimately, their parenting. The proposed model is shown in Figure 1.

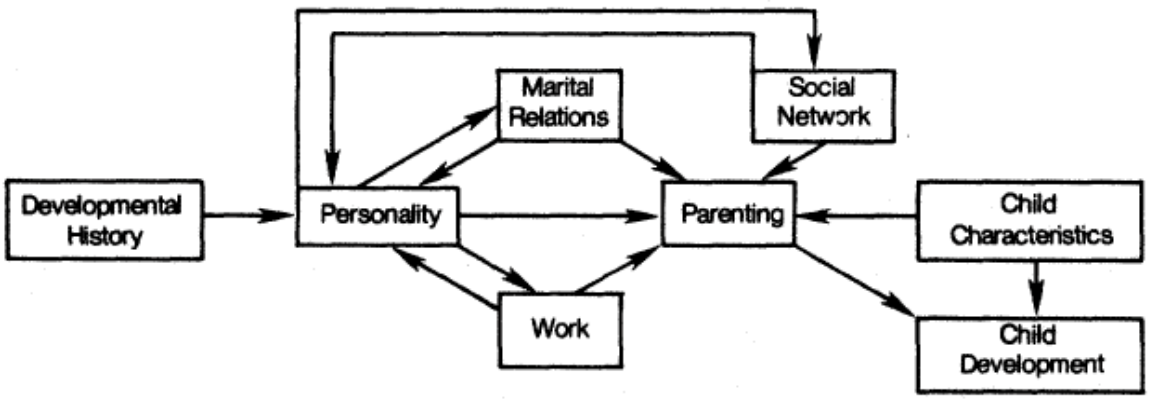


*Figure 1*. Picture taken from the article "The Determinants of Parenting: A Process Model" by Belsky (1984) illustrating the proposed "ecological model of parenting" (p. 84).[3]

[2] The model was developed from the perspective of the aetiology of child maltreatment, but can also be applied to parenting in the context of moderate-to-good functioning

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In the ecological model of parenting, partners are defined as a contextual factor influencing the parenting of an individual. As the partner is the parent of the same child, both partners are a "contextual factor" to each other and thus interdependent.

Based in part on Belsky's process model of parenting and on research results, Cabrera et al. (2014) proposed a modified model of the determinants of the father's parenting which is illustrated in Figure 2. Cabrera et al. (2014) stated that the extended model "might also apply to mothers or to other caregivers" (Cabrera et al., 2014, p. 337). They conclude in their review article that the parenting of mothers and fathers compliments each other in terms of the effect on child development, and that both parental roles might be on the one hand culturally and historically determined and on the other hand shaped by the specific requirements of the environmental and parental conditions (e.g. single parents, working parents, etc.). In addition to Belsky's model, Cabrera et al. (2014) implement bidirectional influences and feedback loops into their model, illustrating how the different factors and members of family systems influence each other dynamically and reciprocally. This draws on the idea of transactional processes in families articulated by *family systems theory*.

*Family systems theory* proposes that the transition to parenthood represents a disruption in the family system and activates "transactional regulatory processes of the dynamic systems" (Cox & Paley, 1997, p. 244) to adapt to the new situation. These processes shape how individuals react and the partners interact.

Researchers have devised different ways to describe how partners influence each other in transitions and everyday life. Dyadic processes or interdependencies between parents may express themselves in two ways (Bolger, DeLongis, Kessler, & Wethington, 1989; Erel & Burman, 1995; Nelson, O'Brien, Blankson, Calkins, & Keane, 2009)[4]: the first is through a *crossover* of affect and behavior to the other partner, resulting in an increase in the same or similar affect and behavior in the partner; the second is as a *compensatory* response to the affect and behavior of

[4] *Spillover* and *compensatory* processes were originally summarized by Erel and Burman (1995) in the context of dyadic processes in the relationships between partners, and between the parent and child; the *crossover* process was described by Nelson et al. (2009) and Bolger et al. (1989). The transmission of affect and behaviour from one person to another is sometimes also called *spillover (Larson & Almeida, 1999)*. To clearly distinguish an interdependence between partners from a process in which one person's affect is transmitted from one context to another (e.g., work-to-family) on an intra-individual basis, I decided to use the term *crossover* here.

the partner, resulting in a decrease of the same or similar affect and behavior, in order to compensate for the negative affect and behavior of the partner.

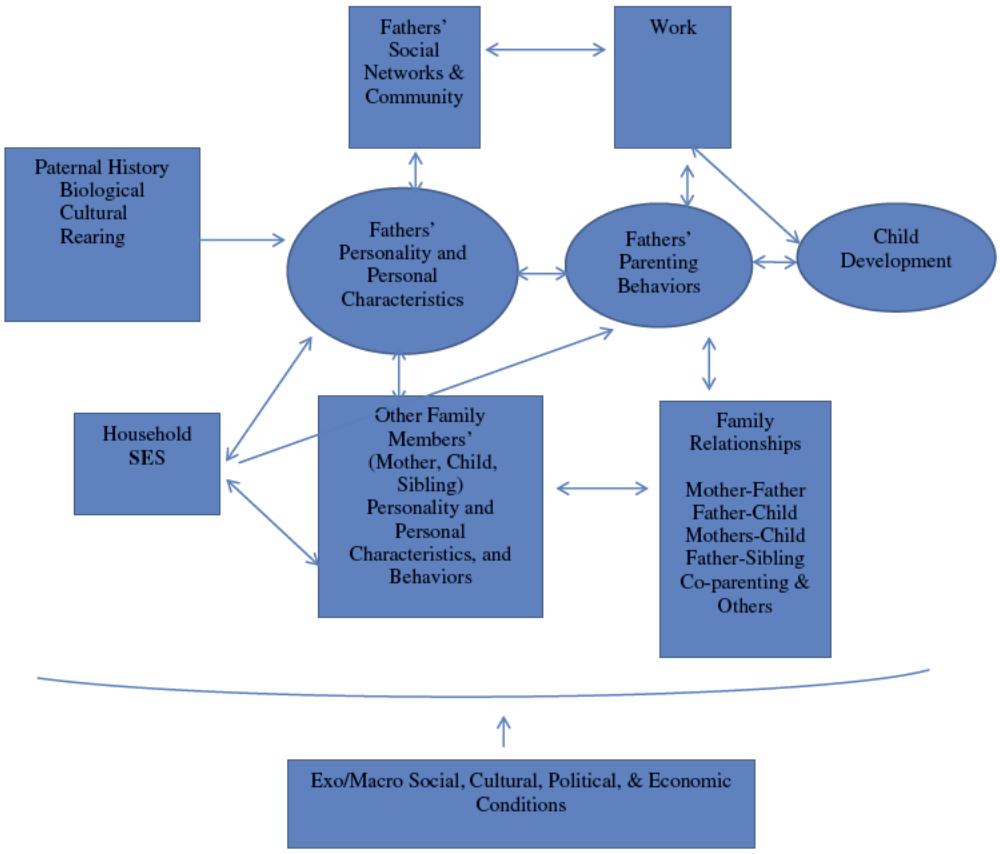


*Figure 2.* Picture taken from the article "The Ecology of Father-Child Relationships: An Expanded Model." by Cabrera et al. (2014, p. 342) illustrating the adapted model on determinants of fathers' parenting.[5]

The research question of this work taps into aspects of both *family systems theory* and the *ecological model of parenting*. This study examines how parents influence each other as part of one single family system during the transition to parenthood, and considers both proximal (depression; the partners) and more distal factors (NCEs) when explaining one dimension of parenting (parenting stress).

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This research does not study the infant-parent-relation directly and thus neglects one important part of the family system. Nevertheless, parenting stress incorporates the parents' perception of the parent-child-relationship and the characteristics of the child, which can be viewed as an indirect assessment of this important component of the family system.

Kenny et al. (2006) suggested an analytical model for studying the interplay of emotions and behavior in dyadic relations, i.e. the Actor Partner Interdependence Model (APIM; Kenny, 1996), which has been widely used in research (Ledermann, Macho, & Kenny, 2011) and extended to the study of mediational processes in dyadic data (Ledermann et al., 2011). This analytical framework will be applied in the present study.

To summarize, I make the theoretical assumption – grounded in *family systems theory* and *ecological model of parenting* – that perceived parenting stress is dependent not only on the individual's, but also on the partner's, emotional well-being and relational experiences in the family of origin.

In the following, results of existing empirical research will be reviewed to differentiate and clarify the research questions and hypotheses.

## 2.2 Parenting stress in mothers and fathers

To better understand the factors that underlie the extent and parental interdependence of perceived stress in parenting, it is necessary to fully explore the concept and research thereon.

Parenting stress is defined as a multidimensional construct that encompasses the extent of stress experienced by a parent originating from multiple sources. The extent of perceived stress is dependent on the balance between competencies and resources for coping with parenthood and current challenges. Stress is generated if situational demands exceed the parents' ability to meet them (Abidin, 1995).

Parenting stress, as defined by Abidin (1995), covers a wide range of potential sources of stress experienced by parents. Abidin (1995) allocated these sources of parenting stress to two main categories: (1) child-related (e.g., Demandingness, Hyperactivity, Mood, Adaptability, etc.) and (2) parent-related (e.g., Sense of Competence, Social Isolation, Role Restrictions, etc.). Parent-related aspects address the "parent's functioning" (Abidin, 1995, p. 9), whereas child-related

aspects examine the parent's perceptions of the child and the stress experienced during interactions with the child.

Results on differences in parenting stress between mothers and fathers are divergent, suggesting either that women generally report more stress than men (Abidin, 1995; Mothander & Moe, 2010; Rollè et al., 2017; Skreden et al., 2012; Vismara et al., 2016), or that levels of stress are equal between women and men (Bai & Han, 2016; in the non-clinical group: Milgrom & McCloud, 1996; Saisto et al., 2008; Seah & Morawska, 2016). Regardless, parenting stress levels seems to be highly correlated between fathers and mothers (Le et al., 2017; Ponnet, Wouters, et al., 2013; Vismara et al., 2016). To my knowledge, no published study has examined the longitudinal impact of one partner's parenting stress levels on the other partner's parenting stress at a later time point.

Depression was found to be one of the most important factors explaining the extent of experienced stress, especially in mothers (Cornish et al., 2006; Galbally, Watson, Boyce, & Lewis, 2019; Le et al., 2017; Leigh & Milgrom, 2008; Saisto et al., 2008; Vismara et al., 2016). The data for fathers are less extensive, but depressive symptoms also seem to be an important predictor of the level of stress that they experience in their role as parent (Le et al., 2017; Saisto et al., 2008; Skjothaug, Smith, Wentzel-Larsen, & Moe, 2018; Vismara et al., 2016).

In particular, parent-related aspects of parenting stress seemed to be associated with depressive symptoms in parents (e.g. Cornish et al., 2006; Le et al., 2017; Misri et al., 2006). Findings on the association of depressive symptoms with child-related parenting stress are mixed: some studies found an association in mothers (Cornish et al., 2006; Milgrom & McCloud, 1996; Thomason et al., 2014), whereas others did not (Misri et al., 2006) or only found a weak one (Le et al., 2017). Le et al. (2017) examined a dyadic model of mothers and fathers and found that, for both mothers and fathers, negative affect was a predictor of child-related stress, although to a much lower extent than for parent-related stress. Regarding fathers, Skjothaug et al. (2018) found that child-related parenting stress at 6 months postpartum was predicted by both anxiety and depressive symptoms of fathers during pregnancy. Parent-related parenting stress was not examined in this study. McKelvey et al. (2009) found that paternal depressive symptoms were associated with parent-related stress and child-related parenting stress.

## 2.3 Negative childhood experiences and their impact on the transition to parenthood

A factor rarely studied in terms of its impact on parenting stress is the NCEs of the parents themselves.

NCEs, often referred to as adverse childhood experiences, childhood maltreatment or early stressful experiences, have been shown to impact adult physical and mental health, well-being and relationship functioning (Anda et al., 2006; Witt, Sachser, Plener, Brähler, & Fegert, 2019). Even with changes in the environment and experiences, the detrimental impact of NCEs was shown to persist (O'Neal, Richardson, Mancini, & Grimsley, 2016) into adulthood. Thus, they can put individuals and family systems at risk of additional problems during the transition to parenthood (Deater-Deckard, 2004; Lange, Callinan, & Smith, 2018). This factor accords with the parenting determinant “developmental histories” in the ecological model of parenting (Belsky, 1984) shown in Figure 1.

### 2.3.1 The concept and prevalence of NCEs, research thereon

Regarding the concept and prevalence of NCEs, studies provide different definitions based on different types and ranges of experiences; accordingly, prevalence rates are also diverse. Furthermore, comparable representative cohorts are rare.

Conceptions of NCEs differ in the range and severity of negative, potentially traumatic experiences. Some definitions are based on NCEs that are interpersonal (traumatic) experiences only. Others encompass non-interpersonal (traumatic) experiences, such as a car accident, fire or natural disaster. Regarding interpersonal experiences – often referred to as “childhood maltreatment” – active and passive forms of maltreatment during childhood can be distinguished. Active forms are experiences such as physical, emotional and sexual abuse, whereas emotional and physical neglect are considered passive forms (Taillieu, Brownridge, Sareen, & Afifi, 2016). Additionally, some NCEs might occur as single events (such as physical or sexual abuse, or non-interpersonal events), while others are typically characterized by a long-term pattern of dysfunctional and maladaptive interactions with close caregivers who are either physically or psychologically abusive, or neglectful (e.g. emotional neglect and abuse; see Glaser, 2002). Psychological maltreatment – such as emotional abuse and neglect – is defined as “a repeated pattern or extreme incident(s) of caretaker behavior that thwart the child’s basic psychological needs (e.g., safety, socialization,

emotional and social support, cognitive stimulation, respect) and convey a child is worthless, defective, damaged goods, unloved, unwanted, endangered, primarily useful in meeting another's needs, and/or expendable" by the American Professional Society on the Abuse of Children (APSAC, 2019, p. 3).

The concept of "household dysfunction" (Anda et al., 2006) refers to the conditions that the child experiences in the home, which may be aversive if there is a parent suffering from mental illness or substance abuse, the child witnesses domestic violence, a parent is incarcerated, or the parents are divorced or separated.

Two widely used measures to assess NCEs are the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003) and, more recently, the questionnaire on Adverse Childhood Experiences (ACE; Anda et al., 2006; Felitti et al., 1998). The concept of ACEs, and the questionnaire thereon, covers emotional, physical and sexual abuse, emotional and physical neglect, and forms of household dysfunction such as mental illness, substance abuse, violence, incarceration of household members and parental divorce or separation. A validated German version of the ACE questionnaire was published by Wingenfeld et al. (2011). The CTQ has a narrower definition of NCEs based on child maltreatment, including emotional, physical and sexual abuse, as well as emotional and physical neglect. Aspects of household dysfunction are not included. A validated German version of the CTQ was published by Klinitzke, Romppel, Häuser, Brähler, and Glaesmer (2012).

A NCE questionnaire covering both a broad range of potentially traumatic experiences and ratings for frequency and severity is the Trauma Antecedents Questionnaire (TAQ; van der Kolk, 1997). This self-report measure consists of 42 items on potentially traumatic experiences, such as neglect, emotional, physical and sexual abuse, separation of the parents, witnessing traumatic events, experiencing illness, death of a close person, or alcohol and drug abuse by a parent or close person. Therefore, it covers all aspects of potentially traumatic events addressed by both the CTQ and ACE, and also adds a scale on non-interpersonal traumatic events, such as natural disasters and serious accidents. However, it does not differentiate between emotional and physical neglect, unlike the CTQ and ACE. As it covers a broad spectrum of negative childhood experience, I chose to use the TAQ in this study.

The diversity of measures used in research makes it difficult to obtain a clear picture of NCE prevalence in general population. A meta-analytical study compared and summarized the prevalence of ACEs among international studies (K. Hughes et al., 2017): on average, 57% (range: 33% to 88%) experienced at least one type of ACE. A mean of 13% (range: 1% to 38%) of people had four or more adverse experiences during childhood. In a non-clinical sample of mothers, 25% reported more than four ACEs (Steele et al., 2016). Witt et al. (2019) reported the first data on adverse childhood experience in a representative German sample using the validated German version of the ACE questionnaire of Wingenfeld et al. (2011), which includes questions on emotional and physical neglect; 43.7% of respondents reported one or more ACEs, and 8.9% reported experience in four or more areas. Drug abuse in the household (16.7%) and parental divorce or separation (19.4%) were reported most frequently.

Two representative surveys using the CTQ, by Witt, Brown, Plener, Brähler, and Fegert (2017) and Witt et al. (2018), showed that one third of the German population reported at least one form of psychic or physical maltreatment during childhood. Compared to an earlier representative survey by Häuser, Schmutzer, Brähler, and Glaesmer (2011), more physical neglect was reported, but less emotional abuse. The latter finding might be due to greater awareness of the negative consequences of emotional abuse among the public.

When comparing representative surveys using the CTQ and the ACE questionnaire, a higher percentage of people reported NCEs in the ACE questionnaire-based study. The reason for this might be the inclusion of household dysfunctionality in the ACE questionnaire. Moreover, the reported rates of physical and emotional abuse were also higher. Contrastingly, the rates of sexual abuse, emotional and physical neglect were lower in the ACE questionnaire-based study compared to studies using the CTQ. Whereas the ACE questionnaire only has dichotomous response options, the CTQ collects data on frequency and severity, and differences among studies might be attributed to the different cut-off levels of the two instruments (Witt et al., 2019). Maltreatment was indicated by an abuse severity of at least “moderate to severe” in Witt et al. (2017) and Häuser et al. (2011). Correlations between the corresponding scales and sum scores of the CTQ and ACE questionnaire were high in a German validation study of the latter instrument (Wingenfeld et al., 2011).

No representative studies have been conducted on the TAQ, in Germany or internationally. In the majority of studies, clinical samples were studied (e.g. Büttner, Dulz, Sachsse, Overkamp, & Sack, 2014; Pajulo et al., 2012; Rosenkranz, Muller, & Henderson, 2014) or only mean scores were obtained; no results on prevalence were reported (Simonic et al., 2013; Stoltenberg, Anderson, Nag, & Anagnopoulos, 2012). Results from non-clinical samples can be informative regarding whether NCE prevalence is comparable to that in representative studies using the CTQ and ACE questionnaire. Merza, Papp, and Szabó (2015) studied 51 adults using the TAQ in Hungary. Emotional and physical abuse were reported by 39.2 and 11.8% of respondents, respectively; 39.2% of the sample experienced neglect, sexual abuse was reported by 3.9%, and witnessing domestic violence was experienced by 17.6%. The rate of parental divorce or separation was very high, at 80.4%. The rates of sexual and physical abuse were comparable to representative data on ACE in Germany published by Witt et al. (2019). rates of emotional abuse, neglect and domestic violence were up to three times higher in the TAQ study (Merza et al., 2015). Saleptsi et al. (2004) found that emotional neglect and abuse were the most prevalent experiences reported in their TAQ-based study that included a clinical population and a control group.

Researchers agree that certain forms of child maltreatment do not tend to occur in isolation. In the study of Witt et al. (2017) 14% of the population reported at least two different forms of maltreatment, which is almost 50% of all those who reported any child maltreatment at all.

### 2.3.2 Impact of NCEs on parenting stress during the transition to parenthood

Prevalence rates show that NCEs are common. Thus it is important to be cognizant of the impact of NCEs on the transition to parenthood – and parenting stress in particular. Belsky (1984) concluded in his review that the impact of parents' developmental histories on parenting occurs indirectly via contextual factors (e.g. the partnership, social networks, job situation) and individual mental well-being. In a review article, Christie et al. (2017) concluded that new parents with a history of childhood maltreatment face greater risks during the transition to parenthood, especially regarding their mental well-being, the possibility of a distorted view of the child, the quality of the parent-child-relationship and lower confidence in their ability to parent. These challenges might lead to a higher perceived stress of parenting. However, they also found that the birth of a child

can promote personal growth in women with NCEs. Data on fathers and low-income communities remain scarce.

Reviews and meta-analyses on the impact of NCEs on parenting behaviors generally document adverse effects of a personal history of NCEs on both parental behavior and parental experiences/identity (primarily in mothers).

E.g., in a meta-analysis, Assink et al. (2018) reported that the odds of child maltreatment by parents who experienced maltreatment in their families of origin was approximately three times higher than that in families without a history of child maltreatment. A recent meta-analysis by Madigan et al. (2019) replicated this result by showing that the intergenerational transmission of child maltreatment had a modest effect size, which was robust given the high methodological quality of the studies. The authors also estimated the likelihood of transmission of specific types of child maltreatment to the next generation: neglect showed the lowest transmission rate, whereas emotional abuse showed the highest. By contrast, safe and stable relationships reduced the risk of intergenerational transmission of abusive experiences (meta-analysis by Schofield, Lee, & Merrick, 2013).

The effect of a history of child maltreatment on parenting behavior was shown to be small but significant in a recent meta-analysis conducted by Savage, Tarabulsy, Pearson, Collin-Vézina, and Gagné (2019). The effect was stronger in studies that used relationship-based measures and/or negative parenting behaviors as outcomes, and had a larger proportion of male offspring. In a meta-synthesis of qualitative studies on parenting experiences, Siverns and Morgan (2019) concluded that parents might feel great insecurity about their parenting abilities in the absence of a positive role-model (i.e. their own parents), as well as hope of a new start/healing via their parenting experiences. Furthermore, they found that challenges experienced in parenting were consistently attributed to the parent's own childhood adversities, and that parents feared being incapable of protecting their children from maltreatment, and wished/longed for support even though they distrusted existing support and offers thereof.

To summarize, research has shown that a history of NCEs consistently poses a risk with respect to subsequent later parenting behaviors. However, it is important to keep in mind that a history of childhood adversity is only one of many factors that influences parenting behavior, and the effect is far from deterministic.

Looking specifically at the concept of parenting stress and its association with NCEs, Ammerman et al. (2013), Shenk et al. (2017), Bai and Han (2016), Pereira et al. (2012), Unternaehrer et al. (2019), Lange et al. (2018) and Steele et al. (2016) all found an impact of childhood trauma on parenting stress in mothers. The association in mothers was mediated by depression (Ammerman et al., 2013; Hugill, Berry, & Fletcher, 2017; Shenk et al., 2017; Unternaehrer et al., 2019). Similarly, Steele et al. (2016) reported that explained variance increased by 6 % when adding ACEs to socioeconomic status and poverty as predictors of parenting stress. Thus, they showed an independent negative impact of ACEs. Two studies on fathers showed a link between NCEs and parenting stress, which was mediated by emotional dysregulation (Bai & Han, 2016) and prenatal mental health (Skjothaug et al., 2018). Skjothaug et al. (2018) performed the only study thus far examining the mediating effect of depressive symptoms in fathers. Therefore, based on the literature, it is reasonable to assume a *spillover* effect of NCEs in an individual to the parental system postnatally, at the actor level.

In the following, different possible pathways by which NCEs could affect perceived parenting stress are described. Based on the ecological model of parenting (Belsky, 1984) and its adaptation to fathers (Cabrera et al., 2014), as discussed above, pathways involving parental mental health, personality, marital relationships, social relationships and the parent's work can be expected. The following section will focus on empirical research providing evidence for two of these pathways.

**a) Emotion and stress regulation**

Studies have shown that NCEs might result in less adaptive emotion regulation strategies, and even in emotional dysregulation, characterized by difficulty of controlling anger, high stress arousal, withdrawal and self-blame (Anda et al., 2006; Bai & Han, 2016; J. G. Beck, Grant, Clapp, & Palyo, 2009; Burns, Jackson, & Harding, 2010; Shipman et al., 2007).

Thus, during the transition to parenthood, individuals who have experienced NCEs might use maladaptive emotion regulation strategies (Liu, Wang, Lu, & Shi, 2019) and feel more strain and stress in association with their parental role.

It has been stated that "Emotion regulation may be conceptualized as involving the (a) awareness and understanding of emotions, (b) acceptance of emotions, (c) ability to control impulsive

behaviors and behave in accordance with desired goals when experiencing negative emotions, and (d) ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses as desired in order to meet individual goals and situational demands" (Gratz & Roemer, 2004, p. 42f ). Adaptive emotion regulation strategies allow one to become aware of an emotion, and manage the duration and intensity thereof (arousal or inhibition). Moreover, they can guide constructive and socially acceptable way, to increase the likelihood of achieving one's goals. These strategies are further characterized by a certain degree of flexibility in response to situational and contextual demands (R. A. Thompson, 1994). Adaptive behaviors for emotion regulation in adulthood include reaching out for support from a close person, stating one's own needs in a non-confrontational verbal manner, etc.

Maladaptive forms of emotional regulation include self-harm, self-blame following an emotional reaction, impulsivity, violence, high stress arousal, etc. (Gratz & Roemer, 2004).

As the capacity to self-regulate emotions is quite rudimentary and raw in infancy and childhood, help/intervention from external sources is needed to modulate emotions/arousal; for example, parents can provide guidance on how to behave in response to such emotions (R. A. Thompson, 1994). Parents who neglect or abuse children are likely to show less capacity to co-regulate their children's (negative) emotions (Shipman et al., 2007), and thus are less likely to teach them how to effectively self-regulate their emotions in future (see Eisenberg, Cumberland, & Spinrad, 1998 for a review on parental socialisation of emotion regulation in children).

Empirical research supports the notion that emotion regulation plays an important role in the experience of parenting stress, in the context of one's own childhood adversities.

Smith, Cross, Winkler, Jovanovic, and Bradley (2014) showed that the effect of maternal childhood abuse on the likelihood of abusing one's own children was mediated by emotion dysregulation and negative affect in mothers. Liu et al. (2019) showed that maternal emotional maltreatment was related to more maladaptive emotion regulation strategies at 6 months postpartum. Self-criticism (an aspect of emotion regulation) was found to mediate the effect of child maltreatment on adult relationship functioning (Lassri & Shahar, 2012). Explicit and implicit depressive cognitive styles were associated with NCEs, especially childhood emotional abuse (Gibb & Abela, 2008; Gibb et al., 2001; Hankin, 2005; A. L. Johnson, Benas, & Gibb, 2011). Mothers were found

to be less confident in their capacity to regulate their own emotions in their relationship with the child (Fava et al., 2016).

Pereira et al. (2012) further hypothesized that NCEs might influence reactivity to stress in adults, who may then experience more parenting-related stress on becoming parents themselves. This hypothesis was supported by animal research revealing the impact of early experiences on later parenting, as modulated by stress reactivity (Francis, Diorio, Liu, & Meaney, 1999), and by studies on the effect of (emotional) abuse on the stress response system (Carpenter et al., 2009; Gonzalez, Jenkins, Steiner, & Fleming, 2012; Opacka-Juffry & Mohiyeddini, 2012). Emotion regulation capacity is also related to stress reactivity (M. Wang & Saudino, 2011).

Bai and Han (2016) found that emotional dysregulation mediated parenting stress in those who had experienced NCEs. X. Hu, Han, Bai, and Gao (2019) found that emotional dysregulation was related to greater parenting stress in mothers and fathers of children with autism.

#### b) Internal working models of the self and others

As humans are social beings from the first day of life, early interpersonal experiences shape our inner representations of close relationships – how they work and what we can expect in the future. *Attachment theory* suggests that relationships are affected by whether we have internalized the belief that we can rely on the proximity and availability of our primary caregivers, to meet our physical and emotional needs; that we can show our negative feelings openly without provoking rejection, humiliation, violence or abandonment by primary caregivers; that our inner drive to explore the world and develop is guided by adequate support, joy and care; and that close persons react in a reliable manner and we do not have to be afraid of experiencing harm in close relationships (either physical or emotional). As we are highly dependent on our primary caregivers in the early years of our lives, we automatically adapt our behavior to the particular interpersonal situation, whether it is emotionally healthy or not, with the aim of surviving and maintaining closeness with our caregivers (Bowlby, 1979).

Individuals who have experienced NCEs might have established internal working models of close relationships characterized by avoidance, anxiety, ambivalence, anger, mistrust, fear or other maladaptive schemas (Crawford & Wright, 2007; Godbout et al., 2009; Hankin, 2005; Messman-Moore & Coates, 2007; Riggs & Kaminski, 2010). Murphy et al. (2014) showed that

with an increasing number of childhood adversities and less experience of emotional support in childhood, the probability of an “unresolved” state of mind, according to the Adult Attachment Interview (AAI), rose substantially. In a surprisingly high percentage (65%) of AAIs, “unresolved” was the classification in the group of adults reporting four or more childhood adversities. Pregnant women with a history of child maltreatment mainly had insecure (mostly unresolved) internal working models of attachment (Ensink, Berthelot, Bernazzani, Normandin, & Fonagy, 2014). Internal working models of attachment were found to predict adult functioning (satisfaction, quality) in close relationships (Riggs & Kaminski, 2010), and thus also the parent-child-relationship. Infants of mothers who experienced childhood abuse or neglect were more likely to show a disorganized pattern of attachment to their mothers (Berthelot et al., 2015; Lyons-Ruth & Block, 1996). Women with childhood trauma were found to behave in a more hostile and emotionally withdrawn manner towards their children (Lyons-Ruth & Block, 1996) or show a bias in information-processing toward angry emotional faces (Gibb, Schofield, & Coles, 2009). These parents were also shown to be more vigilant to their infant’s signals of need (crying, whining, etc.) than parents who did not experience potentially traumatic childhood events (Wright, Laurent, & Ablow, 2016).

Believing that support from close persons is limited, and having less functional social connections with others, might increase the risk of feeling trapped by the new parenting role, and experiencing stress in the partnership and more social isolation (two aspects of parenting stress). O'Neal et al. (2016, p. 431) found that mothers and fathers who reported more NCEs had fewer social contacts and “a decreased ability to provide a positive parenting environment”. Also, the quality of partnerships was diminished in parents with experience of NCEs (Crawford & Wright, 2007; Riggs & Kaminski, 2010), which might constitute an additional stress during the transition to parenthood.

Furthermore, the interactions with, and view of, the child might be more stressful and negative (A. J. Lang, Gartstein, Rodgers, & Lebeck, 2010) in those how have experienced trauma. The infant may elicit or reactivate feelings and memories of childhood experiences in the parent (Fraiberg, Adelson, & Shapiro, 1975). When those experiences are negative, additional stress is placed on the parent.

### c) Challenging and inadequate parenting role models

Individuals who were confronted with NCEs probably had less adequate parental role models (Godbout et al., 2014), and might experience more conflicting thoughts and a greater need for consolidation regarding ideal “parenting”, according to Skjothaug, Smith, Wentzel-Larsen, and Moe (2014); their hypothesis is based on *social learning theory* (Bandura, 1977). The transition to parenthood is known to be a time of consolidation of own childhood experiences (Cowan & Cowan, 2000) and the family of origin often plays a significant role in supporting and guiding new parents (Parkes, Sweeting, & Wight, 2015). It might be that maladaptive parenting behavior and NCEs both have their origin in a dysfunctional family of origin. Poorer parenting quality might not result from the negative experiences themselves (Locke & Newcomb, 2004), but rather from the dysfunctional environment. One’s own negative experiences might also increase the pressure, and inner drive, to do everything “right”, or at least better than one’s own parents (Fava et al., 2016; O'Brien et al., 2019); this could further increase stress. Furthermore, an ongoing stressful relationship with the family of origin might decrease the amount of support available, leading to more stress during parenting. Support was found to buffer the experience of parenting stress (Parkes et al., 2015). Indeed, Unternaehrer et al. (2019) found that the effect of the quality of paternal care in the family of origin on parenting stress at 6 months postpartum was mediated by the quality of the current relationship with the mother’s father. Belsky (1984) concluded that the experience of low paternal involvement in the family of origin might lead to a low identification with one’s own father as a role model, and thus might activate a potentially stressful compensatory process. Unternaehrer et al. (2019) showed that internalization of positive maternal rearing experiences engendered a greater intrinsic motivation among mothers to care for their newborn (in contrast to extrinsic motivation, such as fear of judgment, guilt and shame), and consequently lowered parenting stress.

Not feeling competent in the parenting role is a core component of parenting stress (Abidin, 1995). A feeling of competence and confidence in one’s abilities to be a good parent was found to be diminished in individuals with a history of ACEs; this was seen both in women (Bailey, DeOliveira, Wolfe, Evans, & Hartwick, 2012; DiLillo & Damashek, 2003) and men (O'Brien et al., 2019) who were sexually abused. Martinez-Torteya, Katsonga-Phiri, Rosenblum, Hamilton, and Muzik (2018) and Caldwell, Shaver, Li, and Minzenberg (2011) reported that childhood maltreatment impacted postnatal perceptions of competence in child-rearing, mediated (Caldwell et al.,

2011) or moderated (Martinez-Torteya et al., 2018) by symptoms of depression. The importance of taking mental health into account was also underlined by the results of Berthelot, Lemieux, Garon-Bissonnette, and Muzik (2020) regarding prenatal perceptions of competence.

#### d) Mental health: focus on depressive symptomatology

The first pathway between NCE and parenting stress, i.e. via emotion regulation and stress regulation, is closely related to the putative pathway via mental well-being during the transition to parenthood. Mental health problems take up the psychological resources required to parent responsively and effectively (Ammerman et al., 2013), and might represent a transgenerational link between childhood adversity and child maltreatment in the following generation (Buist, 1998).

NCEs place individuals at a higher risk for developing behavioral or social, as well as physical and mental, health problems (Anda et al., 2006; Dube et al., 2003; Felitti et al., 1998; K. Hughes et al., 2017). The dose-response relationship reported in international studies was replicated for all dependent variables (depression, anxiety, increased physical aggression and low life satisfaction) in a study including a representative German sample using the ACE questionnaire (Witt et al., 2019). The greatest difference with respect to psychiatric diagnosis was found for negative experiences in the developmental stage of adolescence (Saleptsi et al., 2004), whereas other studies found a greater effect of experiences in the early stages of child development on later mental and physical health (Dunn et al., 2017).

Depression or depressive mood was not only found to be more likely in adults suffering from NCEs (Anda et al., 2006; Dunn et al., 2017; O'Neal et al., 2016) but was also an important predictor of parenting stress (Le et al., 2017; Leigh & Milgrom, 2008; Saisto et al., 2008; Vismara et al., 2016). Chapman et al. (2004) showed that the likelihood of lifetime depression was increased 2.7 times in women and 2.5 times in men with a history of emotional abuse in childhood. Risk of depression varied by interpersonal trauma exposure, but by not non-interpersonal trauma or other types of trauma (Dunn et al., 2017). Even less severe NCEs, such as criticism and insults from family members, had a persistently negative effect on adult mental and physical health, were associated with a higher probability of social isolation, and had equal effects on parenting between mothers and fathers (O'Neal et al., 2016).

Looking specifically at the association of the transition to parenthood and perinatal depressive symptoms, several studies reported a role of NCEs. Choi et al. (2019) even documented that postpartum depression was a mediator of the intergenerational transmission of child maltreatment. Fredriksen, von Soest, Smith, and Moe (2017) analyzed different trajectories of perinatal depressive symptoms, and predictors thereof, in women. ACEs were predictive of the “prenatal depressive symptoms only” and “persistent moderate depressive symptoms” trajectories in univariate models. In multivariate models, more proximal factors, such as pregnancy-related anxiety (first trajectory) and different psycho-social factors such as education, anxiety in close relationships, stressful life events and prior psychopathology (second trajectory) were found to be stronger predictors than adverse childhood experience. Based on the results of these studies and the conclusions of those mentioned above, one can hypothesize that some of these factors highly correlate with the experience of childhood adversities, and might therefore mediate the association of childhood adversities with perinatal depressive mood. The trajectory of “postnatal depressive symptoms only” was not predicted by any factor other than prior psychopathology (Fredriksen et al., 2017). Wajid et al. (2020) found that the risk of prenatal depression was 2.5 times higher for women who experienced childhood adversity in four or more domains of the ACE questionnaire than in those with experience in less than four domains, in a high-risk community sample. Scores on all ACE item had a significant association with risk of depression, except for the experience of parental divorce. A recent meta-analysis on the impact on prenatal depressive symptoms showed a stable moderate effect across diverse study samples (Shamblaw, Cardy, Prost, & Harkness, 2019). In a systematic review on lifetime abuse in women, Alvarez-Segura et al. (2014) concluded that childhood experiences have a stronger impact on the antenatal than postnatal period. Wosu, Gelaye, and Williams (2015) stated that the literature on the impact on postnatal depressive symptoms is, in contrast to that on prenatal symptomatology, inconsistent. More recent insights into postnatal depressive symptoms were reported by Teeters et al. (2016) in a study of high-risk mothers in home visiting programs. The results showed that a history of childhood adversities increased the risk of mild, moderate or severe postnatal depressive symptoms. Symptoms were relatively stable over 18 months. McDonnell and Valentino (2016) and Unternaehrer et al. (2019) both found that postnatal depressive mood was predicted by childhood maltreatment. Minor NCEs, such as non-supportive rearing experiences, also had an impact on

postnatal symptoms (Unternaehrer et al., 2019). These recent studies add to the evidence of an impact of NCEs on both pre- and postnatal depressive symptoms in mothers.

Skjothaug et al. (2014) reported that fathers-to-be reporting ACEs before the age of 18 years showed higher levels of prenatal pregnancy-related anxiety and depressive symptoms. In contrast to that, Berthelot et al. (2020) found no difference in depressive symptoms between expectant fathers with versus without experience of childhood trauma. Regarding the postnatal period, Liu et al. (2019) documented an effect of emotional abuse on depressive symptoms in fathers and mothers at 6 months postpartum. A risk factor for postnatal depressive symptoms in fathers was overcontrol or overprotection by the mother and father in the family of origin (Matthey, Barnett, Ungerer, & Waters, 2000). A systematic review on paternal perinatal depression in the US identified the quality of the current and childhood relationship with the family of origin as a psychosocial risk factor for perinatal depression in fathers (Recto & Champion, 2020).

The prenatal period might be more relevant in fathers than the postnatal period in terms of depressive and stressful feelings, as suggested by the results of Condon, Boyce, and Corkindale (2004). However, a recent meta-analysis documented an increase in perinatal depressive symptoms from the prenatal to postnatal period in fathers, but not in mothers (C. Hughes et al., 2020).

To summarize, psychological functioning (e.g. emotion regulation capacity), internal working models of close relationships, maladaptive role models, relationship quality in adulthood and mental well-being – generally and specifically during the transition to parenthood – were discussed as potential pathways through which NCEs impact on parenting stress in both men and women. Mental well-being was proposed as an important potential mediator. Studies specifically concerned with the impact of NCE on parenting stress are still scarce, especially in fathers. This research will thus shed further light on the strength and nature of this relationship.

## 2.4 Interdependence between partners regarding NCE, depressive symptoms and parenting stress

As described above, *family systems theory* proposed interdependence of the partner's behavior and mental well-being, and suggested two potential mechanisms of this interdependence (Bolger et al., 1989; Erel & Burman, 1995; Nelson et al., 2009). First, there may be a *crossover* of behavior or emotion from one partner to the other, or from one subsystem to another, such that an increase

in behavior or emotion in one subsystem or partner would result in an increase of the same behavior or emotion (or associated behaviors and emotions) in the other partner or subsystem. Second, there may be a *compensatory process*, such that one partner reacts to behavior or emotions in the other with counter-balancing behavior or emotions.

It is reasonable to assume crossover of affect and behavior between partners in the context of NCEs and parenting stress, as NCEs were found to have a great impact on individual well-being and parenting, as outlined above. Further, the quality of the couple relationship was shown to be dependent on the experiences in the family of origin, where childhood adversities have a negative impact (Riggs et al., 2011; Riggs & Kaminski, 2010; Skjothaug et al., 2018).

As in the intra-individual process, one can assume either a *direct crossover* of partner's NCEs (and their consequences) on parenting stress in the other partner, or an *indirect crossover* via the well-being and interpersonal behavior of the partner (possibilities described by Belsky, 1984). As the ecological model of parenting proposed, the partner themself has the potential to be a source of stress and support for the other partner – and thus act as a determinant of how well the other partner will be able to parent (Belsky, 1984). Second-order effects (Belsky, 1981) can thus be expected, where the experience of parenting and the perception of the child and parent-child relationship changes in the presence of the partner. Further, the partner might compensate for any reduction in the emotional availability and responsiveness of the other partner due to his or her negative childhood experience and/or depressive mood, by increasing his or her efforts toward caring and being responsive to the infant. These compensatory efforts can be expected to increase perceived parenting stress as well.

Relatively recent research findings support the notion that partners of individuals with childhood adversities are impaired by the negative experiences of their partners in different ways (e.g. Godbout et al., 2014; Godbout et al., 2009; W. L. Johnson et al., 2019; Riggs et al., 2011; Riggs & Kaminski, 2010). Parenting in general was shown to be affected by the partner in multiple ways (e.g. Barnett et al., 2008; Belsky & Volling, 1987). However, results on the dyadic effects of childhood adversities on parenting generally, or parenting stress specifically, are still lacking (one expection: Bai & Han, 2016). In the following, research on dyadic interdependencies in partners and potential mechanisms/pathways of dyadic interdependence of childhood adversities, and their impact during the transition to parenthood, are outlined.

### 2.4.1 Research on potential pathways of dyadic effects

**a) Effect of NCEs on representations and behavior in close relationships, relationship satisfaction and the coparenting relationship**

It can be assumed that NCEs in one partner will affect the other partner, in terms of the way he/she perceives the quality of the relationship, and how satisfied he/she is; furthermore, stress in the couple and coparenting relationships may be elicited.

On an intra-individual level, Skjothaug et al. (2018) showed that marital conflict mediated the effect of ACEs on child-related parenting stress in fathers at 6 months postpartum. This suggests a potential crossover of NCE to the marital level, and subsequent transmission to parenting stress.

On an interpersonal level, several studies found a specific effect of NCEs on the partner's ratings of relationship satisfaction and quality (Godbout et al., 2014; Godbout et al., 2009; Miano, Weber, Roepke, & Dziobek, 2018; Riggs et al., 2011; Wheeler, Barden, & Daire, 2020). Studies on the effect of trauma generally, and trauma symptoms specifically, showed that these had a negative effect on relationship functioning (Fredman et al., 2019; Lambert, Engh, Hasbun, & Holzer, 2012; Ruhlmann, Gallus, & Durtschi, 2018). In addition, data on the effect of childhood adversities on an individual's attachment representation (Ensink et al., 2014; Murphy et al., 2014; Riggs & Kaminski, 2010) and dysfunctional behavior in partnerships (Crawford & Wright, 2007; W. L. Johnson et al., 2019) may shed further light on the potential negative impact on the partner. In the following, research results are presented in detail to explore the potential dyadic processes at work.

The transition to parenthood and the experience of a newborn child can place existential stress on the couple relationship (Cowan & Cowan, 2000; Houts, Barnett-Walker, Paley, & Cox, 2008), thus exacerbating any negative effects of childhood adversities. Miano et al. (2018) found that normal protective factors in relationships are diminished in individuals with high levels of childhood trauma, when they are in challenging, and maybe even relationship-threatening, situations. This "altered threat coping strategy might cause the inability to protect oneself from relationship-threatening information" (Miano et al., 2018, p. 309), and thus may increase the perception of stress in the parenting role. Ruhlmann et al. (2018) reported lower relationship satisfaction and less secure-base attachment behaviors in the husbands of women affected by trauma, but

not vice versa. They described this in the following way: “As survivors manage their own symptomatology and challenges, they tend to oscillate between wanting comfort from their partners and desiring isolation to avoid triggers” (Ruhlmann et al., 2018, p. 28). Such behavior in close relationships, in the absence of a posttraumatic stress disorder, can be described as an unresolved or disorganized interpersonal working model of attachment (Main, Kaplan, & Cassidy, 1985). “Such cycles may leave partners of trauma survivors feeling frustrated at the fact that their needs are going unmet and disheartened that they are unable to help their partners despite their efforts” (Ruhlmann et al., 2018, p. 28). Partners were further found to report more attachment anxiety, such as the fear of being abandoned, being overdependent on the partner and preoccupied with the feelings of the other (Godbout et al., 2014). Ruhlmann et al. (2018) further suggested that the shared experience of trauma (not childhood maltreatment specifically) in couples might lead to compensatory effects in partners showing more attachment-promoting behavior and greater relationship satisfaction. No compensatory effect was found for women’s attachment behaviors with an increasing number of traumatic experiences in their husbands. The compensatory effect in fathers was not present when partners suffered from more severe trauma symptoms, possibly making adaptive couple interactions more difficult. Moreover, men and women showed less secure-base attachment behavior, or even more verbally aggressive and abusive behavior themselves (as found for women and men by W. L. Johnson et al., 2019). However, Wheeler et al. (2020) found no effect of the partner’s ACEs on men’s relationship quality, whereas women rated their relationship quality lower when men reported more ACEs. Women’s experience of emotional or physical abuse, as well as witnessing physical or emotional interpersonal violence, was directly predictive of their partners’ anxious adult attachment style (probably through couple-matching processes), whereas men’s childhood adversities indirectly affected women’s interpersonal violence in the relationship via anxious attachment, and their relationship satisfaction via men’s avoidant attachment style. Furthermore, an anxious attachment style in women was related to their partner’s interpersonal violence, while their attachment avoidance was related to the men’s rating of the relationship quality (Godbout et al., 2009). Supporting these results, Riggs et al. (2011) found that the partner’s emotional abuse predicted the actor’s relationship quality and adjustment. The effect was mediated by the attachment anxiety in the partner, whereas no direct effect of the partner’s personal history on the attachment style of the actor was found, suggesting that the interpersonal behavior of a person is shaped by his/her personal history, and affects the

quality and satisfaction of relationships in adulthood. In a meta-analysis, trauma symptoms had a small effect on relationship functioning. The dyadic effect was stronger from males to females than from females to males (Lambert et al., 2012).

Research on the transition to parenthood is scarce but supports the findings of the other studies discussed herein: the more severe the symptoms of posttraumatic stress disorder, the greater the degree of relationship conflict, as reported by the partner during peripartum (Fredman, Le, Marshall, Brick, & Feinberg, 2017; Fredman et al., 2019). Partner effects were equal between partners. Maternal marital satisfaction 6 months postnatally was lower if the husband suffered from emotional maltreatment during childhood, but not vice versa. This effect was mediated by postnatal paternal depression (Liu et al., 2019). Several studies have shown an effect of the perceived quality of the couple relationship on parenting stress (Colpin, De Munter, Nys, & Vandemeulebroecke, 2000; Mulsow, Caldera, Pursley, Reifman, & Huston, 2002). Salmela-Aro et al. (2006) found that changes in marital satisfaction covary in partners during the transition to parenthood.

As proposed above, as well as relationship functioning and satisfaction, the coparenting relationship of partners of individuals with NCEs might suffer. It was suggested that the coparenting relationship – the extent to which partner's stand by each other in their role as parents, show solidarity with respect to their parenting behavior, support each other in their relationships with the child, and share joy and closeness in parenting (Kotila & Schoppe-Sullivan, 2015) – modulates the effect of the marital relationship on parenting (Camisasca et al., 2014). Markers of a low-quality coparenting relationship include "behaviors such as competition, criticism, blame, and belittling" (Kotila & Schoppe-Sullivan, 2015, p. 735), which undermine the parenting of the partner.

There is a paucity of research on the effect of NCEs on the quality of coparenting. Related research showed that the quality of the coparenting relationship in the family of origin was predictive of the perception of coparenting in fathers and mothers (Stright & Bales, 2003; Van Egeren, 2003). Post-traumatic stress symptoms were associated with lower coparenting quality (Fredman et al., 2017). Parenting stress in both mothers and fathers was shown to be dependent on the quality of the coparenting relationship (Delvecchio, Sciandra, Finos, Mazzeschi, & Riso, 2015; Lionetti, Pastore, & Barone, 2015; Schoppe-Sullivan, Settle, Lee, & Kamp Dush, 2016).

**b) Effect of NCE on the psychological functioning and well-being of partners**

As well as the effect of childhood adversities on relationship functioning, interpersonal and attachment behavior, studies have shown that the psychological functioning of an individual is affected by their partners' childhood adversities.

For example, Bai and Han (2016) found that the partner's emotion regulation capacities were diminished if the other partner suffered from emotional abuse in childhood. This might be due to the higher effort the partner has to show in co-regulating the partner's affect. Maternal maltreatment history was shown to be associated with paternal symptoms of anxiety and stress, as well as greater hostility when children were 3 years old (Rijlaarsdam et al., 2014). Another study showed that partners of sexually abused women who did not receive parental support in their family of origin displayed a higher level of psychological distress (Godbout et al., 2014). Symptoms of posttraumatic stress in trauma survivors were moderately associated with greater psychological distress in their partners in a meta-analysis (Lambert et al., 2012). Wheeler et al. (2020) found no effect of partner's ACEs on general health. There is a lack of research on the specific effect of the partner's negative childhood experience on depression.

**c) Potential direct effects of NCE on parent- and child-related parenting stress in partners**

Less is known about the direct impact of a partner's NCEs on the parenting (and the stress thereof) of the partner. Bai and Han (2016) showed that both mother's and father's parenting stress was affected by their partner's experience of emotional abuse. A parent with NCEs may be less able to consistently support, and therefore elicit more stress in, their partner. Paternal feelings of competence in child-rearing were found to be predicted by maternal support (Gibaud-Wallston & Wandersman cited by Belsky, 1984). The more severe the women's symptoms of posttraumatic stress disorder, (likely a consequence of severe childhood adversities), the higher the men's parenting-associated stress level (Fredman et al., 2017). Paternal hostility, reflected in harsh paternal discipline, was found to be impacted by maternal history of childhood maltreatment in a study by Rijlaarsdam et al. (2014), which did not control for paternal childhood experiences. Greater stress in the parental role might also originate from compensatory actions one parent has

to take when the other parent suffers negative consequences of an experience of childhood adversities.

**d) Impact of depressive symptoms on parenting stress in partners**

The hypothesis that depressive symptoms mediate the dyadic relationship between NCEs and parenting stress is plausible, as partner's negative childhood experience had an effect on mental wellbeing (see above), and mental wellbeing during the transition to parenthood was found to impact on the partner's wellbeing (Wee, Skouteris, Pier, Richardson, & Milgrom, 2011), relationship quality or satisfaction (Barnett et al., 2008; Whisman, Uebelacker, & Weinstock, 2004), and parenting stress (Le et al., 2017).

Maternal and paternal perinatal depression often co-occur (Goodman, 2008; C. Hughes et al., 2020), and studies showed dyadic interdependence, where for example maternal prenatal depressive symptoms impacted on fathers' postnatal depressive symptoms (Fredriksen, von Soest, Smith, & Moe, 2019). Depression in one partner has been shown to predict depression, or more frequent depressed mood, in the other partner (Benazon & Coyne, 2000; Vismara et al., 2016); this was attributed mainly to a greater burden experienced by the spouse of the depressed person, rather than one's own susceptibility to depression (Benazon & Coyne, 2000). Wee et al. (2011) concluded in a systematic review that the factors most often correlated with the father's ante- and postnatal depressive symptoms were a partner with severe depressive symptoms and low satisfaction with the partnership. Furthermore, Salmela-Aro et al. (2006) have shown that pre- and postnatal depressive symptoms underlie similar changes in partners, and thus are highly interdependent. Contagion of depressive symptoms during peripartum was more prevalent for partners with insecure than secure attachment irrespective of parent gender (Fredriksen et al., 2019). Paulson, Bazemore, Goodman, and Leiferman (2016) found that maternal prenatal symptoms had an impact on paternal prenatal symptoms, but paternal prenatal symptoms did not impact on maternal postnatal symptoms.

Goodman (2008, p. 626f) described the effect of maternal depressive symptoms on the father in the following way: "If a woman is depressed, she may be unable to fulfill a supportive, facilitative role, and the father–infant relationship may suffer. Alternatively, however, a depressed mother's decreased engagement with the infant may provide the father greater access and involvement

with the infant." Crossover from the mother to the father might increase the father's parenting stress. To the best of my knowledge, only one study (Le et al., 2017) has estimated the effects of mother's and father's depressive symptoms or negative affect on parenting stress simultaneously, thus controlling for shared variance. Le et al. (2017) found that the greater the negative affect in one parent, the higher the parent-related parenting stress in the other parent – independent of the parent's gender. Fathers' perceptions of child-related stress were dependent on the extent of negative affect in mothers, but not vice versa. Gerstein, Crnic, Blacher, and Baker (2009), Goodman (2008), Vismara et al. (2016) and Milgrom and McCloud (1996) showed an impact of mothers' and fathers' mental well-being on their partners' parenting stress in separate models of mothers and fathers. In detail, Gerstein et al. (2009) noted an effect of paternal mental well-being on stress regarding daily hassles associated with parenting, as reported by mothers, and of maternal well-being on father's general level of stress. The participants in that study were families with a 3-year-old child with an intellectual disability. Vismara et al. (2016) found that first-time father's parenting stress at 6 months postpartum was indirectly predicted by the mother's postpartum depressive symptoms at 3 months, i.e. the relationship was modulated by their own postpartum depressive symptoms at 3 months. Milgrom and McCloud (1996) showed that in families with a mother suffering from postnatal depression, fathers reported a higher level of parenting stress – especially in the Parent Domain – than fathers in the control group. They also found that reported strain increased over time. They felt "less competent, less emotionally attached to their child, less healthy, more depressed and more socially isolated. They also felt they had a more restricted lifestyle because of their child and found their child more demanding" (Milgrom & McCloud, 1996, p. 184). Fathers further reported lower relationship satisfaction. These results were replicated recently by Egmose, Tharner, Liebenberg, Steenhoff, and Væver (2020). Goodman (2008) documented an effect of maternal depression on paternal parenting stress, and effects of the maternal perception of the mother-child-relationship (Parenting Stress Index [PSI] subscale *Dysfunctional Parent Child Interaction*) and depressive symptoms on the father-child-interaction.

Contrastingly, van Eldik, de Haan, Arends, Belsky, and Prinzie (2019) found no impact of mothers' or fathers' psychological resources (measured with the Depression subscale of the PSI) on the experience of stress in the relationship (subscale of the PSI). One reason for the lack of a dyadic effect could be the cross-sectional design of the study. Recently, X. Hu et al. (2019) found

no evidence for dyadic processes between parental emotion dysregulation and parenting stress in an APIM of the parents of children with autism, while Canzi et al. (2019) observed no dyadic interdependence in partners regarding how their parenting-related stress at 3 month postnatally impacted their stress at 15 months postnatally.

To summarize, research has shown that NCEs in one partner negatively impact the psychological well-being and functioning, as well as the perception of the partnership, of the other partner. Furthermore, during the transition to parenthood, partners were shown to be dependent on each other regarding their mental well-being, which impacts the stress experienced in the parental role. Pathways of interdependence of partners during the transition to parenthood, with respect to the influence of childhood adversities, might thus include relationship functioning, interpersonal behavior and psychological well-being and functioning.

### 2.4.2 Interdependency in parents during the transition to parenthood – risk or benefit?

Higher interdependence between parents can pose both risks and benefits with respect to child development. In the case of parenting stress and NCEs, it could be of great benefit if the partner is not emotionally affected by the mental stress that these experiences exert on the other partner, and does not show an increase in parent- or child-related parenting stress, which was shown to have a negative effect on parenting behaviors. The partner's relationship with the child may then act as a buffer against the negative impact of stress and NCEs in the other parent on the parent-child-relationship and, subsequently, child development. However, higher parent-related stress, e.g. in terms of "role restriction", might be consequence of a compensatory process in partners facing the strain associated with a partner having NCEs, in which the parent increases his effort to be involved in parenting and support of the partner. This dyadic process may be of benefit for child development.

Greater interdependency between partners would probably also lead to positive emotional contagion, and might increase the probability of an emotionally stressed person with NCEs experiencing less parent- and child-related stress, which would reduce any negative impact on child development. For example, Barnett et al. (2008) found that in the context of emotional support and low conflict in partnerships, sensitive parenting behavior by one partner might crossover to the other partner, and thus increase the likelihood of sensitive parenting in the parent-child-dyad

(irrespective of parent gender). Thus, in a harmonious and emotionally supportive relationship, positive behavior of one partner may crossover to the other partner. However, it is not yet clear whether couple interdependency is greater for positive or negative emotions and behavior.

### 2.4.3 Is there an equal influence in both directions?

*Family systems theory* would assume a bidirectional influence between parents, i.e. the mother affects the father and vice versa (Cox & Paley, 1997), where effects may differ in extent and domains. To be open and receptive to the psychological state and behavior of another is a crucial aspect of a close relationship (Beebe & Lachmann, 2002), and is an ongoing subconscious process in which one partner matches their facial emotional expression to that of the other (Dimberg, Thunberg, & Elmehed, 2000). In this process, the emotional expression of one partner evokes a similar psychophysiological state in the other. The partner is set to a “resonant emotional state” (Beebe & Lachmann, 1998, p. 487) and an expanded consciousness shared between the partners is created (Tronick, 1998).

The extant literature on how partners and parents influence each other in terms of their affect, attitudes and behavior (e.g. parenting) has shown a likely predominance of influences from the mother to the father in the context of parenthood (e.g. Belsky, 1979; Field et al., 2006; Paulson & Bazemore, 2010; Pedro, Ribeiro, & Shelton, 2012; van Eldik et al., 2019; Volling & Belsky, 1991). For example, research has shown that fathers’ parenting behaviors were more strongly associated with the marital relationship than mothers’ parenting behaviors, as concluded by Barnett et al. (2008). Meanwhile, Pelchat, Bisson, Bois, and Saucier (2003) found that paternal, but not maternal, sensitivity was dependent on marital stress. Researchers hypothesized that the concept of “fathering” may be less normatively and biologically determined and prescribed to men than the role of “mothering” to women (Coiro & Emery, 1998; Volling & Belsky, 1991), and thus may be more likely to be influenced by the family system and the environment. This is known as the *fathering vulnerability hypothesis* (Cummings, Merrilees, & George, 2010). Furthermore, the direction of the effects might be attributable to the fact that mothers typically assume the role of primary caregiver for their children (Barnett et al., 2008; Bradford & Hawkins, 2006; Coiro & Emery, 1998; Doherty, Kouneski, & Erickson, 1998), as seen in older studies in particular. However, recent results also suggested that the well-being of fathers, and fathering quality, might be more dependent on maternal stress and characteristics than vice versa (Field et al., 2006; van

Eldik et al., 2019). For example, men's parenting behavior was more affected by the quality of the coparenting support perovided by their partners (Pedro et al., 2012), posttraumatic symptoms in mothers had a detrimental effect on paternal parenting stress (Fredman et al., 2017), and contagion of prenatal depressive symptoms was more prominent from women to men than vice versa (Field et al., 2006). Fredman et al. (2017) hypothesized that it might be especially stressful for fathers to compensate for any deficit in emotional availability and capacity to parent in the mother.

Some research on day to day emotional transmission in family systems has been contrary to the *fathering vulnerability hypothesis*. Women were more susceptible to men's affect than vice versa (for a review, see Larson & Almeida, 1999). For example, stress experienced by men outside the dyad had a greater effect on women's daily hassles in family life, than vice versa (Bodenmann, Ledermann, & Bradbury, 2007). Larson and Pleck (cited by Larson & Almeida, 1999) attributed this to a reproduction of traditional role models in families in which the man exercises power over the woman. Roberts and Krokoff (1990) propose an alternative view of this process: women might just be more responsive and emotionally available to the husband's signals. Gerstein et al. (2009) reported that more pleasure in father-child-interactions (observer-rated) with a child with an intellectual disability at baseline buffered the increase of stress associated with daily parenting hassles in mothers over time, but not vice versa. Thus, how the father copes with the disability of the child might be especially important to women in their experience of daily parenting hassles. Additionally, destructive conflict behavior by the male partner had a negative effect on the female's ability to provide supportive parenting (Gao, Du, Davies, & Cummings, 2018). Gao et al. (2018) hypothesized that being confronted with negative emotions and destructive conflict behavior in parenthood may impact on critical aspects of the mother's life, such as the capacity to be a good parent. This might increase women's vulnerability to men's behavior and mental well-being during the transition to parenthood, as suggested by Le, McDaniel, Leavitt, and Feinberg (2016) in reference to *identity theory* (Katz-Wise, Priess, & Hyde, 2010; Simon, 1992). That theory proposes that motherhood is more critical to women's identity, and more culturally salient to women than fatherhood is in terms of men's identity, such that it might be more important to mothers how the father copes with the new role, in emotional and practical terms, than vice versa. Furthermore, women tend to spend more time, and show greater involvement, with the child (S. N. Lang et al., 2014; Locke & Newcomb, 2004), and might thus be more susceptible to the context in which parenting takes place.

Although motherhood may be more normatively and biologically determined than fatherhood, the relationship with the newborn infant is new to both the mother and father. Barnett et al. (2008) found that mothers and fathers were equally affected by negative and intrusive parenting behaviors of the other partner, as well as by sensitive parenting behaviors if marital conflict was low and emotional support high. Ponnet, Mortelmans, et al. (2013), and Ponnet, Wouters, et al. (2013), reported partner effects of equal strength for mothers and fathers in a study using the Actor-Partner-Interdependence Model to predict child-rated parenting styles by parenting stress and marital relationship/depressive symptoms. Nelson et al. (2009) reported partner effects in both directions with respect to the effect of stress in the parent (marital stress, job dissatisfaction, stress regarding the household and depressive symptoms) on both partners' supportive or non-supportive parenting behaviors, which still differed between mothers and fathers in the domain of stress. Le et al. (2017)'s results supported the equality of partner effects for parent-related stress, but found a dependency of fathers' perceptions of the child's difficulty on mothers' negative affect only. Stevenson, Volling, and Gonzalez (2019) showed that both fathers and mothers were receptive to interparental conflict in terms of their perceptions of parental efficacy.

To summarize, results regarding the direction of dyadic processes between partners during the transition to parenthood are mixed, and the specific nature and strength of dyadic effects must be further studied to determine the circumstances under which interdependencies are high/low, and in which situations mothers and fathers are especially vulnerable (Cummings et al., 2010). Given the research on differences in vulnerability to the other partners' emotions and behavior, dyadic interdependence between NCEs, perinatal depressive symptoms and parenting stress may vary as a function of parent gender. This research will extend findings pertaining to these research questions.

# 3. Research questions and hypotheses

The current literature on the impact of NCEs on parenting, and parenting stress specifically, has several limitations: 1) Data on parents was mostly analyzed in separate models, thus neglecting the interdependence of mothers and fathers and so likely overestimating certain individual effects and neglecting dyadic effects. 2) To date, only one study examined the specific effect of NCE on parenting stress. 3) There is still a grand lack of literature on expectant fathers exposed to a history of NCEs. 4) Studies on predictors of parenting stress seldomly differentiated between the two dimensions of parenting stress: child-related and parent-related stress. 4) Results on non-clinical community samples are rare.

In light of the above limitations and gaps in the literature, this research addresses the following research questions and hypotheses:

**Research Question 1:** Do retrospectively reported NCEs, both in mothers and fathers, predict their perceived parenting stress at 1 year postnatally?

**Hypothesis 1:** I hypothesize that the more severe the reported NCEs, the higher the perceived parenting stress in both mothers and fathers.

It can be expected that the majority of the sample – as a middle class, well-educated, non-clinical sample – will show normative parenting behavior. Nevertheless, NCEs will likely still be prevalent– albeit not of the extreme kind, such as sexual abuse and severe emotional or physical abuse – and might impact the individual's experience of parenting in terms of perceived parenting stress, as found by Shenk et al. (2017) for mothers and Skjothaug et al. (2018) for fathers. I expect to both replicate existing results and shed more light on the specific impact on NCEs on the two distinct dimensions of parenting stress (parent- and child-related).

**Research Question 2:** Does perinatal well-being – in the form of pre- or/and postnatal depressive symptomatology – mediate the association between NCEs and parenting stress?

**Hypothesis 2:** I hypothesize that depressive symptomatology mediates the association between NCEs and parenting stress.

As outlined above, research has shown that pre- and postnatal depressive symptomatology is highly predictive of parenting stress in mothers (Cornish et al., 2006; Le et al., 2017; Leigh & Milgrom, 2008; Saisto et al., 2008; Vismara et al., 2016) and fathers (Le et al., 2017; Saisto et al., 2008; Skjothaug et al., 2018; Vismara et al., 2016). Recent research further documented a specific relationship between reported childhood experiences and perinatal mood (Fredriksen et al., 2017; Teeters et al., 2016; Unternaehrer et al., 2019; Wajid et al., 2020), validating the assumption that perinatal depressive symptoms play a mediating role. Studies by Ammerman et al. (2013), Unternaehrer et al. (2019) and Shenk et al. (2017) documented the mediating effect of depression in mothers; Skjothaug et al. (2018) performed the only study on this for fathers.

Thomason et al. (2014) stressed the importance of considering the multidimensionality of the construct of parenting stress. In studies differentiating between child- and parent-related parenting stress, more consistent effects were found for parent-related parenting stress (Cornish et al., 2006; Galbally et al., 2019; Le et al., 2017). The emotional well-being of parents might have a stronger effect on perceptions of parent-related aspects of parenting stress, such as a feeling of competence, role restriction and social isolation, than on child-related aspects such as ratings of the child's demandingness. Therefore, I expect a stronger mediating effect for parent-related parenting stress.

In addition to the replication of existing mediational studies, this examination will shed more light on the previously neglected topics of diverging associations among the different domains of parenting stress and pre- and postnatal depressive symptoms in fathers with a history of NCEs.

**Research Question 3:** Do NCEs in one partner influence the other partner's level of parenting stress?

**Hypothesis 3:** I hypothesize that more severe NCEs in one partner predict a greater parent- and child-related parenting stress in the other partner.

This is one of the first studies to specifically test this hypothesis (one expection: Bai & Han, 2016). Research on the effect of childhood adversities on personal (Bai & Han, 2016; Godbout et al., 2014; Lambert et al., 2012) and interpersonal (Godbout et al., 2014; Godbout et al., 2009;

Miano et al., 2018; Riggs et al., 2011; Wheeler et al., 2020) functioning, as well as parenting (e.g. Barnett et al., 2008; Belsky & Volling, 1987), justify this hypothesis.

**Research Question 4:** Are partner effects mediated by pre- and postnatal depressive symptomatology?

**Hypothesis 4:** I hypothesize that pre- and postnatal depressive symptomatology of both partners mediate the impact on one partner's NCE on the other partner's parenting stress.

The impact of NCE on depressive symptomatology, both generally (Anda et al., 2006; Dunn et al., 2017; O'Neal et al., 2016) and perinatally (Choi et al., 2019; Fredriksen et al., 2017; Liu et al., 2019; Skjothaug et al., 2014), as well as the impact of perinatal depressive symptoms on parenting stress (Le et al., 2017; Leigh & Milgrom, 2008; Saisto et al., 2008; Vismara et al., 2016), have been studied. Studies on partner effects of NCEs on depression and depressive symptoms are still rare (one exeption: Godbout et al., 2014), and this analysis will shed further light on the interpersonal pathways of the impact of NCE on the transition to parenthood in both partners.

Additionally, I explored whether direct and indirect partner effects differ between mothers and fathers. Results on gender differences in partner effects are mixed, and potential specific vulnerabilities of fathers and mothers have been discussed. Thus, no specific hypothesis can be formulated on gender differences in partner effects. Nevertheless, my examination should shed more light on this controversial topic. The analytic approach of APIMeM is applied to this end.

The (APIMeM; Kenny et al., 2006; Ledermann et al., 2011) represents the state of the art for studying intra-individual and dyadic relations and mediating effects in one model. Figure 3 shows the proposed APIMeM.

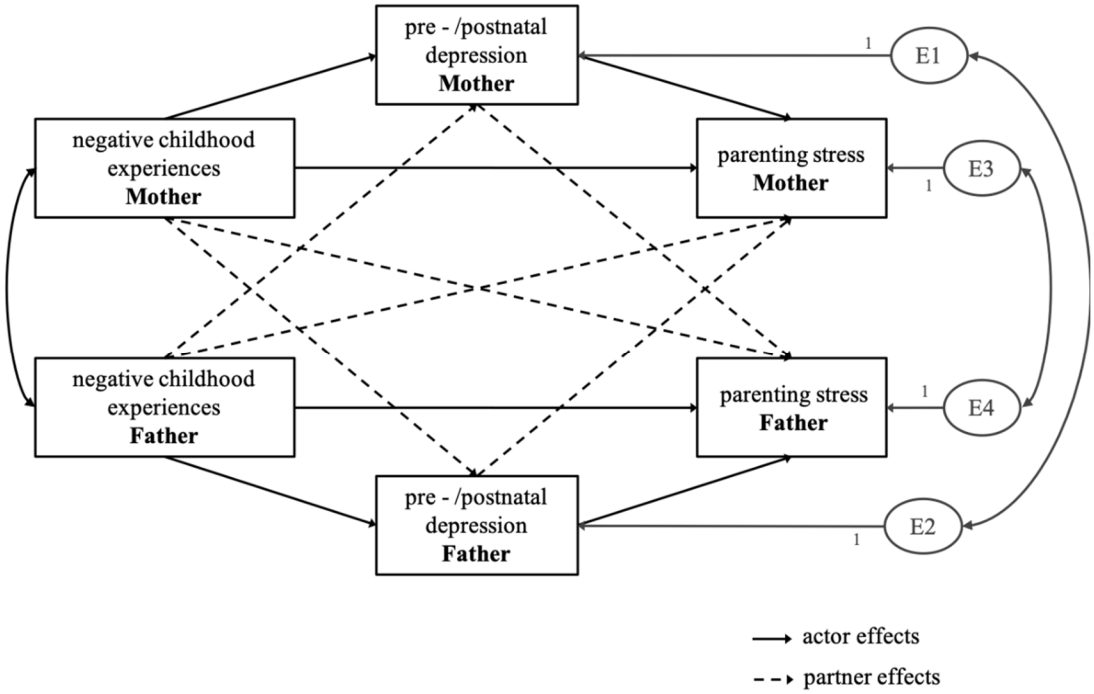


*Figure 3.* Actor-Partner Interdependence Mediation Model (APIMeM) for negative childhood experiences (T1: prenatal) and parenting stress (T3: postnatal) with depression as mediator (T1: prenatal / T2: postnatal) in mothers and fathers. Actor and partner effects (dashed paths), as well as error terms (E1-E4) and their covariances.

# 4. Method

## 4.1 Sample description

I report on a subsample of a study conducted at the Dr. von Hauner Children's Hospital at the Clinic of the LMU Munich[6], which aimed to compare the efficacy of an attachment-based prevention program with that of a course on birth preparation and baby care.

A total of 167 mothers and 138 fathers were originally enrolled in the study and randomly assigned to the intervention and control groups. Three couples expecting twins were excluded, as parents of twins tend to experience more parenting stress compared to parents of singletons (e.g. Glazebrook, Sheard, Cox, Oates, & Ndukwe, 2004). All cases in which men and women were in a solid relationship, and in which both partners filled out the assessment on potentially traumatic experiences in childhood, were included in the analysis (112 couples) and were the basis for imputation of missing data (see *Analytic Strategy* for information on imputation methodology). Of these 112 couples, 97.3% of mothers and 97.3% of fathers provided information on prenatal (T1) depressive symptomatology, while 63.4% of mothers and 66.1% of fathers provided information on postnatal (T2) depressive symptomatology. Information on parenting stress (T3) was reported by 84.8% of mothers and 73.2% of fathers. In total, 66 (58.9%) couples were allocated to intervention group and 46 to control group.

The age of the mothers at the first assessment was 33.58 years (range: 19-44 years, *SD* = 5.10). The fathers had an average age of 35.85 years (range: 19-51 years, *SD* = 6.33). In total, 87.5% of the sample were expecting their first child. Information was missing on one couple. Variables of interest did not differ significantly in terms of the variance or mean values between first-time parents and non-first-time parents. Over the course of the study, 58 (51.8%) boys and 54 (48.2%) girls were born; 92.9% of the children were born maturely between week 38 and 42 of pregnancy; thus, eight infants (7.1 %) were born prematurely (between week 30 and 37 of pregnancy).

The socioeconomic background of the couples and new families were as follows: 90.2% of mothers and 92% of fathers had a German nationality. Moreover, 74.1% of mothers and 67.0%

[6] The study protocol was carefully checked and then approved by the local ethical review committee at the University Hospital Munich (Klinikum der Universität München). Informed consent was obtained from all participants.

of fathers had a university degree, 13.4% of mothers and 16.1% of fathers had higher secondary education, 9.8% of mothers and 11.6% of fathers had middle secondary education, and 2 (1.8%) mothers and 6 (5.4%) fathers had lower or no secondary education. Information on education was missing for one mother. All mother-father-dyads were in a committed relationship (70.5% married).

## 4.2 Recruitment and study protocol

Couples were recruited during pregnancy via flyers, which were distributed in birth clinics, at gynecologists' offices and in social care institutions. All interested couples were included in the study unless they suffered from an acute psychiatric disorder. Assessments took place at the Paediatric Psychosomatic Clinic in Munich, and included the questionnaires used for this analysis (among others), along with interviews and observations to address the other research questions. Partners were independently assessed at each time point of the study.

Of the five measurement points, three were included in this analysis. The first measurements (Time 1: T1) were conducted prenatally. For mothers in this subsample, this was approximately at approximately week 34 of gestation (*SD* = 5.10), while for fathers it was at week 36 (*SD* = 6.33). The second assessment (T2) took place after 5.91 months *(SD* = 4.34) on average for mothers and 7.05 months (*SD* = 5.51) on average for fathers. The third assessment (T3) was scheduled for approximately 15 months postnatally for mothers (*SD*= 3.00) and 17 months postnatally for fathers (*SD* = 3.21). NCEs were measured at T1, depression at T1 and T2, and parenting stress at T3.

## 4.3 Measures

### Outcome measure

**Parenting stress.** Parenting stress was measured with the PSI (101-item version) of Abidin (1995), which consists of two dimensions. The *Parent Domain (PD)* assesses the strain experienced by parents in the areas of *Sense of Competence, Role Restriction, Social Isolation, Attachment, Depression, Parental Health,* and *Relationship with Spouse*, and thus captures how parents perceive themselves (and the contact with their partner and child) in their role as parent. The

*Child Domain (CD)* includes the *Distractibility/Hyperactivity*, *Adaptability*, *Parent Reinforcement*, *Demandingness*, *Mood* and *Acceptability* scales, and thus taps into the parents' perception of the child's temperament and behavior in parent-child interactions (Abidin, 1995; Olafsen et al., 2018; Skjothaug et al., 2018). Responses to the items are measured using a five-point Likert scale ranging from "strongly agree" to "strongly disagree". Missing data on up to three items were accepted per domain, and for up to five items over the entire questionnaire. Missing data were replaced by the subscale mean.

During the conceptualization of this study, the study team were not aware of any German translation of the PSI, and therefore translated it themselves with the help of a native speaker. Regarding internal consistency, the Cronbach's α was .92 in mothers and .87 in fathers on the PD sum score, and was .89 for mothers and α = .87 for fathers on the CD sum score. Previous research has demonstrated the validity of the PSI, where distinct sources of stress are mapped by the subscales (Abidin, 1995); also, good convergent and predictive validity were demonstrated in several studies (see list in Abidin, 1995). The validity of the two domains and the total scale was also tested for in terms of assessing fathers' parenting stress (McKelvey et al., 2009). The Parenting Stress Index – Short Form has been used more widely in the recent literature on parenting stress. Good comparability with the results obtained using the Short Form can be expected, as the two forms were found to strongly correlate (Abidin, 1995). Furthermore, to reduce shared variance with the measure of depressive symptoms (Beck Depression Inventory; BDI, A. T. Beck, 1961), a modified version of the Parent Domain (PD-DP) was calculated by excluding the *Depression* subscale from the sum score. This procedure was also used by Ammerman et al. (2013).

**Predictive measures**

**Assessment of potentially traumatic experiences in childhood.** The TAQ, developed by van der Kolk (1997), was applied in the German version published by Hofmann, Fischer, and Koehn (1999). It consists of 42 items concerning positive, and a broad range of potentially traumatic/negative, life experiences in the following domains: 1) competence, 2) safety, 3) neglect, 4) separations, 5) family secrets, 6) emotional abuse, 7) physical trauma, 8) sexual trauma, 9) witnessing trauma, 10) other traumas, and 11) exposure to drugs and alcohol. Domains 3) to 11) assess potentially traumatic experiences on a 4-point frequency/intensity scale (0, 'Never or not at all'; 1,

'Rarely or a little bit'; 2, 'Occasionally or Moderately'; 3, 'Often or Very Much'). Participants responded to each item in four different developmental periods: birth to 6 years, 7 to 12 years, 13 to 18 years, and adulthood. To focus specifically on NCEs and increase comparability with research on ACEs (Adverse Childhood Experiences; Anda et al., 2006; Felitti et al., 1998), which concentrate on events before 18 years, I summed the results of the age groups between birth to 18 years on domains 3) to 10). The domains of resilience 1) "competence" and 2) "safety" were thus excluded from the analysis. The 'Never or not at all' (0) and 'Rarely or a little bit' (a) ratings were both classified as no experience of a potentially traumatic event in this domain and age group. Missing items were scored as '0'. The mean of all items was computed for each domain and age group, and these mean scores were then summed over all domains and age groups except adulthood. Therefore, the overall score is composed of both the intensity/frequency of experiences in each domain and the number of domains affected. This score is used in the statistical analyses. To report the frequency of NCEs scores on each scale and developmental period were dichotomized, with scores greater or equal to 2 indicating the occurrence of this type of negative experience in childhood.

The Cronbach's α of the sum score was .92 in mothers to-be and α = .94 in fathers to-be. An assessment of the psychometric characteristics of the questionnaire by van der Kolk (1997) showed that the type and developmental period of trauma were associated with complex PTSD and PTSD. Rosenkranz et al. (2014) also found an association with symptoms of complex PTSD in a sample of substance abusing men and women. Other studies found significant differences in the frequency and intensity of negative experiences between psychiatric patients and healthy controls (Merza et al., 2015; Saleptsi et al., 2004).

**Depression.** Depressive symptoms were assessed using the German version of the 21-item BDI (A. T. Beck, 1961; Hautzinger, Bailer, Worall, & Keller, 1995) at time point T1 and T2. The BDI had a rating of good to excellent diagnostic validity in all pregnancy and postpartum periods (preconception, all trimesters; postpartum, until 26 weeks postpartum) in an analysis by Ji et al. (2011). Missing questionnaire data were replaced by the mode of all other items (for up to three missing items), as recommended by Prof. M. Hautzinger, the author of the German version, in a personal communication (date: June 05th, 2013).

For mothers, the Cronbach's α was .74, while for fathers it was α = .78. Tests of differences between the two groups (control group, *n* = 46; intervention group, *n* = 66) on all dependent and independent variables revealed a significant difference only for the BDI in mothers (*t* = -2.83, *df* = 110, *p* = .006), with mothers in the intervention group showing higher levels of postnatal depressive symptoms. I controlled for group by including it as a cluster variable in the analysis (see section *4.4 Analytic Strategy*).

**Covariates**

**Child temperament.** Parent-rated child-temperament was assessed at T3 using the German translation of the 13-month version of the Infant Characteristics Questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979). The questionnaire consists of 32 items pertaining to the child's adaptability, inhibition, unpredictability, and unsociability, rated on a 7-point scale ranging from 1 (more optimal) to 7 (less optimal). The scale is completed separately by both mothers and fathers. The score on the most reliable subscale, "Fussy/Difficult" (Bates et al., 1979), was included as a covariate in the analysis; it covers crying, fussiness, difficulty and amenability to being soothed, and consists of six items. Mother's and father's mental health and parent-related parenting stress were found to predict the perception that the infant is fussy and difficult (Atella, DiPietro, Smith, & St James-Roberts, 2003; Mäntymaa, Puura, Luoma, Salmelin, & Tamminen, 2006).

**Birth weight.** Child birth weight was reported by parents in *grams*. Four families did not provide information on child birth weight. A low birth weight can be an indicator of premature birth and/or a low birth weight according to the gestational age of the child. Prematurity and low birth weight were shown to relate to NCEs in women (Cederbaum, Putnam-Hornstein, King, Gilbert, & Needell, 2013; Christiaens, Hegadoren, & Olson, 2015) and to a greater extent of parenting stress (Howe, Sheu, Wang, & Hsu, 2014; Schappin, Wijnroks, Venema, & Jongmans, 2013).

## 4.4 Analytic strategy

Fathers and mothers are nested in a dyad, and therefore share variance and are dependent; the data should be analyzed accordingly (Kenny et al., 2006). I therefore decided to use the commonly employed APIMeM, introduced by Ledermann et al. (2011), for this analysis. All variables

were allowed to vary between and within dyads (*mixed variables*). Mothers and fathers were treated as distinct entities.

Estimation of each model was done in MPlus 8 (Muthén & Muthén, 1998-2017) using a structural equation framework, based on 50 imputed[7] datasets and a maximum likelihood estimator with robust standard errors (MLR), which is robust to violations of multivariate normal distribution and non-independence of observations (Muthén & Muthén, 1998–2017). A cluster analysis based on the group membership (control or intervention group) of the participants (type = COMPLEX) was also conducted.

Multiple imputation was considered the best way to deal with missing data at the scale level while retaining the maximum analytical power, where simulation studies suggested that imputation of missing data leads to more accurate, less biased results than simply omitting whole cases (Lüdtke, Robitzsch, Trautwein, & Köller, 2007; Newman, 2009). Little's MCAR test (performed in SPSS 24; SPSS Inc., Chicago, IL, USA) showed that the patterns of missing BDI and PSI data were completely at random ($X^2$ = 101.23, *df* = 100, *p* = .447 n.s.), such that one important requirement for multiple imputation was met. Missing data were imputed in MPlus 8 using MLR; data values were restricted to the range of values in the scales used. To improve the estimation of missing values, auxiliary variables – predicting an absence of values and/or the value of variables with missing data – were included in the multiple imputation procedure, as suggested by Spratt et al. (2010). More detailed information on the imputation routine can be found in the appendix.

Hypotheses 1 and 2 were first tested in separate models for mothers and fathers, and then cross-validated with the results of the APIMs (no mediators) or APIMeMs to control for the variance shared by the mothers' and fathers' data.

The APIMeMs consisted of two predictor variables (TAQ: $X_{mother}$ [$X_{mo}$] and $X_{father}$ [$X_{mo}$]), two mediator variables (depressive symptoms: $M_{mother}$ [$M_{mo}$] and $M_{father}$ [$M_{fa}$]; Models 1 and 3, prenatal; Models 2 and 4, postnatal) and two outcome variables (T3 parenting stress: $Y_{mother}$ [$Y_{mo}$] and $Y_{father}$ [$Y_{fa}$]; Models 1 and 2, PD; Models 3 and 4, CD). All models included six actor effects and six partner effects (as illustrated in Figure 1). *Actor effects* refer to those between the variables of a

[7] Spratt et al. (2010) suggested using at least 25 imputations as a basis for estimation.

single individual, whereas *partner effects* refer to the relationship between one individual's independent variable and another's dependent variable (Kenny et al., 2006). In this case, prediction of maternal parenting stress by maternal depressive symptoms and/or NCE can be classified as actor effects. In contrast, prediction of paternal parenting stress by maternal depressive symptoms and/or NCE refers to partner effects. All effects were tested in saturated models – therefore, interpreting actor and partner effects, as well as indirect effects was the main focus. To test the mediation hypothesis, indirect effects and their 95% confidence intervals (CIs) were estimated for each model using the *Model constraint* function and *new* command. CIs are reported based on the distribution of estimated indirect effects within the 50 data sets. All indirect effects were expected to be positive according to the hypothesis that the association between NCEs and parenting stress is mediated by depressive symptomatology.

I also tested a serial mediation APIMeM of pre- and postnatal depressive symptomatology using the same procedure.

As all models were saturated, to evaluate the fit of the final APIMeM, the following procedure was used: direct actor or direct partner effects were fixed to zero if small (approximately $\beta < .10$), to free up one or more parameter; the fit to the constrained model was then evaluated. As well as the global model test ($\chi^2$), each model was evaluated using the criteria and cut-offs suggested by L. Hu and Bentler (1999) and Beauducel and Wittmann (2005): model fit was classified as good if the root mean square error of approximation (RMSEA) $\leq .08$, the comparative fit index (CFI) $\geq .95$, and the standardized root mean square residual (SRMR) $\leq .08$.

# 5. Results

## 5.1 Descriptive and bivariate analysis

Table 1 shows the prevalence of retrospectively reported NCEs. In mothers the rate of NCEs ranged between 8% (*sexual abuse*) and 56.3% (*separations* and *neglect*). In fathers, the rate was between 0% (*sexual abuse*) and 56.3% (*separations*). Prevalence was significantly higher in women in many domains, especially during early childhood. No gender differences were found in the domains of *separations*, *other trauma* (e.g. severe accident) or *alcohol and drug abuse*. The mean number of subscales with NCEs was 3.66 in mothers and 3.18 in fathers (no significant on t-test or Wilcoxon's test; $t$= 1.74, $p$= .08; $Z$= -1.71, $p$= .09). Variance differed significantly ($F$= 1.51, $p$= .030).

In total, 37.5% of mothers and 25% of fathers reported NCEs in five or more domains. The distribution was significantly dependent on parent gender ($X^2$= 4.11; $p$= .043). In 50.9% of couples, both partners reported NCEs in fewer than five domains. In 13.4% of the couples, both partners reported NCEs in more than four domains. In 35.7% of the couples, one partner suffered NCEs in more than four domains.

Descriptive statistics for the TAQ, BDI and PSI scores are provided in Table 2. Mothers showed significantly higher mean scores, with small to medium effect sizes, as well as significantly greater variance on the TAQ and BDI (pre- and postnatally), and on the PD of the PSI. The differences in means and variances on the variables of interest illustrate the distinct nature of the dyad members (Kenny et al., 2006). Prenatally, 25 mothers (22.3%) showed mild to moderate depressive symptoms (scores between 11 and 17) and 4 mothers (3.6%) exhibited a sum score higher than 17, which is in the clinically relevant range according to the cut-offs suggested by Hautzinger et al. (1995) for the German population. Only eight fathers (7.1%) reported mild to moderate depressive symptoms.

Table 1

*Prevalence and distribution of negative childhood experiences (NCEs) in mothers and fathers*

| | 0 – 6 years | | | | 7 – 12 years | | | | 13 – 18 years | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NCE | M | F | M vs. F | | M | F | M vs. F | | M | F | M vs. F | |
| (TAQ subscales) | % | % | $X^2$ | *p* | % | % | $X^2$ | *p* | % | % | $X^2$ | *p* |
| Neglect | 26.8 | 15.2 | 4.55 | .03 | 39.3 | 24.1 | 5.96 | .02 | 56.3 | 44.6 | 3.02 | .08 |
| Separations | 34.8 | 31.3 | .32; | .57 | 52.7 | 53.6 | .02 | .89 | 56.3 | 56.3 | 0 | 1 |
| Family secrets | 27.7 | 17.0 | 3.71 | .05 | 32.1 | 27.7 | .53 | .47 | 33.0 | 26.8 | 1.04 | .31 |
| Emotional abuse | 33.0 | 17.9 | 6.80 | .009 | 44.6 | 32.1 | 3.70 | .05 | 51.8 | 41.1 | 2.59 | .11 |
| Physical abuse | 17.9 | 4.5 | 10.13 | .001 | 18.8 | 14.3 | .81 | .37 | 16.1 | 10.7 | 1.39 | .24 |
| Sexual abuse | 8.0 | 0.9 | 6.70 | .01 | 3.6 | 0.9 | 1.84 | .18 | 8.0 | 0 | 9.38 | .002 |
| Witnessing | 22.3 | 6.3 | 11.81 | .001 | 30.4 | 13.4 | 9.43 | .002 | 30.4 | 15.2 | 7.34 | .007 |
| Other trauma | 24.1 | 26.8 | .21 | .65 | 23.2 | 28.6 | .84 | .36 | 29.5 | 22.3 | 1.49 | .22 |
| Alcohol & drugs | 14.3 | 8.9 | 1.57 | .21 | 19.6 | 17.0 | .27 | .60 | 23.2 | 25.9 | .22 | .64 |

| number of NCEs | *M* (*SD*) | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fathers | 3.66 (2.52) | % | 4.5 | 19.6 | 20.5 | 17.0 | 13.4 | 8.0 | 8.9 | 5.4 | 2.7 | 0 |
| mothers | 3.18 (2.05) | % | 8.0 | 18.8 | 12.5 | 9.8 | 13.4 | 14.3 | 7.1 | 7.1 | 5.6 | 3.6 |

*Note.* *N* = 112 couples; M = mother; F = father; cut-off for occurrence of negative event ≥ 2; level of significance not corrected for possible alpha-error inflation; NCE = negative childhood experience; NCEs were measured with the Trauma Antecedents Questionnaire (TAQ).

For the postnatal measurement time, 11 mothers (9.8%) showed mild to moderate depressive symptoms and 1 (0.9%) displayed symptoms in the clinical range. Five (4.5%) fathers reported mild to moderate depressive symptomatology postnatally, and none reported symptoms in the clinical range. Significantly more mothers showed an elevated level of depressive symptomatology prenatally than postnatally ($X^2$= 7.37, *p*= .012). The percentage of fathers showing an elevated level of symptoms did not differ between assessments ($X^2$= 1.30, *p*= .314). In total, 30.3% of mothers and 10.7% of fathers reported an elevated level of depressive symptoms at least once during the perinatal period. As the great majority of mothers (69.7%) and fathers (89.3%) showed subthreshold depressive symptoms (BDI score < 11) both pre- and postnatally, I looked at the distribution of scores below this threshold. In total, 15.2% of mother reported scores lower than 5, and 54.5% had symptom scores between 5 and 10. In total, 50.9% of fathers had scores lower 5 and 38.4% had scores between 5 and 10.

Table 2

*Descriptive data for depressive symptoms and parenting stress in mothers and fathers, and results of the analysis of differences in mean values and variance*

| | Mothers | | | | Fathers | | | | | | | var.test |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable | *M* | *SD* | min | max | *M* | *SD* | min | max | *T* | *p* | *d* | *p* |
| TAQ | 19.80 | 17.15 | 0 | 73.17 | 14.43 | 11.31 | 0 | 46.08 | 3.00 | .003* | .28 | <.001* |
| BDI pre | 7.67 | 5.11 | 0 | 27 | 4.26 | 3.66 | 0 | 17 | 6.09 | <.001* | .58 | .001* |
| BDI post | 5.64 | 4.23 | 0 | 22 | 3.24 | 3.32 | 0 | 16 | 5.35 | <.001* | .51 | .011* |
| PSI PD | 109.65 | 25.88 | 55 | 204 | 101.79 | 18.42 | 54 | 156 | 2.93 | .004* | .28 | <.001* |
| PSI CD | 86.42 | 18.53 | 47 | 142 | 85.87 | 16.53 | 54 | 138 | 0.34 | .734 | .03 | .230 |
| PSI PD-DP | 94.33 | 20.63 | 50 | 170 | 89.31 | 16.36 | 45 | 136 | 2.27 | .025* | .21 | .015* |

*Note.* *N*= 112 couples; paired sample t-test, level of significance corrected according to Bonferroni-Holm; * denotes significance; TAQ = Trauma Antecedents Questionnaire; BDI = Beck Depression Inventory; pre = prenatal; post = postnatal; PSI PD = Parenting Stress Index Parent Domain; PSI CD = Parenting Stress Index Child Domain; PSI PD-DP = modified Parent Domain with Depression subscale excluded; *d* = Cohen's *d*. Cohen's *d* < 0.5 is a small effect; medium effects range from 0.5 to 0.8 and *d* > .08 is defined as a large effect; var.test = F-Test of difference/equality in variance.

In 67.9% of couples at T1 and 84.8% of couples at T2, both partners reported a subclinical level of depressive symptomatology, whereas in only 0.9% (T1), and 0% (T2), of the couples did both partners report an elevated level of depressive symptoms. Mothers were more likely to show an elevated level of depressive symptoms than fathers (25.0% vs. 6.3% in T1, and 10.7% vs. 4.5% in T2).

Depressive symptom severity typically declined significantly between the prenatal and postnatal assessments, in both mothers ($t_{paired}$= 4.18, p< .001) and fathers ($t_{paired}$= 2.91, p= .004). The extent of depressive symptoms was stable or decreased between the prenatal and postnatal assessments in 69.6% of mothers and 68.8% of fathers.

To evaluate the clinical relevance of the parenting stress reported by mothers and fathers, I looked at the Total Score of the PSI (sum score of PD and CD). Abidin (1995) suggested a cut-off of 245 to define clinically relevant levels of parenting stress. A score of 245 and above corresponded to the 85$^{th}$ percentile in Abidin (1995)'s validation sample. Among mothers, 9.8% reported a score equal to or higher than 245. Only three fathers (2.7%) had a score above this cut-off. The difference in distribution between mothers and fathers was not significant ($X^2$= 1.92, Fisher's exact test *p*= .269).

Table 3

*Zero-order correlations (Pearson) between NCEs, postnatal depressive symptomatology and parenting stress in mothers and fathers*

| | Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TAQ M | 1 | | | | | | | | | | | |
| 2 | TAQ F | .161 | 1 | | | | | | | | | | |
| 3 | BDI pre M | .414** | .096 | 1 | | | | | | | | | |
| 4 | BDI pre F | .229* | .376** | .118 | 1 | | | | | | | | |
| 5 | BDI post M | .141 | .158 | .409** | -.014 | 1 | | | | | | | |
| 6 | BDI post F | .335** | .298** | .229* | .442** | .227* | 1 | | | | | | |
| 7 | PSI PD M | .213* | .059 | .415** | .063 | .400** | .313** | 1 | | | | | |
| 8 | PSI CD M | .178 | .090 | .236* | .034 | .124 | .192* | .682** | 1 | | | | |
| 9 | PSI PD F | .258** | .263** | .238* | .336** | .180 | .433** | .214* | .188* | 1 | | | |
| 10 | PSI CD F | .260** | .041 | .415** | .069 | .203* | .253** | .274** | .525** | .504** | 1 | | |
| 11 | PSI PD-DP M | .200* | .016 | .374** | .047 | .384** | .315** | .989** | .696** | .217* | .293** | 1 | |
| 12 | PSI PD-DP F | .269** | .262** | .248** | .323** | .197* | .463** | .220* | .169 | .988** | .482** | .219* | 1 |

*Note*. $N$= 112, * $p$< .05, ** $p$< .01; M = mother; F= father; TAQ = Trauma Antecedents Questionnaire; BDI = Beck Depression Inventory; pre = prenatal; post = postnatal; PSI PD = Parenting Stress Index Parent Domain; PSI CD = Parenting Stress Index Child Domain; PSI PD-DP = modified Parent Domain with Depression subscale excluded.

Zero-order correlations between variables of interest are reported in Table 3.

At the intra-individual level, NCEs showed significant correlations with mothers' prenatal, but not postnatal, depressive symptoms, as well as with parent-related, but not child-related, parenting stress. In fathers, NCEs were significantly correlated with both depressive symptoms and parent-related, but not child-related, parenting stress. The PD and CD of the PSI were strongly intercorrelated in mothers ($r$=.68; $p$< .01) and fathers ($r$= .50; $p$< .01).

At the dyadic level, as expected, mothers' and fathers' NCEs were not significantly correlated, and nor was prenatal depressive symptomatology. In contrast, postnatal depressive symptomatology, as well as parenting stress in both domains of mothers and fathers, were significantly associated (BDI: $r$=.23, $p$= .016; PSI PD: $r$=.21, $p$= .024; PSI CD: $r$= .53, $p$< .001). Therefore, the strength of the associations between the data of the two partners increased postnatally relative to the prenatal timepoint.

Strikingly, mothers' NCEs were significantly correlated with BDI (pre- and postnatally) and the PSI PD and CD of fathers (range: $r$= .23 to $r$= .34), whereas fathers' NCEs did not correlate

significantly with the mother's depressive symptoms and parenting stress; the coefficient never exceeded *r*= .16. Paternal postnatal depressive symptoms (*r*= .229; *p*< .05) and parenting stress (PD: *r*= .238; *p*< .05; CD: *r*= .415; *p*< .01) were significantly correlated with maternal prenatal symptoms, whereas paternal prenatal depressive symptoms and parenting stress in mothers were not significantly related. Paternal postnatal symptoms correlated significantly with maternal parenting stress (PD: *r*= .313; *p*< .01; CD: *r*= .192; *p*< .05), whereas maternal postnatal symptoms related significantly to paternal child-related, but not to paternal parent-related stress (PD: *r*= .180; *p*> .05; CD: *r*= .203; *p*< .05).

Table 4

*Zero-order correlations (Pearson) between NCEs, postnatal depressive symptomatology and parenting stress in mothers and fathers, at the intra-individual level*

| NCE | Mothers | | | | Fathers | | | |
|---|---|---|---|---|---|---|---|---|
| (TAQ subscales) | PSI PD | PSI CD | BDI pre | BDI post | PSI PD | PSI CD | BDI pre | BDI post |
| Neglect | .234* | .222* | .163 | .054 | .134 | -.137 | .363** | .207* |
| Separations | .009 | .044 | .167 | .069 | .057 | .087 | .106 | .055 |
| Family secrets | .108 | .131 | .287** | .008 | .221* | .039 | .311** | .301** |
| Emotional abuse | .194* | .210* | .324** | .155 | .287** | .155 | .177 | .259** |
| Physical abuse | .138 | .072 | .288** | .247** | .160 | .040 | .206* | .091 |
| Sexual abuse | .085 | .030 | .379** | .032 | - .056 | .024 | -.085 | -.064 |
| Witnessing | .189* | .135 | .250** | .179 | .049 | .025 | .105 | .115 |
| Other trauma | .150 | .029 | .317** | .071 | .225* | .063 | .285** | .140 |
| Alcohol & drugs | .145 | .130 | .381** | .018 | .093 | -.104 | .212* | .203* |

*Note. N= 112,* * *p*< .05, ** *p*< .01; NCE = NCEs; NCEs were measured with the Trauma Antecedents Questionnaire (TAQ); BDI = Beck Depression Inventory; pre = prenatal; post = postnatal; PSI PD= Parenting Stress Index Parent Domain; PSI CD = Parenting Stress Index Child Domain.

Intra-individual correlations between the different forms of NCEs and other study variables are shown in Table 4. Emotional abuse showed significant relationships with parenting stress in mothers and fathers, whereas the experience of neglect related to parenting stress only in mothers. For mothers, witnessing domestic violence was related to parent-related stress and prenatal

depressive mood, whereas in fathers this form of NCE did not relate to parenting stress or symptoms of depression. “Other trauma” in childhood correlated with a higher level of parent-related stress in fathers, but not mothers. ”Family secrets” was correlated with paternal parenting stress in the PD only.

Mothers prenatal depressive mood was strongly associated with all types of NCEs except neglect and separations. Postnatal depressive mood was relatively independent from childhood adversities, but not from physical abuse. In fathers, depressive mood was highly correlated with the experience of neglect, family secrets, emotional abuse, and the abuse of alcohol and drugs in the family of origin. “Other trauma” and physical abuse were correlated with prenatal depressive mood only. Postnatal depressive mood seemed to be more strongly related to NCEs in fathers than mothers. “Separations” showed no significant correlation with parenting stress or perinatal depressive symptoms.

Table 5

*Zero-order correlations (Pearson) with the socioeconomic data of couples and the birth weight and temperament of children*

| | Education, mother | Education, father | Temperament, mother-rated | Temperament, father-rated | Birth weight |
|---|---|---|---|---|---|
| TAQ M | -.261** | -.110 | .225* | .136 | .004 |
| TAQ F | -.043 | -.150 | .151 | .140 | -.086 |
| BDI pre M | -.136 | -.072 | .307** | .307** | .020 |
| BDI pre F | -.153 | -.101 | -.036 | .034 | -.060 |
| BDI post M | .026 | .035 | .260** | .196 | .016 |
| BDI post F | -.279** | -.036 | .094 | .157 | .020 |
| PSI PD M | -.193* | -.103 | .572** | .299** | -.248** |
| PSI CD M | -.132 | .053 | .786** | .578** | -.269** |
| PSI PD F | -.094 | .051 | .092 | .339** | -.023 |
| PSI CD F | -.136 | .116 | .501** | .621** | -.053 |

*Note.* * $p < .05$, ** $p < .01$. Sample sizes diverge because of missing covariate data. Sample sizes are as follows: mother’s education, $n$= 111; father’s education, $n$= 112; mother-rated temperament, $n$ = 98; father-rated temperament, $n$= 87; and birth weight, $n$= 108. Temperament was measured with the ICQ = Infant Characteristics Questionnaire; TAQ = Trauma Antecedents Questionnaire; BDI = Beck Depression Inventory; pre = prenatal; post = postnatal; PSI PD = Parenting Stress Index Parent Domain; PSI CD = Parenting Stress Index Child Domain; PSI PD-DP = modified Parent Domain with Depression subscale excluded.

The results of the bivariate correlation analysis between variables and potential covariates, are reported in Table 5. No significant association was found with the age of parents for any variable. Maternal education was negatively associated with mothers' reported NCEs and their parent-related parenting stress, but not with pre- or postnatal depressive symptoms. The temperament of the child, as perceived by mothers, was associated with all variables of interest in mothers, and with fathers' perceived child-related parenting stress. Fathers' child temperament rating was associated with both fathers and mothers' ratings of parenting stress, and with mothers' prenatal depressive symptomatology. Birth weight, as an indicator of the maturity of children at birth, was significantly related to mothers perceived parenting stress; the lower the birth weight, the higher the stress reported.

## 5.2 Intra-individual predictive models of parenting stress according to NCEs

To address the first hypothesis, i.e. that retrospectively reported NCEs in both mothers and fathers predicts their perceived parenting stress at 1 year postnatally, I conducted intra-individual linear regression models. Covariates were entered in the second step.

Intra-individual NCEs were significant predictors of mothers' and fathers' parent-related parenting stress, and of mothers' child-related parenting stress (see Table 6, Step 0). However, the proportion of the variance was small, and significant only for parent-related parenting stress in fathers.

I then tested whether the ability of NCEs to predict parenting stress persisted when the covariates of education and birth weight were included in the models. With an increase of one standard deviation in NCEs, values for parenting stress increased by between .15 and .27 depending on parent gender and PSI subscale. Both covariates were independent and significant additional predictors of parent- and child-related parenting stress in mothers. In fathers, parent-related parenting stress was predicted by education level (the higher the education level, the more stress), but not by birth weight. The direction of the predictive effect of NCEs was unaffected, and the strength of the prediction was also largely unchanged in mothers and fathers. As child temperament and the CD of parenting stress show major conceptual overlap, and as the CD can be

viewed as a parent-rated measure of child temperament (Olafsen et al., 2018; Skjothaug et al., 2018), it was not included as an additional covariate in the analysis.

Table 6

*Regression models for intra-individual prediction of parenting stress by NCEs and covariates*

| | | Mothers | | Fathers | |
|---|---|---|---|---|---|
| | | PSI PD | PSI CD | PSI PD | PSI CD |
| Step 0 – No Covariates | $R^2$ | .06 | .04 | .07* | .02 |
| NCEs | *ß (SE)* | **.25 (.10)*** | **.19 (.07)**** | **.26 (.06)***** | **.12 (.08)** |
| Step 1 – Covariates Only | $R^2$ | .12* | .10** | .01 | .02† |
| Education | *ß (SE)* | -.25 (.12)* | -.16 (.07)* | .04 (.07) | .12 (.05)* |
| Birth weight of child | *ß (SE)* | -.26 (.05)*** | -.28 (.04)*** | -.04 (.06) | -.06 (.05) |
| Step 2 – Covariates + NCE | $R^2$ | .16* | .12** | .08** | .04 |
| NCE | *ß (SE)* | **.21 (.09)*** | **.17 (.06)**** | **.27 (.06)***** | **.15 (.08)†** |
| Education | *ß (SE)* | -.20 (.10)* | -.12 (.06)* | .10 (.05)† | .15 (.05)** |
| Birth weight of child | *ß (SE)* | -.26 (.04)*** | -.27 (.04)*** | .03 (.05) | -.04 (.05) |

*Note.* † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Regression models were in the form of structural equation models, as described for the APIMeMs in the "Analytic Strategy" section; standardized betas and standard errors (in brackets), and the variance explained ($R^2$) by each model, are reported. As data on education and birth weight were not imputed, $n$= 107 in mother models and $n$=108 in father models. NCE = negative childhood experiences; NCEs were measured with the Trauma Antecedents Questionnaire (TAQ); PSI PD = Parenting Stress Index Parent Domain; PSI CD = Parenting Stress Index Child Domain.

## 5.3 Intra-individual models of the mediating effects of prenatal/postnatal depressive symptoms

The second hypothesis is that pre- and postnatal well-being – as reflected in depressive symptomatology – mediates the association between NCEs and parenting stress. To test this hypothesis, serial and intra-individual models of the mediating effects of pre- and postnatal depressive symptomatology were constructed. Figures 4 and 5 depict the results for the PD and CD, respectively, in mothers and fathers.

In mothers, prenatal depressive symptomatology was more strongly predicted by NCEs than postnatal depressive symptomatology (pre: *ß*= .41 vs. post: *ß*= .17). In fathers, path estimates were high for both assessments (pre: *ß*= .36 and post: *ß*= .31). Maternal parenting stress on the

PD was significantly predicted by pre- and postnatal symptoms (pre: ß= .37 and post: ß= .38), whereas CD was significantly predicted by prenatal symptoms; however, for postnatal symptoms, there was only a trend toward significance (pre: ß= .23 and post: ß= .16). Paternal parenting stress in the PD was predicted by pre- and postnatal depressive symptoms in fathers (pre: ß= .28 and post: ß= .40). Paternal parenting stress in the CD was not predicted by postnatal depressive symptoms alone (pre: ß= .09 and post: ß= .30).

The ability of NCEs to predict parenting stress at the individual level was fully or partially mediated by pre- and or postnatal depressive symptomatology (see Table 7 for the statistical data on the indirect effects). Prenatal depressive symptoms significantly mediated PD in mothers but not fathers (Model 1). Postnatal depressive symptoms were a significant mediator of PD in both mothers and fathers (Model 2). Regarding the fathers' CD, postnatal but not prenatal depressive symptoms were a significant mediator (Model 4). There was a trend toward a mediating effect of prenatal, but not postnatal, depressive symptoms on the relationships of NCEs and parenting stress with the CD in mothers (Model 4).

In the serial mediation analysis, the effect of NCEs on parenting stress was not significantly mediated by pre- or postnatal depressive symptoms in mothers (see Table 7 for the statistics on the indirect effects), whereas in fathers the effect of NCE on child-related parenting stress was fully mediated by both pre- and postnatal depressive symptoms. Additionally, for mothers, the effect of prenatal depressive symptomatology on both parent- and child-related parenting stress was not mediated by postnatal depressive symptomatology, whereas in fathers this was the case (see Models 5 and 6, and Table 7 for the statistics on the indirect effects).

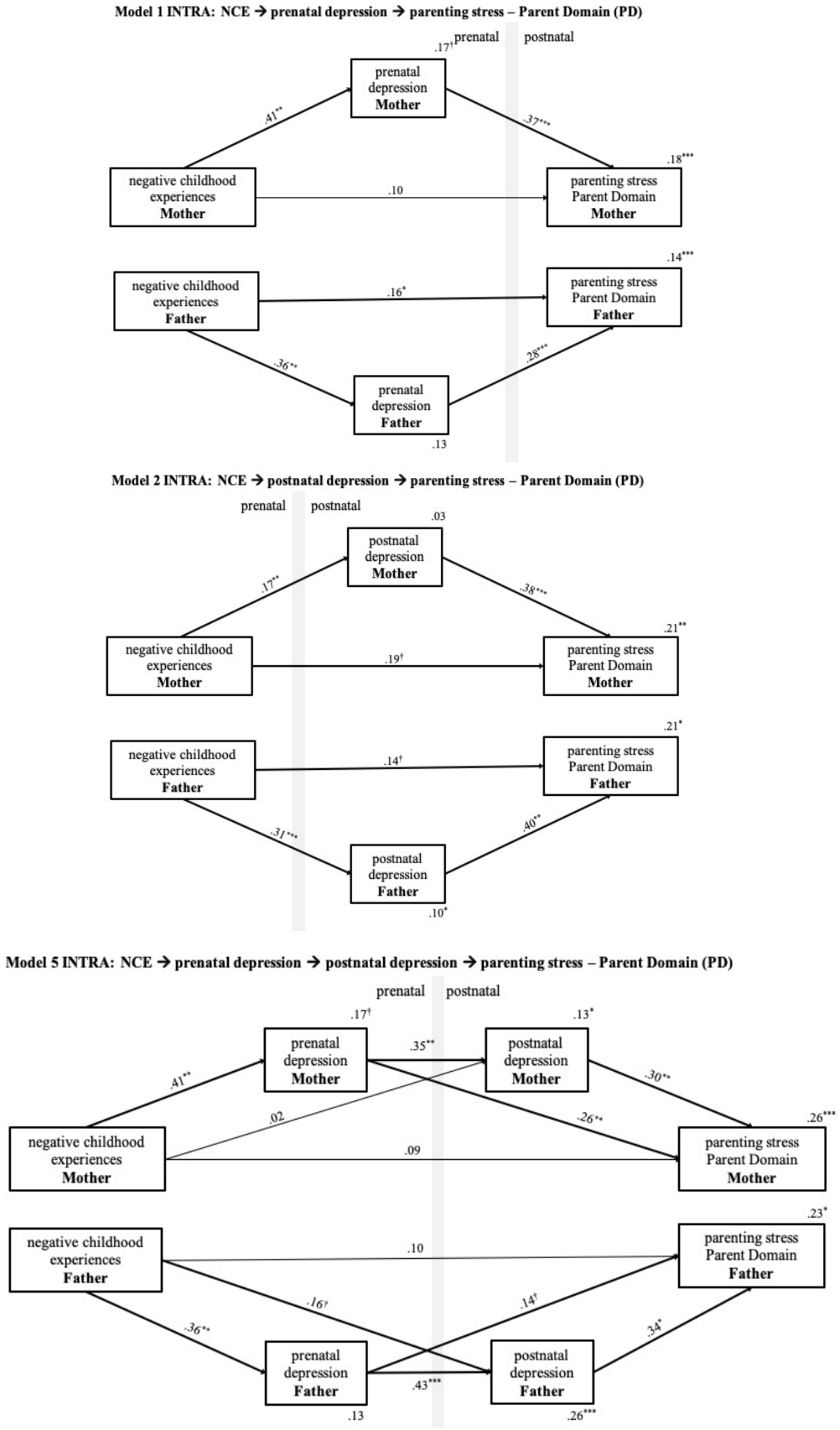


*Figure 4.* Graphic illustrations of intra-individual mediation models for the Parent Domain in mothers and fathers. Thickness of paths represents the significance; $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Standardized betas are reported. Error terms are not depicted to enhance the clarity of the illustration.

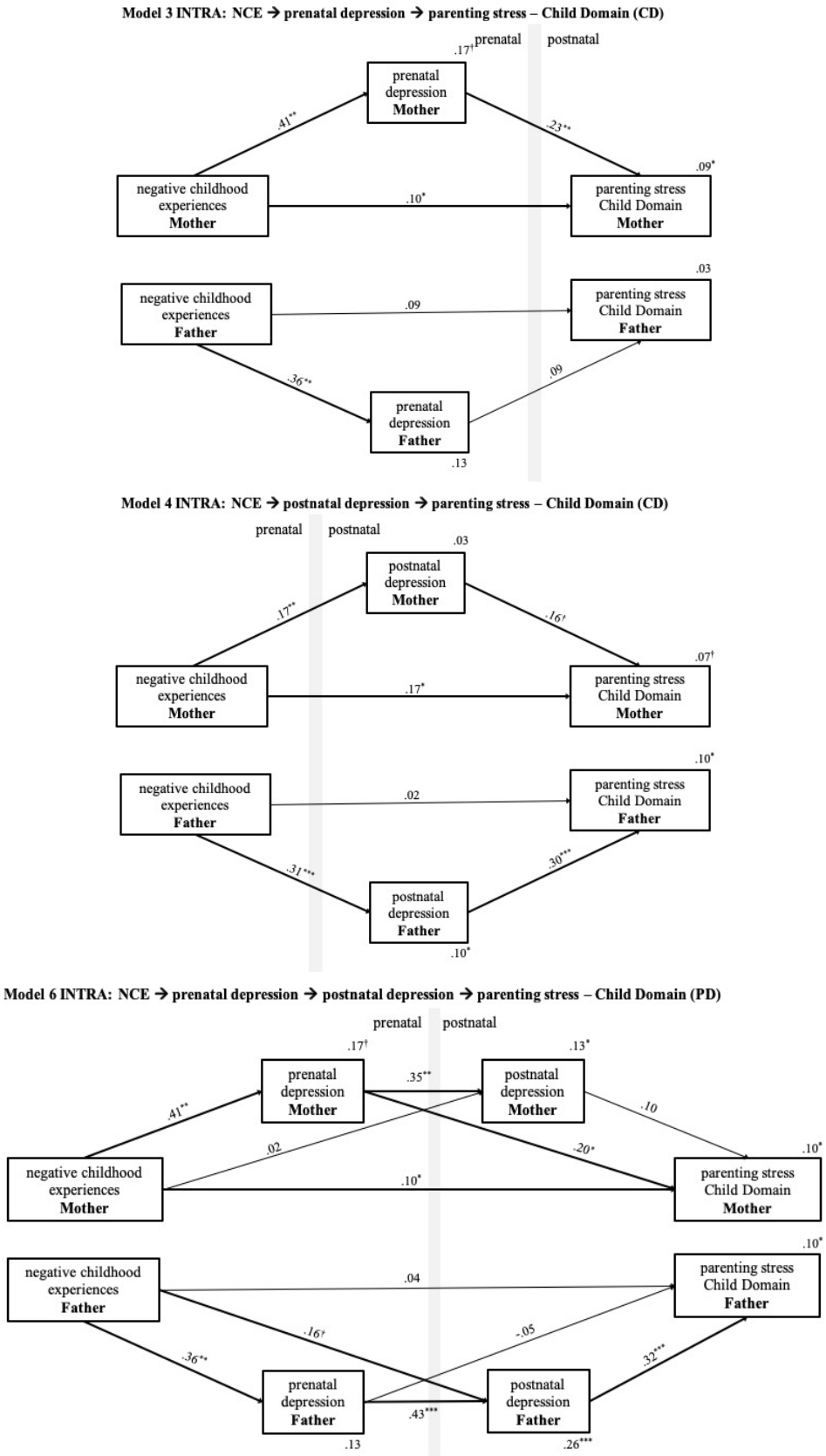


*Figure 5.* Graphic illustrations of intra-individual mediation models for the Child Domain in mothers and fathers. Thickness of paths represents the significance; $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Standardized betas are reported. Error terms are not depicted to enhance the clarity of the illustration

Table 7

*Indirect effects in intraindividual models with Parent Domain and Child Domain as outcomes: TAQ as a predictor and BDI (prenatal vs. postnatal) as a mediator*

| | *Parent Domain* | | | | *Child Domain* | | | |
|---|---|---|---|---|---|---|---|---|
| | Mothers | | Fathers | | Mothers | | Fathers | |
| Indirect path | IE (*SE*) | 95% CI | IE (*SE*) | 95% CI | IE (*SE*) | 95% CI | IE (*SE*) | 95% CI |
| X→ M1 → Y | .24 (.07)$^{**}$ | .10, .37 | .17 (.09)$^{\dagger}$ | -.006, .35 | .10 (.06)$^{\dagger}$ | -.02, .22 | .05 (.04) | -.03, .13 |
| X → M2 → Y | .10 (.04)$^{*}$ | .01, .18 | .20 (.10)$^{*}$ | .02, .39 | .03 (.02) | -.01, .07 | .14 (.05)$^{**}$ | .05, .23 |
| Indirect paths in serial mediation models (Models 5 and 6) | | | | | | | | |
| X → M1 → M2 → Y | .07 (.04)$^{\dagger}$ | -.002, .14 | 09 (.07) | -.06;.23 | .02 (.01) | -.01;.04 | .07 (.03)$^{*}$ | .007;.14 |
| X → M1 → M2 | .03 (.01)$^{**}$ | .01, .06 | .05 (.02)$^{**}$ | .01;.08 | .03 (.01)$^{**}$ | .01;.07 | .05 (.02)$^{**}$ | .01;.08 |
| M1 → M2 → Y | .55 (.22)$^{*}$ | .12;.99 | .74 (.44)$^{\dagger}$ | -.12;.1.60 | .13 (.12) | -.11;.36 | .62 (.17)$^{***}$ | .28;.96 |

*Note.* $N$ = 112, $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$; 95% confidence interval (95% CI) based on the distribution of estimated indirect effects within the 50 imputed data sets; IE = indirect effect; SE= standard error; X= independent variable = TAQ = Trauma Antecedents Questionnaire; M = mediator = BDI = Beck Depression Inventory; M1 = BDI pre; M2 = BDI post; Y= dependent variable = PSI PD = Parenting Stress Index Parent Domain or PSI CD = Parenting Stress Index Child Domain.

## 5.4 Actor-Partner-Interdependence Mediation Models

The two hypotheses on dyadic influences were that NCEs in one partner influence the other partner's parenting stress, and that the partner effects are mediated by pre- or/and postnatal depressive symptomatology at the intra-individual or partner level.

Regarding Actor-Partner-Interdependence Models[8] not including the mediating effect of depressive symptoms (not depicted in a figure), mothers' NCEs had a direct effect on fathers' parenting stress in the PD (*ß*=.23; *SE*= .08; *p*=.007; $R^2$= .12$^{**}$) and CD (*ß*=.25; *SE*= .08; *p*=.001; $R^2$= .08$^{*}$). No significant partner effect was found for fathers' NCEs on mothers' parenting stress (PD: *ß*=.01; *SE*= .05; *p*=.834; $R^2$= .07; CD: *ß*=.05; *SE*= .13; *p*=.676; $R^2$= .04$^{*}$). The actor effects found in the intra-individual models remained significant in mothers (PD and CD) and fathers (PD) in the dyadic model.

In the APIMeMs (illustrated in Figure 6 for PD and Figure 7 for CD), mothers' NCEs influenced the extent of the fathers' depressive mood postnatally. Also, mothers' depressive mood post-birth was more severe in cases where fathers reported more NCEs. Prenatal depressive symptoms in mothers showed a trend towards predicting fathers' parent-related parenting stress, and significantly predicted fathers' child-related parenting stress. No significant direct partner effect of NCEs on parenting stress in parents was found, when including depressive symptoms as mediators. Only the perception of child-related stress in fathers showed a trend toward being directly impacted by mothers' NCEs (see Model 4 in Figure 7). This suggested that, in particular, prenatal depressive symptoms in mothers mediated the effect of maternal NCEs on paternal child-related stress.

Significant dyadic indirect effects, i.e. mediating effects of one's own or the partner's pre- or postnatal depressive mood, were found (see Table 8a for the statistics of the indirect effects). Mothers' prenatal depressive symptoms mediated the effect of their NCEs on child- and parent-related (trend) parenting stress in fathers. The effect of mothers' NCEs on fathers' parenting stress (PD and CD) was also mediated by fathers' postnatal depressive symptoms. Thus, the

[8] For all APIMs and APIMeMs, standardized betas and level of significance are reported in the main text and figures. Extended information on unstandardized betas, standard errors and p-values are listed in the Appendix Section B Table B1.

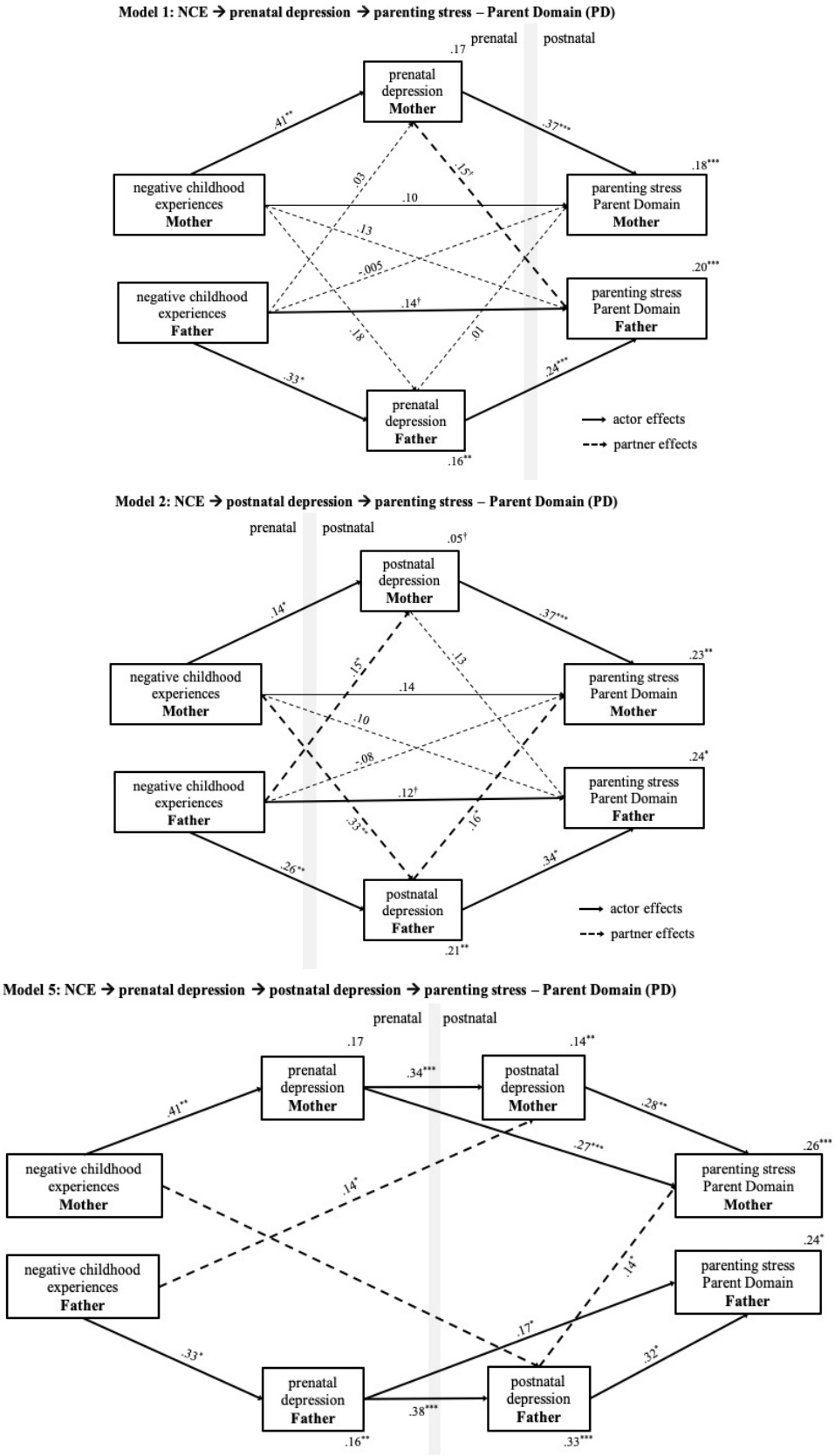


*Figure 6.* Graphic illustration of the APIMeM for the Parent Domain in mothers and fathers. Thickness of paths represents the significance; $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Standardized betas are reported. Lined paths indicate actor effects. Dashed paths indicate partner effects. Thick paths represent significance, and light paths non-significance. Correlations between predictor variables and residual covariances are not depicted to enhance the clarity of the illustration. In Model 5, the constrained model is shown to enhance clarity.

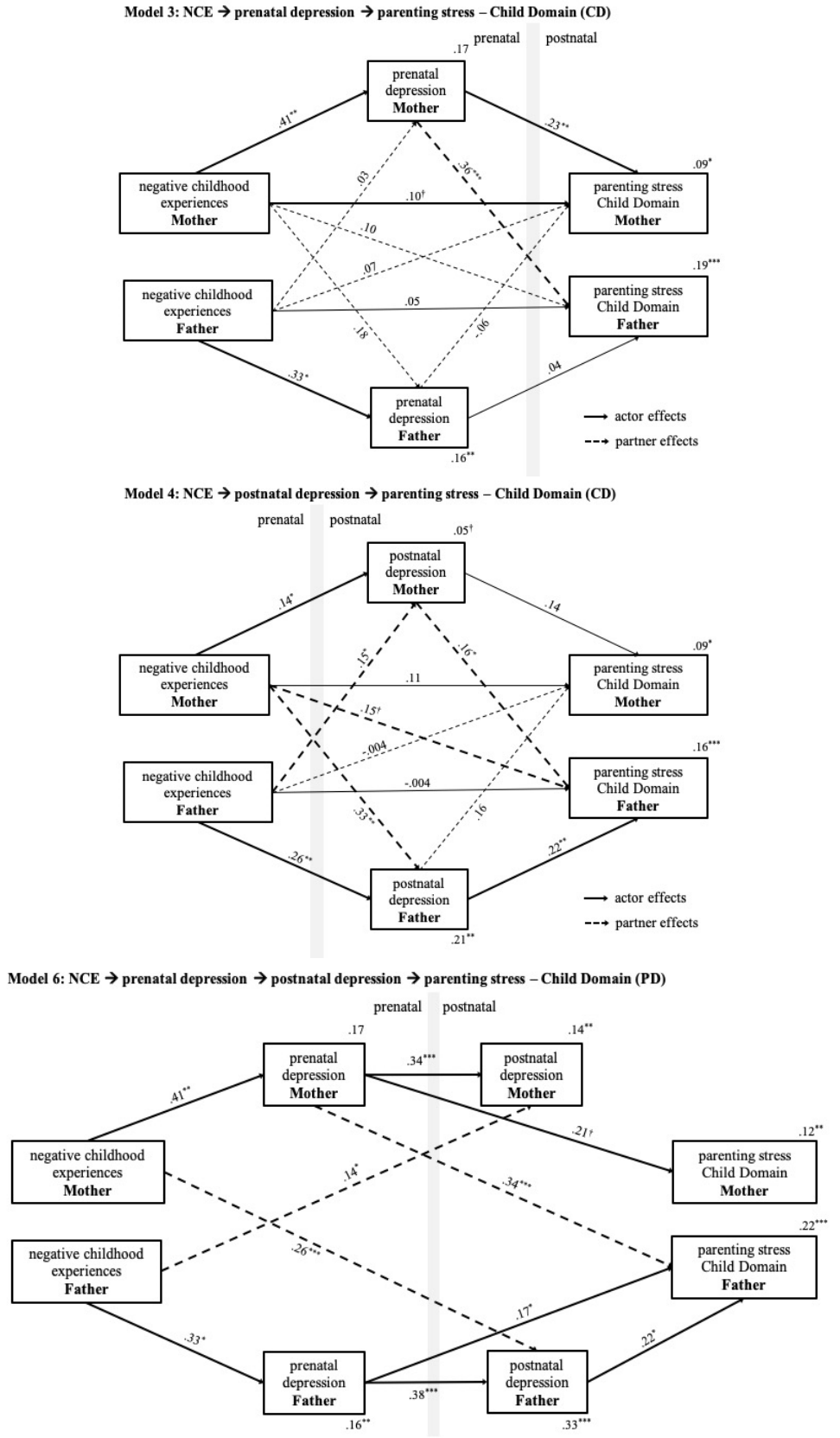


*Figure 7.* Graphic illustration of the APIMeM for the Parent Domain in mothers and fathers. Thickness of paths represents the significance; $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Standardized betas are reported. Lined paths indicate actor effects. Dashed paths indicate partner effects. Thick paths represent significance, and light paths non-significance. Correlations between predictor variables and residual covariances are not depicted to enhance the clarity of the illustration. In Model 5, the constrained model is shown to enhance clarity.

dyadic influences of mothers' NCEs seemed to be mediated especially by mothers' prenatal depressive symptoms and fathers' postnatal depressive symptoms. Postnatal depressive symptoms in fathers mediated the effect of fathers' NCEs on mothers' parent-related parenting stress (without evidence of a direct partner effect). Dyadic effects were predominantly in the direction from mothers to fathers.

Indirect actor effects were of equal magnitude to the indirect effects seen in intraindividual models (see Table 7 for intraindividual models and Table 8a for dyadic models), aside from parent-related parenting stress in fathers. The indirect effects (via pre- and postnatal depressive symptoms) were now both nonsignificant, suggesting that a substantial proportion of the variances was better explained by maternal depressive symptoms or NCEs.

In serial mediation models testing both pre- and postnatal depressive symptoms, the indirect path from mothers' NCEs to fathers' parent-related parenting stress via father's postnatal depressive symptoms, but not mother's prenatal depressive symptoms, remained significant (see Table 8b). The indirect paths from mothers' NCE to fathers' child-related parenting stress, via mother's prenatal depressive symptoms and fathers' postnatal depressive symptoms, were stable. No indirect path from fathers' NCE to mothers' parenting stress was found. Further, no serial mediational paths including both pre- and postnatal depressive symptoms were found.

The direct partner effect of paternal postnatal depressive symptoms on maternal parent-related parenting stress (Model 2) remained significant in the serial mediation model (Model 5). The direct partner effect of maternal postnatal depressive symptoms on paternal child-related parenting stress seen in Model 4 was not significant when both pre- and postnatal symptoms were included in the model (Model 6), suggesting that the variance was better explained by prenatal depressive symptoms than postnatal depressive symptoms in mothers. Furthermore, the trend toward the partner effect (of maternal NCEs on paternal child-related parenting stress) in Model 4 was shown to be fully mediated by maternal prenatal depressive symptoms in mothers in Model 6. The direct partner effect of paternal NCEs on maternal postnatal depressive symptoms in Model 4 remained significant in Model 6.

Table 8

*Indirect effects*

*a) Indirect effects for the APIMeM for models with PSI Parent Domain and Child Domain as outcomes, TAQ as a predictor and BDI (prenatal vs. postnatal) as a mediator*

| | *PSI Parent Domain* | | | | *PSI Child Domain* | | | |
|---|---|---|---|---|---|---|---|---|
| | BDI prenatal -Model 1- | | BDI postnatal -Model 2- | | BDI prenatal -Model 3- | | BDI postnatal -Model 4- | |
| Indirect Path | IE (*SE*) | 95% CI | IE (*SE*) | 95% CI | IE (*SE*) | 95% CI | IE (*SE*) | 95% CI |
| $X_m \rightarrow M_m \rightarrow Y_m$ = A + A | .23 (.07)*** | .10, .36 | .08 (.04)* | .003, .16 | .10 (.06)† | -.02, .22 | .02 (.02) | -.01, .06 |
| $X_f \rightarrow M_f \rightarrow Y_f$ = A + A | .13 (.09) | -.05, .32 | .15 (.10) | -.06, .35 | .02 (.04) | -.05, .09 | .08 (.04)* | .001, .17 |
| $X_m + M_m + Y_f$ = A + P | .07 (.03)† | .00, .13 | .02 (.02) | -.02, .06 | .14 (.04)** | .06, .23 | .02 (.02) | -.01, .06 |
| $X_f \rightarrow M_f \rightarrow Y_m$ = A + P | .01 (.09) | -.16, .18 | .10 (.05)* | .005, .19 | -.03 (.06) | -.15, .09 | .07 (.06) | -.05, .18 |
| $X_m \rightarrow M_f \rightarrow Y_f$ = P + A | .09 (.04)† | -.01, .10 | .12 (.04)** | .04, .21 | .006 (.01) | -.01, .03 | .07 (.03)* | .01, .13 |
| $X_f \rightarrow M_m \rightarrow Y_m$ = P + A | .03 (.04) | -.05, .10 | .13 (.07)† | -.02, .27 | .01 (.02) | -.03, .05 | .03 (.03) | -.03, .10 |

*b) Indirect paths of partner effects in serial mediation models (Models 5 and 6)*

| Parent Domain (Model 5) | | | Child Domain (Model 6) | | |
|---|---|---|---|---|---|
| Indirect Path | IE (*SE*) | 95% CI | Indirect Path | IE (*SE*) | 95% CI |
| $X_m \rightarrow M_{2f} \rightarrow Y_f$ | .09 (.03)* | .002;.18 | $X_m \rightarrow M_{1m} \rightarrow Y_f$ | .14 (.05)** | .04;.23 |
| $X_f \rightarrow M_{2m} \rightarrow Y_m$ | .09 (.05)† | -.02;.19 | $X_m \rightarrow M_{2f} \rightarrow Y_f$ | .05 (.02)* | .01;.10 |
| $X_f \rightarrow M_{1f} \rightarrow M_{2f} \rightarrow Y_m$ | .04 (.03) | -.02;.10 | | | |

*Note.* $N$ = 112, † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$; 95% Confidence Interval (95% CI) based on the distribution of estimated indirect effects within the 50 imputed data sets; P = partner effect, A= actor effect; IE = indirect effect; SE= standard error; X= independent variable = TAQ = Trauma Antecedents Questionnaire; M= mediator = BDI = Beck Depression Inventory; Y= dependent variable = PSI PD = Parenting Stress Index Parent Domain or PSI CD = Parenting Stress Index Child Domain; m = mother; f = father.

The fit of the APIMeMs was evaluated as described in the Analytic Strategy section. Constraining all paths with standardized betas < .10 to zero, Models 1, 3 and 4 showed a good fit with the data (Model 1: $\chi^2$ (3)= .733, *p*= .865; RMSEA= .001; CFI= 1.0; SRMR= .012; Model 3: $\chi^2$ (5)= 3.20, *p*= .669; RMSEA= .008; CFI= .997; SRMR= .026; Model 4: $\chi^2$ (2)= 1.57, *p*= .456; RMSEA= .016; CFI= .989; SRMR= .011). The fit of Model 2 was poor. A more parsimonious model, with both direct partner effects and the direct actor effect in mothers of NCEs on PSI PD set to zero, showed a good model fit (Model 2: $\chi^2$ (3)= 5.82, *p*= .121; RMSEA= .079; CFI= .968; SRMR= .034). The model fit for constrained path models (serial mediation by both pre- and postnatal depressive symptoms) was also acceptable (Model 5 PD: $\chi^2$ (10)= 15.33, *p*= .120; RSMEA= .06; CFI= .965; SRMR= .04; Model 6 CD: $\chi^2$ (9)= 14.07, *p*= .120; RSMEA= .042; CFI= .953; SRMR= .026).

Correlations of the error terms of couple's parenting stress in both CD and PD (see Table B2 for all models in the Appendix) were significant, indicating non-independence of the data beyond the variance explained by actor and partner effects (Fitzpatrick, Gareau, Lafontaine, & Gaudreau, 2016). The error terms of couple's depressive symptoms were not significantly correlated, suggesting that couples were independent beyond the relationships explained by the predictors and paths included in the models.

Table 9

*Explained variance in the structural equation models and increase in explained variance between the individual and dyadic mediation models*

| | Mothers | | | Fathers | | |
|---|---|---|---|---|---|---|
| Model # | $R^2$ intra | $R^2$ dyadic | $\Delta R^2$ | $R^2$ intra | $R^2$ dyadic | $\Delta R^2$ |
| 1: BDI pre / PSI PD | .18 | .18 | .00 | .14 | .20 | .06 |
| 2: BDI post / PSI PD | .21 | .23 | .02 | .21 | .24 | .03 |
| 3: BDI pre / PSI CD | .09 | .09 | .00 | .03 | .19 | .16** |
| 4: BDI post / PSI CD | .07 | .09 | .02 | .10 | .16 | .06 |
| 5: BDI pre+ BDI post / PSI PD | .26 | .26 | .00 | .23 | .24 | .01 |
| 6: BDI pre+ BDI post / PSI CD | .10 | .12 | .02 | .10 | .22 | .12 |

*Note*. **$p$ < .01; BDI = Beck Depression Inventory; pre = prenatal; post = postnatal; PSI PD = Parenting Stress Index Parent Domain; PSI CD = Parenting Stress Index Child Domain; PSI PD-DP = modified Parent Domain with Depression subscale excluded; $\Delta R^2$ = difference in variance explained between the intra-individual and dyadic model.

When taking dyadic interdependencies into account by using APIMeMs, the variance in parenting stress explained increased from 1% to 16% for fathers, and by a negligible amount in mothers, as shown in Table 9. The change in the amount of variance in parenting stress explained was significant for Model 3 in fathers only.

I tested APIMeMs with the PD-DP (excluding the Depression scale) as the dependent variable; these showed almost identical results, indicating that the variance shared by BDI and PSI PD did not account for the findings.

# 6. Discussion

In this research work, I set out to examine potential dyadic processes between mothers and fathers during the transition to parenthood. I was interested in the intra-individual and dyadic impact of NCEs on perinatal depressive symptomatology and parenting stress at 1 year postnatally. Unlike most previous studies, this study included both mothers and fathers in the analyses, thus controlling for variance shared by the partners.

High perceived stress of parenting was shown to be strongly associated with the quality of parenting (Pereira et al., 2012) and child development (Barroso et al., 2018; Harewood et al., 2017), and thus is a powerful indicator of the parent's capacity to responsively and effectively parent their child or children. Furthermore, parenting stress mediated the impact of childhood adversities on maternal parenting behavior, over and above the impact of postnatal depressive symptoms (Pereira et al., 2012), thus showing the importance of wellbeing in the specific context of the parental role, in addition to general mental well-being.

Examining factors that may increase parenting stress, including the influence of the partner, might shed light on the specific mechanisms underlying maladaptive parenting behavior. Knowledge of these mechanisms is highly valuable for effective intervention and treatment in the context of the transition to parenthood.

Previous research has clearly demonstrated the detrimental effect of NCEs (various forms of child maltreatment, household dysfunction and, to some degree, non-interpersonal trauma) on adult's interpersonal and mental functioning (e.g. K. Hughes et al., 2017; Witt et al., 2019). A growing body of research has also shown the negative impact of NCEs on parenting behavior and mental health during the transition to parenthood (Choi et al., 2019; Fredriksen et al., 2017; Savage et al., 2019; Teeters et al., 2016; Wajid et al., 2020), although research on fathers is scarce in this context (Skjothaug et al., 2014). It is theoretically reasonable to hypothesize an effect of NCEs on parenting stress (see section 2.3.2). So far, few studies have examined this putative relationship (e.g. Bai & Han, 2016; Steele et al., 2016), especially in fathers (Bai & Han, 2016; Skjothaug et al., 2018).

Data on the dyadic effects of NCEs on mental health in romantic partners are lacking. However, research suggests an effect of NCEs on relationship functioning and satisfaction in partners (e.g. Godbout et al., 2014; Riggs et al., 2011). To the best of my knowledge, only one study (Bai

& Han, 2016) has reported a potential dyadic interdependence of mothers and fathers in the context of NCEs and parenthood using the APIMeM. As mental well-being was identified an important factor for explaining high levels of parenting stress, I hypothesized that perinatal depressive symptomatology in parents mediates the relationship between NCEs and parenting stress, both intra-individually and between partners.

**The main results of this empirical study were as follows:**

NCEs significantly predicted mothers' and fathers' parenting stress, but the effect was stronger for parent- than child-related parenting stress (Hypothesis 1).

In mothers, pre- and postnatal depressive symptoms mediated the effect of NCE on parent-related parenting stress, whereas perinatal depressive symptoms showed only a trend toward having a mediating effect on child-related parenting stress (Hypothesis 2). In fathers, postnatal, but not prenatal, depressive symptoms mediated the effect of NCE on both child- and parent-related parenting stress (Hypothesis 2). These results documented a *spillover process* from strain (NCEs and depression) in parents to the domain of parenting.

On the dyadic level, I found evidence for several *crossover processes*: mothers' NCE significantly predicted fathers' parent- and child-related parenting stress, whereas fathers' NCEs showed no substantial effect on mothers' parenting stress (Hypothesis 3).

The partner effects of mothers' NCEs on fathers' parenting stress were mediated by prenatal depressive symptoms in mothers (for child-related parenting stress) and postnatal depressive symptoms in fathers (for both parent- and child-related parenting stress) (Hypothesis 4). The indirect effect of fathers' NCE on mothers' parent-related parenting stress, via paternal postnatal depressive symptoms, was significant, but there was no significant direct effect (Hypothesis 4). Thus, I found substantial *crossover* of rearing experiences in the family of origin to the partner's parenting stress in the direction from mother to father, but less consistently in the direction from father to mother. In the following, the results of this research work will be discussed in detail in the context of existing research findings.

## 6.1 Interpretation of results on prevalence and gender differences in NCEs, depressive symptoms and parenting stress

Prevalence of NCEs in mothers and fathers

In studies on adverse childhood experiences (ACEs), exposure to more than four types of ACEs was associated with an increased risk of negative outcomes in diverse areas of mental and somatic health (Crouch, Strompolis, Radcliff, & Srivastav, 2018; K. Hughes et al., 2017). In this sample, 37.7% of mothers reported NCEs in more than four domains on the TAQ, compared to 25% of fathers. In a comparable non-clinical sample of mothers, only 25% reported more than four ACEs (Steele et al., 2016). The percentage values in this sample were in the mid of the range for men and the higher end of the range for women with respect to studies included into the meta-analytical study by K. Hughes et al. (2017). It was though even 4 times higher than the combined prevalence fpr men and women found by Witt et al. (2019) in a German representative sample.

Only a very small percentage of mothers and fathers reported no potentially traumatic childhood experiences in this sample (8% of mothers, 4.8% of fathers). This is in stark contrast to other representative study samples; the respective values were 31.3% and 34.2% in a North American sample (Dube et al., 2003), values of 56.3% for an adult German sample (Witt et al., 2019) and 73% for a sample of fathers (Skjothaug et al., 2014) were also reported. In a representative study of the German population using the CTQ – which does not cover household dysfunction – 69% of adults did not report emotional, physical, or sexual abuse, or emotional and physical neglect (Witt et al., 2017).

One reason for the high prevalence of NCEs in this sample might be that the measure used (TAQ) covers a more diverse range of potentially traumatic experiences. On the one hand, this allows a more detailed picture of the sample to be built up, but on the other hand might overestimate strain and lower the potential for differentiation between cases at risk for higher parenting stress and those not at risk. Witt et al. (2019) discussed how, when using the ACE, NCE prevalence might be underestimated. Prevoo, Stoltenborgh, Alink, Bakermans-Kranenburg, and Ijzendoorn (2017) documented a dependence of NCE prevalence on the number of questions included in measures. Conversely, the TAQ, with its broader range of more specific questions,

might provide a more precise picture of NCEs and rule out processes like denial or avoidance of difficult experiences.

Furthermore, the TAQ uses a less strict definition/cut-off for a potentially traumatic event compared to the ACE; events are characterized as potentially traumatic when the respondent reports a frequency/intensity of “occasionally or moderately”, whereas the ACE uses “often/very often”. Some additional differences between the TAQ and ACE might also have contributed to the higher prevalence of NCEs in this sample: the “family secrets” scale might have high prevalence due to a very low threshold, while the other trauma scale includes non-interpersonal experiences, such as a severe illness or accident, which are not included in the ACE questionnaire. Approximately one third of both the men and women reported experiences on the “family secrets” scale. Nevertheless, it is unlikely that the difference in threshold and areas examined fully explains the relatively high prevalence of NCEs in this sample.

Self-selection might be another reason for the high prevalence of NCEs in this sample. This is supported by the prevalence of NCEs being more comparable to the subsample of Witt et al. (2019) reporting low life satisfaction (1 standard deviation below the mean) than to the whole sample. A strong feeling of the need for a change might have motivated parents-to-be to take part in the time-consuming intervention and study.

Regarding specific domains of NCEs, the prevalence rates in this sample were more comparable to those in other studies. In a review of a series of meta-analyses, Stoltenborgh, Bakermans-Kranenburg, Alink, and van Ijzendoorn (2015) reported a combined prevalence of 29.2% (CI 14.1 to 50.8) for emotional abuse in Europe. The prevalence for men and women in my study sample is thus within the reported CI. Physical abuse was in the range of 14.9 – 33.6 (estimated rate = 22.9%), i.e. in the lower range of the CI. The sexual abuse rate in this study was lower than the reported estimates for women (13.5%; CI=11-16.5) and men (5.6%; CI=3.8 – 8.4). The prevalence of physical neglect was 6.5% (CI= 3-13.7). No prevalence estimation for emotional neglect in Europe was provided (c.f. 14.5% in North America and 40% in Australia). As the TAQ does not differentiate between emotional and physical neglect, comparison with the meta-analytic data is difficult.

The rate of parental separation/divorce in the family of origin was 56.3% for men and women and thus twice as high as in the epidemiological study of Anda et al. (2006), and almost three

times higher than in Witt et al. (2019). Again, self-selection of the sample might explain this high percentage. More than 50% of both the mothers and the fathers reported experiencing neglect, emotional abuse and/or parental separation. This experience, and the likely desire to protect one's own partnership and to not repeat negative experiences, might also have motivated parents to look for extensive support and guidance during the transition to parenthood.

Regarding gender differences, women had a significantly higher score (small effect size) and greater variance than men in the TAQ sum score – a score based on both the frequency and intensity of negative experiences in all domains. Women reported more neglect, emotional, physical and sexual abuse, and witnessed more potentially traumatic events – especially at a young age. In contrast, Bai and Han (2016) did not report a difference between mothers and fathers in emotional abuse on the CTQ, but Witt et al. (2017) reported a difference in the general population. The gender difference in prevalence was greatest for sexual abuse (Häuser et al., 2011; Witt et al., 2017).

The TAQ, similar to the CTQ and ACEs, does not evaluate whether the person has emotionally come to terms and coped with the negative experience. Nevertheless, with increased severity and frequency of negative events, the potential for impaired affect regulation, mentalization, stress management and conflict resolution skills increases (Riggs, 2010). Murphy et al. (2014) also showed that the probability of an "unresolved state of mind" regarding experiences of trauma and loss, based on the AAI, increases with the number of childhood adversities.

To summarize, the study sample showed a prevalence of NCEs, such as emotional, sexual and physical abuse, within the range reported in meta-analytic studies. Paternal separation and other types of household dysfunction were more prevalent. Different forms of NCEs cooccurred more frequently than in representative samples.

Extent and interdependence of parenting stress.

In this study, 9.8% of mothers and a small percentage (2.7%) of fathers reported a high level of parenting stress, which is regarded as clinically relevant with respect to child development (Abidin, 1995), at 1 year postnatally. Compared to studies on parenting stress in the early postnatal period (up to 6 months postnatally), the parenting stress level was relatively low (Seah & Morawska, 2016; Vismara et al., 2016). However, follow-up studies (Rollè et al., 2017; Vismara et al., 2016) showed a decrease of parenting stress at later postnatal timepoints (up to 16 months), possibly

due to adaptation to the new role over time. The rates at 12 and 16 months were equally low, or even lower, than in this sample.

The mothers in this study reported a significantly higher level of parent-related parenting stress than fathers, whereas child-related parenting stress was of equal magnitude between men and women. The findings replicate other research on first-time parents. Vismara et al. (2016) found a higher level of parental and child-related distress in mothers than fathers at 3 months postpartum, but not at 6 months postpartum. For the same sample, Rollè et al. (2017) reported higher parent-related, but equal child-related, distress in mothers compared to fathers at 1 year postpartum. Skreden et al. (2012) reported that perceived social isolation was more severe in fathers of preschool children than in mothers, although in all other aspects of parent-related parenting stress mothers reported higher levels. These findings stand in contrast to the reports of equal-magnitude parenting stress between mothers and fathers, by Bai and Han (2016), Milgrom and McCloud (1996), Seah and Morawska (2016) and Saisto et al. (2008). One reason for the divergent results might be differences in study populations.

The correlation between mothers' and fathers' perceived stress was lower for parent-related than for child-related stress (PSI PD: $r$ =.21, $p$ = .024; PSI CD: $r$ = .53, $p$ < .001) in this sample. Le et al. (2017) found equally small correlations, of $r$ =.28 and .29, for parent-related and child-related distress, respectively. Bai and Han (2016) and Ponnet, Wouters, et al. (2013) reported correlations of .52 and .45, respectively, between fathers' and mothers' PSI total scores for children older than 7 years; these correlations are stronger than that in this sample ($r$= .39, $p$ < .001) and similar to the correlation for child-related parenting stress. Saisto et al. (2008) found no significant association in parent-related parenting stress between fathers and mothers for children aged 2 to 3 years. No other study specifically reported on the association of child-related stress between partners. Thus, the extent of the association between parenting stress in mothers and fathers, generally and in different domains, remains unclear. The diverging results might be attributable to differences in the study samples regarding the age of the child, and whether it was the first child or not. In this study, no difference in the associations between primiparous and multiparous women with their partners were found. Characteristics such as the length and quality of the partnership might influence the associations, but none of the studies reported on this.

Comparison of depressive symptomatology between partners

In this study, the rates of elevated levels of depressive symptoms were comparable to other studies including non-clinical populations (Matthey et al., 2000; Rao et al., 2020); symptoms were predominantly in the mild to moderate range. Mothers reported higher levels of depressive symptoms than fathers, in accordance with the known gender gap (Matthey et al., 2000; Vismara et al., 2016). As Matthey et al. (2000) and Cameron, Sedov, and Tomfohr-Madsen (2016) had reported, I also found a decrease in the extent of depressive symptoms for both parents, and a decrease in the rate of elevated symptoms in mothers between the late prenatal period and approximately 6 months postnatally. Contrastingly, Fredriksen et al. (2019) found a decrease in mothers only. The large majority of mothers and fathers in this sample reported no or subclinical levels of depressive symptoms (69.7% of mothers and 89.3% fathers). Fredriksen et al. (2017) pointed out the importance of taking subclinical variance in symptoms into account, and of using dimensional variables. They found that depressive symptoms in women persisted between the prenatal and postnatal period, at borderline clinical levels. This trajectory was characterized by a range of psychosocial adversities. Also, subclinical levels of depressive symptoms were shown to impact maternal self-esteem and confidence in the maternal role (Weinberg et al., 2001), marital functioning (Cummings, Keller, & Davies, 2005), parenting stress (Wade, Giallo, & Cooklin, 2012), maternal bonding and hostility (Behrendt et al., 2016), parenting in general (meta-analysis by Lovejoy, Graczyk, O'Hare, & Neuman, 2000), toddler's emotion regulation and temperament (West & Newman, 2003), and offspring's internalizing and externalizing behavior problems in adolescence (Campbell, Morgan-Lopez, Cox, & McLoyd, 2009). There is increasing evidence that subclinical symptoms in fathers also have an adverse impact on children's functioning (see a review by Cummings et al., 2010). Thus, although the prevalence of clinically relevant depressive symptoms was small in this sample, research suggests that it is important to also consider the impact of subthreshold symptoms on parenting stress.

## 6.2 Findings at the intra-individual level: prediction of parenting stress by NCEs

At the intra-individual level, the findings for NCEs and parenting stress, including their association, were generally in line with the results of prior research (Lange et al., 2018; Pereira et al., 2012; Shenk et al., 2017; Steele et al., 2016). In addition, this study provides new insight into the effects

of NCEs in fathers on their parent-related parenting stress and perceptions of the child's behavior. As hypothesized, reported NCEs were predictive of intra-individual parent- and child-related parenting stress in mothers, and parent-related parenting stress in fathers. The ability of childhood adversity to predict child-related parenting stress in fathers was unstable. Furthermore, the effect was stronger for parent-related parenting stress.

Prediction of parent-related parenting stress

The coefficients for the correlation of NCEs with parent-related parenting stress was *r*= .213 for mothers and *r*= .263 for fathers, comparable to those reported previously, for example by Ammerman et al. (2013) at 5 months postnatally and Shenk et al. (2017) at 9 and 18 months postnatally (for mothers in a home visiting program). Pereira et al. (2012) found a stronger correlation for the parental distress scale (*r*= .34). For fathers, Bai and Han (2016) reported a lower correlation of *r*= .17 between emotional abuse and PSI-SF total score.

The significant effect of NCEs on parent-related parenting stress remained for fathers and mothers after adjusting for parental education and the child's birth weight. This accords with the findings of Steele et al. (2016) on parent-related stress in mothers. However, Lange et al. (2018) and Bailey et al. (2012) found only a trend toward significance with respect to NCEs predicting parent-related stress in mothers. In fathers, no study yet has estimated the effect of NCEs on parent-related parenting stress. In this study, similar effects were seen for fathers and mothers, in terms of the variance in parenting stress explained by NCEs. This underscores the importance of childhood adversities to paternal perceptions, of and adjustment to, the parental role and supports the idea that fathers' interpersonal experiences in their family of origin might shape how confident, or how socially isolated and restricted, they feel in/by their parental role. This supports Cabrera et al. (2014)'s adaptation and extension of Belsky (1984) ecological model of parenting of fatherhood, in which parental rearing experience affects parenting behavior via the personal characteristics of the father. Skjothaug et al. (2018)'s study provides some insight into a specific facet of parent-related parenting stress in fathers: the stress experienced by fathers in the spousal relationship (one scale of the PD; see Method section) was predicted by childhood adversity in fathers (and mediated by depressive symptoms during pregnancy and perceived child behavior). Items on the "Spousal Relationship" subscale capture/tap into the father's perception regarding whether sufficient emotional and instrumental support is being provided by the partner. Marital

satisfaction in fathers was also found to be predicted by their experience of emotional abuse, by Liu et al. (2019).

Prediction of child-related parenting stress

NCEs were a significant predictor of child-related parenting stress in mothers, and there was a trend toward significance in fathers, even after adjusting for covariates in a linear regression model. In mothers, the small but robust effect of childhood adversities on the perception of stress in relation to their child's behavior and temperament might originate from two different coexistent sources, which will be discussed in the section on mediation by pre- and postnatal depressive symptoms. However, bivariate correlations were lower (and non-significant) for child- than parent-related parenting stress in this study ($r$= .178 n.s. in mothers and $r$= .041 n.s. in fathers). That finding accords with the results of Pereira et al. (2012), Galbally et al. (2019) and Bailey et al. (2012), who also reported a weaker association with child-related parenting stress in mothers. In Galbally et al. (2019), childhood abuse was not a significant predictor of the "difficult child" or "Parent-Child Dysfunctional Interaction" PSI Short Form scale scores. However, Lange et al. (2018) found that the number of ACEs in mothers, suffering from depression and taking part in a stress management course significantly predicted child-related parenting stress ("Difficult child scale") but not parent-related parenting stress. The divergent finding of Lange et al. (2018) might be due to the fact that, in the presence of depressive symptomatology or other mental health problems, childhood adversities have a greater impact on children's behavioral and emotional functioning (Plant, Barker, Waters, Pawlby, & Pariante, 2013); thus, the association might be more robust in a clinical sample.

The effect of NCEs on child-related parenting stress in fathers was potentially confounded by the education level of the mother and child temperament. When including both variables as co-variates, NCEs became a significant predictor. The relatively small and unstable effect of NCEs in fathers on child-related parenting stress accords with the finding of Skjothaug et al. (2018) of no direct effect of childhood adversities on child-related parenting stress at 6 months postnatally, but the prevalence of NCEs was very low in the sample, suggesting that variance might have been restricted. As no other study has estimated the specific ability of NCEs to predict child-related parenting stress in fathers, at this stage we may conclude that the direct effect of paternal NCEs on the perception of stress, in relation to their child's behavior and temperament, is minimal.

Furthermore, significance disappeared when including the mother in the analysis (see discussion on dyadic effects). Potential reasons for a smaller effect of NCEs on child-related parenting stress may include the perception of child-related parenting stress also being dependent on the child's temperament (Szymańska & Aranowska, 2019), and the fit between the parent and child (Newland & Crnic, 2017), as well as subjective projection onto the child in accordance with the parent's capacities (e.g. driven by emotion regulation and mental health, as well as the partnership) and attitude towards the child's behavior. Furthermore, the scale of parent-related parenting stress covers more aspects of parents' perception of their parental role, which shows greater concordance with areas found to be affected by NCEs, such as the feeling of confidence and perception of partner support (see above and discussion of mediation by depressive symptoms).

As only one other study (Lange et al., 2018) differentiated between the effects of NCEs on parent- or child-related parenting stress, this research adds new insight regarding which dimensions of parenting stress are most affected by childhood adversities.

NCEs as an independent predictor of parenting stress explained a relatively small amount of the variance (< 10%; $r^2$ = .02 to $r^2$ = .07), indicating a small effect (Cohen, 1988). The effect was stronger for parent-related stress (from $r^2$ = .06 to $r^2$ = .07) than for child-related stress ($r^2$ = .02 to $r^2$ = .04). The small amount of variance explained is consistent with the findings of a recent study by of Unternaehrer et al. (2019), in which 4% of the variance in parenting stress was explained by CTQ Maltreatment. In Steele et al. (2016)'s study, the amount of variance in parent-related stress explained increased substantially, by 6%, when adding ACE to the regression model. Potential reasons for the low amount of variance explained in this study could be as follows. First, the study sample had fairly high socioeconomic status, and education was an important factor contributing to parenting stress in mothers. Second, I studied a sample with a high educational level and low levels of depressive symptoms and parenting stress, but with similarly high levels of NCEs, suggesting that the parents had come to terms with their experiences in childhood quite well and thus might not experience a significant transmission/spillover to the domain of parenting. This points to other potential sources of resilience and adaptive coping in the sample (such as positive experiences with other important caregivers besides the parents), which would reduce the negative impact of NCEs on psychological functioning. For example, all of the participants were capable of obtaining information about, and subsequently deciding to take part, in a relatively time-intensive intervention program.

Third, several other factors not studied or included in this analysis may explain the extent of parenting stress in the context: mental health, affect regulation, partner and social support, coparenting relationship, relationship with the family of origin today, other current life stressors etc. Given the “complex multifactorial nature” of both NCEs and stress in the parental role, it is reasonable that only a small amount of the variance is explained by a single predictor, as Rijlaarsdam et al. (2014, p. 75) pointed out. Fourth, parenting stress is only one indicator, and not a direct behavioral measure of the parenting experience or behavior, as argued by Unternaehrer et al. (2019); other factors important for responsive parenting and positive child development might also be influenced by NCEs. Fifth, the study relies on parent-reported data only, which can be biased. Especially in the context of NCEs, the process of down-regulating and minimizing strain might be prevalent, although no data on this was found. These factors might reduce the association between NCE and parenting stress. Pereira et al. (2012) further emphasized that the variance explained does not necessarily correspond to the clinical relevance of the effect. Although the effect on parenting stress was shown to be small, it nevertheless could affect parental behavior, and thus the childhood of the offspring, for at least 18 years. Given the relatively high prevalence of NCEs, the effect will be relevant to a large proportion of the population.

Effect of covariates on parenting stress

Regarding the effect of the studied covariates, surprisingly, the higher the paternal education level, the higher the level of parenting stress, and especially the child-related stress, as reported by fathers. One reason for this unexpected finding might be that highly educated fathers felt more pressure to achieve in their new paternal role, and thus experienced a higher level of stress, and the child as more demanding. Furthermore, it was shown previously that partners of women with a higher education and greater income are inclined to play a greater role in household activities (Kitterød, 2002), and to take a higher proportion of paternity leave (Lappegard, 2008); thus, they might experience more stress in the parental role, which might spill over to a perception of the child being more difficult (Skjothaug et al., 2018). Fathers with a higher educational level might also find it more difficult to balance the demands of home and work, as suggested by Skreden et al. (2012).

In contrast to that, mothers with a higher education level reported lower parenting stress. With a higher education, mothers might feel more confident in their role as parent and less stressed by

other factors, such as financial strain. Furthermore, education was found to be an important moderator of the impact of NCEs on later health (Font & Maguire-Jack, 2016). Unternaehrer et al. (2019) and Saisto et al. (2008) did not find an effect of education on parenting stress, although the results are in line with those of Bai and Han (2016) and Steele et al. (2016), who found an equally strong association with family income.

Birth weight of the child was a significant predictor of parenting stress in mothers, but not fathers. This is concordant with the results of Howe et al. (2014) and Schappin et al. (2013). A reason for this might be the physical interconnectedness of the mother and the child during pregnancy and perinatally. Both the greater worries of mothers about the healthy development and weight of the child (i.e. whether they can sufficiently feed and nurture the child) arising from a low birth weight (Schappin et al., 2013), and the influence of the adrenocortical stress system both on fetal growth and birth weight (Duthie & Reynolds, 2013) and on the mother's parenting stress (Rieder, Goshin, Sissoko, Kleshchova, & Weierich, 2019), might account for this significant relation.

Exploratory interpretation: Effect of specific forms of NCE on parenting stress

Research on the effect of NCEs on parenting stress seldom differentiates between the effects of different forms of childhood adversities. Studies on the impact of maltreatment on parenting stress have only been done for sexual abuse (see a review by Hugill et al., 2017), and emotional abuse and neglect (Bai & Han, 2016; Pereira et al., 2012). The results of this study will be discussed without reference to a specific hypothesis. Emotional abuse showed significant relationships with parenting stress in mothers and fathers, whereas the experience of neglect related to parenting stress only in mothers.

Pereira et al. (2012) also found that emotional abuse and neglect in particular were associated with maternal parenting stress. Similarly, Bailey et al. (2012) documented relationships of emotional abuse, neglect and witnessing family violence with the *Sense of Competence* in mothers; these three types of NCEs accounted for 5.1% of the variance. Bai and Han (2016) replicated this finding in mothers, and also showed that fathers' emotional abuse was associated with parenting stress. However, it must be borne in mind that Bai and Han (2016) did not compare with or control for other forms of childhood adversity, so their high comorbidity requires careful interpretation. The results of this research further demonstrate that emotional abuse has a major effect

on new fathers as well. This finding is in line with prior research on parenting generally. Locke and Newcomb (2004) showed that emotional neglect was – above and beyond other forms of childhood adversities – associated with fathers' lack of warmth and indifferent parenting. In mothers, family neglect – i.e. both emotional and physical neglect – was associated with poor parenting practices in the same sample (Newcomb & Locke, 2001).

Research to date has indicated that, in particular, emotional abuse and emotional neglect affect the perception of parenting in mothers (and possibly also emotional abuse in fathers). This can be likely explained in a number of ways. Emotional abuse shows a higher incidence (Witt et al., 2019), and independence (Glaser, 2002), from others forms of child maltreatment, and might therefore have a more prominent effect, especially in non-clinical samples. Furthermore, Hart, Binggeli, and Brassard (1997) concluded in a review that emotional abuse might be common to all forms of child maltreatment. Emotional abuse and neglect were shown to have a specific (Caldwell et al., 2011; Taillieu et al., 2016), and stronger, effect on aspects of mental well-being, such as affective disorders in adulthood, than household dysfunction and sexual abuse (Sullivan, Fehon, Andres-Hyman, Lipschitz, & Grilo, 2006; Westermair et al., 2018) and might thus indirectly have a greater impact on the stress experienced during parenting. Additionally, emotionally abusive or neglectful parenting reduces the likelihood that a coherent and positive picture of the self, and relations to others, will be achieved in the child to a greater extent than other forms of childhood maltreatment (Caldwell et al., 2011; Godbout et al., 2009; Riggs, 2010; Riggs & Kaminski, 2010), as well as the development of adaptive emotion regulation strategies (Burns et al., 2010). Also, specifically in men, emotional abuse in childhood was related to an anxious attachment style in adulthood (Godbout et al., 2009). In women, the transition to parenthood increases emotional vulnerability due to hormonal changes and the process of adaptation to the new role. In both parents, the emotional needs and dependence of the newborn might trigger memories of their own experiences of being emotionally dependent, and maybe even helplessly exposed to fearful, stressed, or even hostile parents ("ghost in the nursery"; Fraiberg et al., 1975, p. 387). These processes mostly remain in the subconscious, but leave the mother with a perception of being helpless and overwhelmed by the parental role, leading to feelings of shame and guilt. Feelings of shame were found to relate to emotional maltreatment in childhood (Webb, Heisler, Call, Chickering, & Colburn, 2007). Blame and hostility experienced when interacting with one's own parents can become an inner voice criticizing the individual in the context of their role as a new

parent. Psychological maltreatment was found to be related to lower self-esteem and self-depreciation in adulthood (Lassri & Shahar, 2012).

For mothers, witnessing domestic violence was related to their experience of parent-related stress. No significant correlation was found for fathers. Westermair et al. (2018) documented that household dysfunction, as measured by the ACE questionnaire (including witnessing domestic violence and substance abuse in parents, for example) was associated specifically with negative health behavior and lower educational and economic achievement, in both women and men. They proposed that model-based learning takes place and results in a deficit of "models for constructive problem-solving and functional emotion regulation" (Westermair et al., 2018, p. 7) strategies in families with household dysfunction, which might increase new mothers' vulnerability to stress in the context of the parental role. Witt et al. (2019) found that witnessing domestic violence in particular predicted a higher likelihood of aggressive behavior in German adults. Similarly, they also reported that household dysfunction related more strongly to negative outcomes than forms of child maltreatment (abuse and neglect). The lack of a significant correlation for fathers could be partly attributed to the significantly lower prevalence in the fathers than mothers in this study.

Experience of parental separation was not correlated with the experience of parenting stress, in either the mothers or fathers in this study, although the rate of parental separation was higher in this study (56.3% in both mothers and fathers) compared to a representative survey on ACEs in Germany (Witt et al., 2019). The finding suggested that parental separation per se did not exert an intergenerational impact on the level of perceived parenting stress. It is more likely that the circumstances and emotional family climate that led to and followed the separation shape the emotional states and vulnerabilities of the offspring and, subsequently, the new parents themselves. These factors might be better represented by scales of emotional neglect and abuse and, in more severe cases, by higher scores for the of witnessing domestic violence.

In concluding this discussion of the impact of specific forms of childhood adversities on parenting stress, it is important to keep in mind that the associations reported were merely correlational, and the variance shared by different forms of adversities was not controlled for. Thus, the findings should be regarded as preliminary, but should also encourage further research to address this gap in the literature.

To summarize the results on the effect of NCEs on parenting stress at the intra-individual level, I found evidence of a *spillover* effect of NCEs from the individual to the parental system. Parent- and child-related parenting stress in mothers, and parent-related parenting stress in fathers, were largely explained by their experiences in their families-of-origin. These findings replicate existing research results and advance the field by addressing the dearth of data on fathers, and differentiating between the two different domains of parenting stress.

## 6.3 Findings at the intra-individual level: mediating effect of perinatal depressive symptoms

NCEs are seen as a distal factor in the ecological model of parenting (Belsky, 1984). Distal factors are assumed to affect parenting indirectly by influencing more proximal factors (Belsky, 1984), such as mental well-being in the perinatal period. In the following, the results on the mediating role of perinatal depressive symptoms will be discussed (Hypothesis 2).

The significance of the mediating effects of pre- and postnatal well-being differed by the source of stress and parent. Prenatal and postnatal depressive symptoms mediated the effect of mother's NCEs on parent-related parenting stress, whereas there was only a trend toward a mediating effect of depressive symptoms in mothers on child-related parenting stress (Hypothesis 2). In fathers, postnatal, but not prenatal, depressive symptoms mediated the effect of NCEs on both child- and parent-related parenting stress (Hypothesis 2). Potential reasons for these disparities will be discussed.

This research extends the limited knowledge on the role of the mental well-being of mothers (Ammerman et al., 2013; Hugill et al., 2017; Shenk et al., 2017; Unternaehrer et al., 2019) and fathers (Skjothaug et al., 2018), as mediating factor in the relation of childhood adversities and perceptions of stress in parenting. New insights were gained, especially for fathers.

Mothers: prediction of depressive symptoms by NCEs

The results for mothers showed that both pre- and postnatal depressive symptoms were predicted by NCE. I observed a stronger effect of NCEs on prenatal than postnatal depressive symptoms. In a serial mediation analysis, the effect of NCEs on postnatal depressive symptoms in mothers was mediated by prenatal depressive symptoms. This investigation thus replicates meta-

analytical findings of a substantial effect of childhood adversities on prenatal depressive symptoms (Shamblaw et al., 2019), and supports the conclusion of a systematic review that childhood adversities exert a greater influence in the antenatal than postnatal period in women (Alvarez-Segura et al., 2014). Furthermore, Fredriksen et al. (2017) found that NCEs were associated with clusters of moderate and persistent prenatal symptoms only, and not with postnatal symptoms. However, there is a growing body of evidence that NCEs also influence postnatal depressive symptoms (McDonnell & Valentino, 2016; Teeters et al., 2016; Unternaehrer et al., 2019). The present results advance the literature, where the analysis of indirect effects showed that the relationship of NCEs to postnatal depressive symptoms was fully mediated by prenatal symptoms in mothers. To my knowledge, the only other study examining this potential mediating effect was published by Leigh and Milgrom (2008). This further supports the notion that NCEs generally increase vulnerability to depression in adulthood (Anda et al., 2006; Dunn et al., 2017; O'Neal et al., 2016), for example through effects on the neuroendocrine system (Carpenter et al., 2009; Gonzalez et al., 2012; Opacka-Juffry & Mohiyeddini, 2012), greater emotional dysregulation (Anda et al., 2006; Bai & Han, 2016) and/or attachment insecurity and disorganization (Riggs & Kaminski, 2010).

Mothers: the effect of NCEs on parent-related parenting stress is mediated by depressive symptoms

In this study, the effect of mother's NCEs on parent-related parenting stress was mediated by pre- and postnatal depressive symptoms. The effect of prenatal symptoms on parent-related stress was partially mediated (by trend) by postnatal depressive symptoms. This is in line with the findings of Ammerman et al. (2013) that depression uniquely linked NCEs to parenting stress in mothers, independent from social support and other mental health symptoms. Similar results were reported by Unternaehrer et al. (2019).

Depression might lead to higher levels of perceived stress in association with the parental role for several reasons: it diminishes the capacity to manage stress and regulate emotions, and reduces drive, which together can lead to feelings of overwhelm in the face of the tasks of parenting. Furthermore, depression impedes bonding between the mother and child (Tester-Jones, O'Mahen, Watkins, & Karl, 2015), which reduces shared joy and reward for the mother (Lovejoy et al., 2000). The importance of assessing NCEs in the context of the transition to parenthood is

underscored by results showing that NCE exacerbated parenting stress from 9 to 18-month postnatal (Shenk et al., 2017).

Postnatal depressive symptoms partially, but not fully, mediated the relationship between prenatal symptoms and parenting stress in the serial mediation model of this study. These findings support the hypothesis that pre- and postnatal depressive symptoms (measured with the BDI) have specific characteristics and have a differential impact on the perception of stress in the parenting role. However, this is contrary to the finding of Leigh and Milgrom (2008) that the effect of prenatal symptoms was mediated by postnatal symptoms in mothers, and concurs with the findings of Saisto et al. (2008) that both pre- and postnatal depressive symptoms in fathers and mother independently predict parenting stress.

In mothers, pre- and postnatal depressive symptoms in particular might differ in terms of somatic complaints. Somatic symptoms, as assessed with the BDI, also often manifest as a part of normal pregnancy (e.g. sleep problems and lower libido), so do not necessarily indicate depressive mood. Depressive symptoms have a deleterious effect on maternal bonding during pregnancy (Dayton et al., 2019) and after birth (Rossen et al., 2016), and might therefore impact specific aspects of parent-related stress in mothers independent of postnatal depressive symptoms (e.g. on the “Attachment” subscale of the PSI). For example, de Cock et al. (2017) reported a significant impact of prenatal bonding on parenting stress, which was mediated by postnatal bonding.

Mothers: the effect of NCEs on child-related parenting stress is mediated by depressive symptoms

The effect of NCEs on child-related parenting stress in mothers showed trend toward being mediated by her prenatal, but not postnatal, depressive symptoms.

The finding of an effect of prenatal, but not postnatal, depressive symptoms on child-related parenting stress in mothers underscores the notion that prenatal well-being in mothers has a lasting effect on child temperament and behavior in the perinatal period. Childhood adversities had an effect on the perception of stress in relation to interactions with the child and child behavior, via prenatal depressive mood (by trend) and independently. The *first pathway* is supported by existing literature. Lee and Hans (2015) also reported a unique effect of prenatal depressive symptoms on child-related parenting stress. Research has shown that women with mental health

problems – which are more prevalent among those with childhood adversities (Anda et al., 2006) – were more likely to have children with a more difficult temperament and problems with behavioral regulation (A. J. Lang et al., 2010; McDonnell & Valentino, 2016; Whitaker, Orzol, & Kahn, 2006). More specifically, studies showed that prenatal depression in mothers had a negative effect on the newborn's physiological (Diego et al., 2004; Gustafsson et al., 2018) and behavioral regulation (Lundy, Field, & Pickens, 1996; Lundy et al., 1999; Zuckerman, Bauchner, Parker, & Cabral, 1990), as well as temperament (Gustafsson et al., 2018; Vedova, 2014). For reviews, see Field (2011) and Kingston, Tough, and Whitfield (2012). Higher levels of crying and fussing, as well as the lower expressiveness of the infants, might increase stress in mothers due to a perception of their infant being demanding, reducing the rewarding effects of interactions with the newborn. Plant et al. (2013)'s study showed that the risk of intergenerational transmission of maltreatment was higher in the presence of maternal *prenatal* depression. Prenatal depressive symptoms can impede the process of maternal prenatal attachment (prenatal bonding) to the unborn (Dayton et al., 2019), which was shown to impact parenting stress (de Cock et al., 2017).

The *second pathway*, i.e. a direct effect of NCEs on child-related parenting stress, might involve other factors discussed in the theory section. Maternal ACEs might have an effect on the behavioral and physiological functioning (Fuchs, Moehler, Resch, & Kaess, 2017) of children, and the mother-child interaction (Fuchs, Möhler, Resch, & Kaess, 2015), even in the absence (i.e. independent from) perinatal mental health problems. Mental health did not mediate the association of emotional availability in the mother-child dyad with maternal abuse history (Fuchs et al., 2015). Less adaptive emotion regulation strategies in adults with childhood adversities (Fuchs et al., 2015; Lyons-Ruth & Block, 1996), and a lack of adequate emotional support (Ammerman et al., 2013), might distort perceptions of the child (e.g. projection of one's own negative feelings onto the child, less differentiation between the self and the child). Higher vigilance with respect to the infant's crying or whining (Wright et al., 2016), and a higher likelihood of interpreting a facial expression as angry (Gibb et al., 2009), in adults with a history of NCEs might promote more negative perceptions of the child. Furthermore, a personal history of childhood abuse and trauma was associated with disorganized patterns of attachment behavior in children (Berthelot et al., 2015; Lyons-Ruth & Block, 1996), which is in turn associated with more challenging child behavior (Fearon, Bakermans-Kranenburg, van Ijzendoorn, Lapsley, & Roisman, 2010). The lack of full

mediation by mental health might be attributable to the limited range of depressive symptoms in this sample, too.

The finding that postnatal depressive symptoms did not predict child-related parenting stress in mothers further implies that whether or not a mother feels depressed postnatally does not influence the extent to which she perceives her child as demanding, or her relationship with the child to be stressful. Postnatal depressive cognitions and emotions did not influence perceptions of the child, i.e. did not reduce the mothers' capacity to maintain a positive view of the child. This is in contrast to the findings of Milgrom and McCloud (1996), who showed that child-related stress was significantly higher in mothers with postnatal depression than in mothers without, although ratings of infant temperament did not differ between groups. Furthermore, it contradicts Thomason et al. (2014), who found that maternal postnatal depressive symptoms predicted later experience of the child as difficult. The differences likely arose from the less severe depressive symptoms, and the small percentage of mothers experiencing clinically relevant symptoms, in this sample. Cornish et al. (2006) suggested that the impact of postnatal depression on child-related stress was dependent on the persistence of depression.

Fathers: prediction of depressive symptoms by NCEs

In fathers, pre- and postnatal well-being were significantly predicted by childhood adversities; in accordance with this, a higher frequency or intensity of NCEs was related to more severe depressive symptoms. The prediction of postnatal depressive symptoms by NCEs was partially mediated by prenatal symptoms.

This is in line with the results of Liu et al. (2019) regarding the impact of emotional abuse in fathers on their postnatal depressive symptoms, and the findings by Skjothaug et al. (2014) and Berthelot, Lemieux, Garon-Bissonnette, Lacharité, and Muzik (2019) regarding the impact on prenatal depressive symptoms. Contrastingly, Berthelot et al. (2020) found no effect of NCEs on prenatal depressive symptoms in fathers. The findings increase our understanding of the impact of NCEs on perinatal well-being, which has been a neglected topic to date. In contrast to mothers, the effect on postnatal depressive symptoms was not fully mediated by prenatal depressive symptoms, suggesting that two independent processes underlie the effect on perinatal depressive symptoms. Scant research on the specific nature of pre- and postnatal depressive symptoms in fathers has been performed, and only tentative hypotheses can be proposed at this stage. One

possibility is that the prenatal period may trigger feelings of exclusion and insecurities regarding one's own competence in child rearing, and the potential impact of the child's birth on the spousal relationship and work life (Morse, Buist, & Durkin, 2000). Furthermore, conflicting ideas on the role of the father (i.e. modern ideas vs. the experiences in the family of origin) could increase depressive mood (Singley & Edwards, 2015). Additionally, the generally higher vulnerability to depressive symptoms of men with childhood adversity could be an important factor (Anda et al., 2006; Dunn et al., 2017). However, information about the level of depressive symptoms prior to the partner's pregnancy is lacking. Data on parents of adolescent children showed that the risk of depression was higher in parents with NCEs, including after the transition to parenthood (O'Neal et al., 2016). In addition to the general increase in uncertainty during pregnancy, the birth of the child might lead to other changes. For example, sudden and lasting changes in the relationship with the partner might increase stress if internal working models of attachment are insecure; the personality and temperament of the child emerge, and dynamics influenced by the father's experiences in the family of origin might affect adaptation to the new role (Pinto, Samorinha, Tendais, & Figueiredo, 2019) and interactions with the newborn. Morse et al. (2000) further suggested that concern with work performance and changes in the sexual relationship with the partner might mask uncertainties and worries about the new parental role and one's own identity during pregnancy. Furthermore, expectations of the postnatal period generated during pregnancy might not accord with the reality, due to a relative lack of information for men and greater emotional distance from the child than experienced by the mother (Chhabra, McDermott, & Li, 2020). This might increase postnatal adaptational stress. Matthey et al. (2000) found that postnatal depressive symptoms, in the absence of prenatal depressive symptoms, were more likely to onset in fathers than mothers. Furthermore, the effect of prenatal depressive symptoms on parent-related parenting stress in fathers was partially (by trend) mediated by postnatal depressive symptoms in the serial mediation analysis; the direct effect was significant. This indicates partial independence of the effect of pre- and postnatal depressive symptoms on parenting stress, supporting the notion that different processes play a role in pre- and postnatal depressive symptoms. However, C. Hughes et al. (2020) found evidence for a single latent factor in paternal depression at various perinatal time points.

Fathers: mediation of the effect of NCEs on parent-related and child-related parenting stress

In fathers, postnatal, but not prenatal, mental well-being was a substantial mediator of the impact of childhood adversities on the perception of stress in their role as a parent, and on their perceptions of child temperament and behavior.

The only other study examining the mediating effect of NCEs found that prenatal depressive symptoms via spousal disharmony (subscale of the PSI) mediated the effect of childhood adversities on child-related parenting stress, but postnatal depressive symptoms did not (Skjothaug et al., 2018). Prino et al. (2016) found a correlation between both pre- and postnatal depressive symptoms and parenting stress in fathers. To date, no study has examined the mediating effect of NCEs on parent-related parenting stress. Liu et al. (2019) showed that the effect of emotional abuse on marital satisfaction (one aspect of parent-related stress) during the transition to parenting was mediated by postnatal depressive symptoms at 6 months. Depression in fathers was associated with lower relationship quality, less coparenting (Bronte-Tinkew, Moore, Matthews, & Carrano, 2007), an increase in conflict and reduction in affection between partners (Ramchandani et al., 2011), and therefore increase perceived stress. In contrast to mothers, postnatal mood in fathers also impacted their child-related parenting stress, suggesting that how fathers felt postnatally was important with respect to their perception of the demandingness of their child; postnatal depression thus modulates the effects of NCE on fathers' perception of their child. The effect remained when including mothers' data in the analysis. So far, no study other than Skjothaug et al. (2018) has examined the specific effect of perinatal depression on child-related parenting stress in fathers. However, Y. Wang (2018) found no effect of paternal depression on perceptions of school-age children. The serial mediational path from paternal NCEs to child-related parenting stress, via pre- and postnatal depressive symptoms, was significant, suggesting that the effect of NCEs on child-related stress is mediated by postnatal depressive symptoms, and that prenatal depressive symptoms account for a significant portion of the variance, along with the aspects of postnatal depressive symptoms responsible via an indirect effect. This is in line with C. Hughes et al. (2020).

Regarding parent-related stress, the mediational effect of postnatal depressive symptoms did not remain significant after including the maternal data in the analysis. Equally, Matthey et al. (2000) found that paternal experiences in the family of origin impacted their postnatal depressive

symptoms shortly after birth, but the impact of couple functioning and maternal well-being on postnatal depression was greater during peripartum. The role of maternal NCEs and depressive symptoms will be discussed in section 6.3 on dyadic effects.

Fathers' prenatal well-being showed a trend toward mediating parent-related stress, but not child-related stress. This finding was unexpected, as prior research by Condon et al. (2004) and Morse et al. (2000) showed that the prenatal period was especially stressful (in term of mental well-being) for fathers-to-be, although symptoms improved at 3 months postnatally and showed few changes thereafter. Furthermore, paternal parenting behavior was found to be dependent on prenatal depression in fathers (S. Wilson & Durbin, 2010). Paternal prenatal depressive symptoms were shown to impede adjustment to the new role (Pinto et al., 2019). Condon et al. (2004) identified the prenatal period as most stressful for fathers, and suggested that, during this time, men anticipate the changes that will occur after child birth and experience higher levels of anxiety and depression, associated with fears of major changes in their role, identity and work life following the birth of the baby (Morse et al., 2000).

When interpreting the mediational effect of paternal depressive symptoms, the possibility that men might express their mental well-being more in domains or behavior such as "gain of weight", misuse of alcohol, relationship and sexual satisfaction, rather than in acknowledging feelings of depressed mood (Condon et al., 2004), should be considered. Condon et al. (2004) found that well-being according to these indicators deteriorated further during transition to parenthood, whereas depressive mood peaked in fathers during pregnancy. Thus, strain in fathers might have been underestimated, as I did not study other indicators of well-being and stress in that group. C. Hughes et al. (2020) reported an exacerbation of depressive affect from the prenatal period to 24-months postnatally in fathers in a latent growth curve analysis.

General considerations and summary of intra-individual effects

Further studies are needed to shed more light on the role of perinatal depressive symptoms as a mediator of the negative effects of NCEs on parenting. There is conflicting evidence on the importance and meaning of pre- and postnatal symptoms, as well as the validity of the measures used (Matthey et al., 2000).

Further analysis of this study's data showed that depressive symptoms were more predictive of parent-related stress, and that the mediating effect of depressive symptoms was more robust for the dimension of parent- than child-related parenting stress.

To date, fewer studies have examined the specific effects of depressive symptoms on child-related stress than on parent-related stress. However, the findings of this study are in line with those of Cornish et al. (2006), McKelvey et al. (2009), Galbally et al. (2019), Le et al. (2017) and Thomason et al. (2014), who all found a significant effect on child-related stress, albeit of less magnitude than in this study. In terms of a potential reason for this, Cornish et al. (2006) documented that the effect of postnatal depression on child-related stress was dependent on the persistence and duration of depression. Mothers with persistent, clinically relevant depressive symptoms further reported greater child-related stress and hostility towards their infant, and also perceived their child's behavior more negatively. Depressive symptoms experienced during a relatively short time period postnatally had a lasting effect on parent-related parenting stress, but not child-related parenting stress, after symptom remission. Hence, the impact on child-related stress might have been limited in this research, as the extent of depressive symptoms was relatively small in both mothers and fathers.

Le et al. (2017) proposed two additional potential reasons. First, child-related stress concentrates solely on interactions with a specific child, whereas parent-related stress encompasses stress experienced in association with parenting in various life domains, such as the partnership, social contacts outside the nuclear family and personal goals in other areas, such as work. Second, the parental distress scale includes items on depressive mood, where this overlap could inflate the effect on parent-related stress. To prevent this, I analyzed models when submitting the "Depression" scale of the PSI, and the results showed that the significance of effects on parent-related stress did not change.

The results of this study show that, both in mothers and fathers, transmission of NCEs in one generation to parenting of the next generation is significantly mediated by perinatal depressive symptoms. The results further indicated a *process of spillover* from the domain of personal well-being and experience in the adult to the domain of parenting, as proposed in *family systems theory* (Cox & Paley, 1997; Erel & Burman, 1995). Parenting stress as an indicator of parenting behavior was shown to mediate the impact of NCEs on parenting sensitivity (Pereira et al., 2012),

and was shown to be associated with an increased risk of child abuse (Gonzalez & MacMillan, 2008; Rodriguez & Green, 1997).

## 6.4 Dyadic processes between parents

The data supported the hypothesis that dyadic processes are important. These processes include an *indirect crossover* of strain in one partner to the other partner's emotional well-being and, consequently, to parenting stress, and/or a *direct crossover* due to compensatory actions taken by one partner when the other partner suffers due to the effects of his/her NCEs.

Direct dyadic crossover effects of NCE on parenting stress

The third hypothesis, i.e. that one partner's NCEs directly impact the other partner's parenting stress, was supported by the finding of an effect of mother's NCEs on father's parent- and child-related parenting stress, but not in terms of a direct impact of NCEs in fathers on mothers; mother's parenting stress was not significantly predicted by father's NCEs.

Bai and Han (2016) – as the only other study on this topic, to the best of my knowledge – also found a partner effect of emotional abuse in mothers on father's parenting stress. However, in opposition to these results, they found an equally strong effect of fathers' NCEs on mother's parenting stress. In relation to trauma generally, rather than childhood adversity specifically, Fredman et al. (2017) found that maternal symptoms of posttraumatic stress disorder impacted paternal parenting stress, but not – in line with findings of this study - vice versa. Contrastingly, O'Neal et al. (2016) found no substantial partner effects of NCEs on mental or physical health, or parenting quality, in a study of families with a member on active duty in the military.

The experiences of mothers in their families of origin thus influenced how stressed father's felt in their role as parent, meaning that the stressful life experiences of a mother in childhood *cross over* to affect the stress experienced by her partner while parenting their child. As illustrated in the theory section, several factors could be involved in this *crossover process* from mother to father, based on research on related topics: these include the quality of and satisfaction with the partnership, the coparenting relationship, emotion regulation capacity (Bai & Han, 2016) and the mental well-being of both parents during the transition to parenthood (see the discussion on mediational processes below). Other studies on the interpersonal effects of childhood adversities

found that parenting behavior deteriorated in fathers from families with maternal childhood abuse (Rijlaarsdam et al., 2014).

As parenting stress in fathers was shown to be associated with more problematic parenting behavior (Le et al., 2017; Ponnet, Wouters, et al., 2013), over and above depressive symptoms in fathers (Ponnet, Wouters, et al., 2013), parenting stress could be an important pathway between a history of maltreatment of the fathers themselves, and also their wives, to maladaptive parenting; this could be focused on in interventions.

This finding corroborates the assumption that fathers are more susceptible than mothers to systemic influences on their parental role, as suggested by the *fathering vulnerability hypothesis* (Cummings et al., 2010). Potential reasons and implications will be discussed in detail below.

Indirect dyadic crossover effects of NCE to parenting stress via perinatal depressive symptoms

The fourth hypothesis, i.e. that partner effects are mediated by perinatal depressive symptoms, was partially supported. The significance of mediational effects was dependent on the dimension of parenting stress, the gender of the parent, and the time of assessment of depressive symptoms; this will be discussed in detail below.

Regarding prediction of paternal parent-related parenting stress, father's postnatal depressive symptoms mediated the effect of maternal NCE on father's stress. Maternal and paternal prenatal depressive symptoms showed a trend toward being a mediator as well. In the serial mediation analysis of pre- and postnatal depressive symptoms, only the indirect path via postnatal depressive symptoms in fathers was significant.

The partner effect of paternal NCEs on maternal parent-related parenting stress was significantly mediated by fathers' postnatal depressive symptoms, and showed a trend toward being mediated by maternal postnatal depressive symptoms. In the direct path model (APIM), no direct partner effect of NCEs on maternal parent-related stress was found. In the serial mediation analysis of indirect effects, the indirect effect via maternal postnatal depressive symptoms showed a trend toward significance, but the indirect effect via postnatal symptoms in fathers was not significant.

As anticipated, both maternal and paternal parent-related and paternal child-related stress (discussed in detail below) were indirectly predicted by the partner's experience of childhood adversities in their family of origin. Parents' own postnatal mental well-being was the primary mediator. This implies that how parents feel between 3 and 6 months postnatally is dependent on the experiences of their partner in the family of origin, and also influences the stress this parent experiences in response to the challenges posed by the parental role. Interestingly, prenatal depressive symptoms in mothers and fathers were not significantly predicted by their partners' NCEs (in mothers: beta =.03; in fathers: beta=.18).

Taken together, these findings suggest that, following the birth of a child, the childhood adversities of partners exert a greater effect on one's own mental well-being, and ability to adapt and cope with the new situation. This might be because maladaptive patterns of interpersonal functioning resulting from NCEs (Murphy et al., 2014; Riggs & Kaminski, 2010) become more salient in the stressful context of being a new parent (Miano et al., 2018), and more important with respect to their partner's parenting experience, leading to greater frustration in the partner (as also described by Ruhlmann et al. (2018)).

In contrast to the findings of this study, Rijlaarsdam et al. (2014) did not find that the partner effect of a maternal history of maltreatment on harsh paternal discipline of their 3-year-old children was mediated by depression and anxiety in fathers; rather, they found that general paternal hostility was a mediator. Furthermore, father's mental well-being was directly affected by a maternal history of maltreatment, supporting my finding. The effect of a paternal history of maltreatment did not serve as a control variable in this research.

The indirect partner effect from fathers' NCEs to mothers' parenting stress revealed by this study must be interpreted with caution, as it does not explain a greater proportion of the variance, and no direct partner effect of NCEs in fathers on mothers' parenting was found (which is a requirement for a mediating effect to be considered significant; Baron & Kenny, 1986). However, other authors argue that, depending on the temporal distance between a predictor and outcome, mediation may occur in the absence of a direct effect (Shrout & Bolger, 2002). Furthermore, other negative indirect effects might reduce the direct effect to nonsignificance, although positive indirect effects are often found (MacKinnon, Krull, & Lockwood, 2000). Liu et al. (2019) found that the

impact of paternal emotional maltreatment on maternal marital satisfaction was mediated by fathers' (actor) postnatal depressive symptoms, indicating processes in the direction from the father to the mother. Furthermore, Bai and Han (2016) found that father's emotional abuse history had an impact on mother's parenting stress via father's emotional dysregulation.

The findings suggest that the effect of partners' NCEs on the parenting stress during the transition to parenthood is predominantly transmitted through one's own perinatal emotional well-being rather than through the emotional well-being of the partner.[9] This finding was unexpected, as both the association of one's own perinatal well-being with one's own NCEs (e.g. Fredriksen et al., 2017; Liu et al., 2019; Skjothaug et al., 2014; Wajid et al., 2020) and the dyadic impact of perinatal depressive symptoms on parenting stress (Le et al., 2017) was recently documented. Further, Bai and Han (2016) found indirect partner effects of both one's own and the partner's emotional dysregulation. The divergence in findings might relate to the focus on emotional abuse in parents and the stress of parenting school-age children. Furthermore, emotional dysregulation might even be more important to the partners' experiences of parenting stress than depressive symptoms, as it might lead to more dysfunctional conflict behavior, aggressive behavior, etc.

There is a paucity of research on the specific impact of childhood adversities on the mental health of partners. Thus, these findings provide new insight into mental health during the transition to parenthood. Generally, traumatization and symptoms of posttraumatic symptoms have been shown to have at least a moderate effect on partners (Godbout et al., 2014; Lambert et al., 2012), although Wheeler et al. (2020) found that general health was not negatively affected by the partner's ACEs.

Furthermore, prenatal depressive symptoms did not contribute to the indirect effects of NCEs on parent-related parenting stress between partners. One reason for this might be that the interdependence of couples increases from the prenatal to postnatal period as the couple relationship, as well as partner support and well-being, become more important. Matthey et al. (2000) found that similarity in extent of depressive symptoms in mothers and fathers increased from the prenatal to postnatal period. Furthermore, the birth of the child might trigger negative feelings in the

[9] However, in the single mediational models this indirect association was significant for the partner effect of paternal NCEs (by postnatal symptoms) and there was a trend toward significance for the partner effect of maternal NCEs (by prenatal symptoms).

parent of their own childhood experiences (Fraiberg et al., 1975), where worries about the child may become existential. For both parents, emotional support by the partner might become even more relevant, as emotional dependency of partners increases.

Dyadic effects with respect to the prediction of child-related parenting stress were divergent and specific in comparison to parent-related stress.

Mothers' prenatal depressive symptoms and fathers' postnatal depressive symptoms significantly mediated the effect of maternal NCEs on paternal child-related parenting stress. The indirect effects were stable in the path analysis.

Fathers' child-related stress was predicted by mothers' prenatal depressive symptoms, but mothers' child-related stress was not predicted by fathers' depressive symptoms. This is in line with the findings of Le et al. (2017), suggesting that a crossover from the parental domain in one partner (depressive symptoms and stress in the parental role) to the child domain in the other partner (how parents perceive the child's temperament and behavior, and their relationship) is more prevalent in fathers than mothers. However, the finding is in contrast to the APIM results of Ponnet, Wouters, et al. (2013), who reported partner effects of equal strength of depressive symptoms on parent-child-communication patterns (a self-rated dimension of child-related parenting stress).

One reason for a more dominant partner effect of mothers on fathers may be that mothers with more severe depressive symptoms cannot be as supportive of the father in interactions with the child, such that the father experiences more stress during interactions. For example, Pedro et al. (2012) found that mother's coparenting support was more important to father's parenting behavior than vice versa. This explanation is not likely to be applicable in this study, as maternal or paternal postnatal depressive symptoms did not mediate the effect of prenatal depressive symptoms, nor did mothers' postnatal symptoms significantly predict father's child-related parenting stress in the serial mediation analysis. Another possible explanation may be that a child whose mother had suffered from depressive symptoms during pregnancy is more irritable and demanding (A. Thompson & Bolger, 1999), as discussed above in the context of intra-individual prediction of child-related stress. This hypothesis is supported by the finding that fathers' pre- and postnatal depressive symptomatology were not associated with an increase in the child-related parenting

stress reported by mothers. Postnatal depressive symptoms in fathers served as a second independent path of dyadic crossover from mother to father.

No significant indirect path was found between maternal child-related stress and paternal NCEs. This was expected, since no direct partner effect was found in the APIM, attributable to the fact that paternal NCE predicted postnatal depressive symptoms in mothers but did not have a substantial effect on child-related stress in mothers.

Discussion of other dyadic effects

Besides the indirect effects of NCEs on partner's parenting stress discussed above, I found additional dyadic effects of depressive symptoms on parenting stress without significantly mediating the prediction by partner NCE.

For example, mothers' parent-related parenting stress was influenced by their partners' postnatal depressive symptomatology. I thus found evidence for a *crossover process* from father's depressive symptoms to mother's perceptions of parenting stress. It is reasonable to expect that women might feel less supported by their partners, more restricted by the parenting role, and more socially isolated and moody if their partners show depressed affect at 3-6 months postnatally and thus less emotionally available and instrumentally supportive (e.g. Saisto et al., 2008). The dyadic impact of depressive symptoms on the other partner's parenting stress may be also explained by a reduction in the quality of the marital relationship as a consequence of depressive moods in one partner (Cummings et al., 2005; F. M. Hughes, Gordon, & Gaertner, 2004), where the quality of the relationship was shown to be a predictor of parenting stress (Camisasca et al., 2014; Gerstein et al., 2009). This is in line with the unidirectional partner effect of postnatal depressive symptoms in fathers on mothers' marital satisfaction that Liu et al. (2019) found. Delvecchio et al. (2015)'s finding that increased postpartum depressive symptoms in fathers were associated with withdrawal during conversations about coparenting supports this assumption. Furthermore, marital support (Nomaguchi, Brown, & Leyman, 2017) and the coparenting relationship (Camisasca et al., 2014) were found to be significant negative predictors of parenting stress in mothers. Because mothers still take on a larger proportion of child-care but now demand a larger contribution from their partners (Lamb, 2000), they may be especially affected if fathers are not able to meet these expectations and therefore suffer even more stress (as also argued by:

Nomaguchi et al., 2017). It is also likely that mothers try to compensate for reduced availability of their partners by increasing their own efforts at home (Bolger et al., 1989) and the extent to which they identify with the parenting role. Nelson et al. (2009) reported that mothers showed more supportive behavior in the context of parenting their preschool children when the father reported more severe depressive symptoms (compensatory partner effect). Nelson et al. (2009) found the same effect for mothers' depressive symptoms and fathers supportive parenting behavior. However, this putative process did not result in higher parent-related stress in the fathers in this study. This finding is in line with the conclusion of Larson and Almeida (1999) that women are more readily affected by their partners emotional states than vice versa – which might be attributable to the greater relevance of the emotional climate of the family to mothers than fathers, as suggested by identity theory (Katz-Wise et al., 2010; Simon, 1992), or greater responsivity and emotional availability of women to husbands with depressed mood, as suggested by Roberts and Krokoff (1990).

Le et al. (2016) found that maternal marital satisfaction during the transition to parenthood was more dependent on coparenting support from the father than vice versa. Contrarily, Fredman et al. (2017) reported greater vulnerability in fathers, where symptoms of posttraumatic stress disorder in first-time mothers impacted paternal parenting stress, but not vice versa.

Importantly, the results of this study also imply that fewer depressive symptoms in fathers predict less parenting stress in mothers. This may even be the most important effect in this sample, given that fathers reported fewer depressive symptoms than mothers during the transition to parenthood. The lower the levels of depressive symptoms in fathers, the more they should be able to support the mothers. As a result, mothers may in turn be more able to cope with the new role, take part in more social activities, and thus feel less restricted by their role.

Mother's prenatal depressive symptoms showed a trend toward having an impact on the father's parent-related parenting stress, although the effect disappeared in the path analysis including both pre- and postnatal depressive symptoms. Thus, maternal perinatal depressive symptoms did not have a substantial effect on parent-related parenting stress in fathers.

No other study has reported on the effect of prenatal depressive symptoms in mothers on fathers' parenting stress. Paulson et al. (2016) found that maternal symptoms did not predict a worsening of the father's depressive symptoms from the pre- to postnatal time. The impact of

postnatal dyadic processes in the direction from the mother to the father may be lower for the following reasons: fathers may be more independent of mothers' emotional well-being in their daily lives if they work full-time, for example, and their parenting stress may derive from other external factors, like occupational workload and the need to provide financially for the family (Doherty et al., 1998). They may also not be expecting as much support from the mother as vice versa, as outlined above. The lack of partner effects in the direction from the mother's depressive symptoms to the father's parenting stress might also be due to the low variance in depressive symptoms in the sample. Furthermore, the timing of the assessment of postnatal depressive symptoms might have been rather late (mean = 5.91 months; *SD* = 4.34), such that the peak burden felt by mothers may have been missed, given the evidence that the severity of depressive symptoms decreases in mothers during the first postnatal year (Cameron et al., 2016; Fredriksen et al., 2019; Matthey et al., 2000). Other studies have reported fairly consistently a substantial effect of mothers' postnatal depressive symptoms on parenting stress in fathers, both at the level of subclinical depressive mood and negative affect (e.g. Le et al., 2017) and at a clinically relevant level of depressive symptomatology (e.g. Egmose et al., 2020; Goodman, 2008; Milgrom & McCloud, 1996).

I did not find indirect effects in the serial mediational model between the pre- and postnatal depressive symptoms of partners. Contrastingly, Morse et al. (2000) documented that postnatal depressive symptoms in mothers were dependent on fathers' prenatal depressive mood, while Fredriksen et al. (2019) found that paternal depressive symptoms were dependent on mothers' prenatal symptoms but not vice versa. Furthermore, attachment style (insecure vs. secure) was a moderator of susceptibility to the partners' perinatal depressive symptoms, and secure attachment served as a buffer against contagion by the depressive symptoms of the partner. As I did not study the parents' attachment representations, I could not determine the dependence of partner effects on this factor. Attachment representations could have served as an indicator of whether the individual has sufficiently processed his or her potential NCEs. Additionally, the primarily subclinical nature of depressive symptoms might have reduced affective contagion between partners.

Summary

In summary, I observed dyadic crossover effects for both parents, but outcomes and aspects/timepoints of depressive mood differed.

Two stable partner effects from fathers to mothers were found: NCEs in fathers predicted postnatal depressive symptoms in mothers, and postnatal symptoms in fathers predicted parent-related stress in mothers. The indirect effect from NCE to parent-related parenting stress only showed a trend toward significance. No indirect effect was found for child-related parenting stress in mothers.

In the direction from mothers to fathers, I observed two direct partner effects of maternal NCEs on postnatal depressive symptoms, and of prenatal depressive symptoms in mothers on child-related stress in fathers. The indirect effect of maternal NCEs on paternal parenting stress via postnatal depressive symptoms in fathers was significant for parent- and child-related parenting stress. Furthermore, maternal prenatal depressive symptoms significantly mediated the effect of NCEs on paternal child-related stress. Interestingly, I did not observe a consistent/significant impact of postnatal depressive symptoms in mothers on parenting stress in fathers.

Dyadic processes in the study sample will be discussed in light of the theoretical background of the study, and the question of whether fathers or mothers are more vulnerable to the partner's affect and behavior.

## 6.5 Interpreting the results in light of the theoretical framework of family systems theory and the ecological model of parenting

The *ecological model of parenting* is multifactorial, including both proximal and distal contextual factors as well as personal characteristics. Both Belsky (1984) and Cabrera et al. (2014), in their adaptation of the model for fathers, defined parental rearing history as a distal factor influencing parenting via more proximal factors, such as mental well-being and other personal characteristics. This study confirmed the propositions of the *ecological model of parenting* by showing that NCEs indirectly impacted parenting experiences via mental well-being. The *ecological model of parenting* also considers the partner of the parent to be a contextual factor influencing parenting. By including both mothers and fathers in the analytic model, this research was able to show that both

partners play a significant role in the other parent's experience of parenting, in terms of NCEs and perinatal depressive symptoms. This is especially true with respect to the impact of the mother on the father. This insight constitutes further evidence of the importance of the shift of emphasis from the individual level to all dyadic relations in a family that *family systems theory* (Belsky, 1981) catalyzed. The analysis of couple interdependence during a critical life event, such as the transition to parenthood, and the finding that NCEs had an effect on the partner's postnatal, but not prenatal, depressive symptoms underscores the proposition of *family systems theory* that systems are adaptive to challenges during transitional periods (Cox & Paley, 1997). Further research on changes in couple interactions prior to pregnancy versus post-birth would increase knowledge on the shift and change in interactional processes triggered by the challenges associated with the transition to parenthood. Additionally, repeated measurement of perinatal depression and parenting stress could provide greater insight into the transactional processes taking place between partners. Cabrera et al. (2014) included transactional processes in their extended model of parenting.

In the present sample, one of the two directions of dyadic processes proposed by family systems theory was evident (Bolger et al., 1989; Erel & Burman, 1995; Nelson et al., 2009), namely *crossover* of strain, affect and stress from one partner to the other partner. However, I did not find evidence for compensatory processes in respect to strain, affect or stress, as proposed by Erel and Burman (1995). Nevertheless, as discussed above, *compensatory* behavior of a parent as a reaction to strain and depressive symptoms in the partner could increase perceived parenting stress.

Family systems theory assumes an interdependence between partners, both in the direction from mother to father and from father to mother (Cox & Paley, 1997). This investigation extended previous findings regarding a predominantly mother-driven influence on the father (e.g. Belsky, 1979; Cummings et al., 2010; Field et al., 2006; Paulson & Bazemore, 2010; Volling & Belsky, 1991), partially supporting the fathering vulnerability hypothesis. The following findings corroborate this assumption: the variance in maternal parenting stress explained did not substantially increase when including the father's data in the model, whereas the variance explained in paternal parenting stress increased in the dyadic models by 3–16%. Additionally, in the APIM model without the mediating effect of depressive symptoms, no direct partner effect from paternal NCEs to maternal parenting stress was found, and there was no indirect path involving child-related stress.

Belsky and Volling (1987) proposed that “the behavior patterns of fathers may simply be more plastic (…). The care that mothers offer babies, on the other hand, may be too highly canalized – by biological imperatives (e.g. breastfeeding), by a lifetime of anticipatory socialization for motherhood and, of course, by contemporary expectations“ (Volling & Belsky, 1991, p. 61). However, I found evidence of greater susceptibility or responsivity of mothers not to father’s NCEs, but rather to fathers’ postnatal well-being, which confirms the hypothesis by Larson and Almeida (1999) and Le et al. (2017) that women are more susceptible/responsive to the paternal well-being, as paternal coping might play a more crucial role in women’s identity as mothers.

I found mother-driven dyadic and father-driven influences for the overall sample. However, it is important to study further the circumstances under which this dyadic process occurs. There may be special conditions under which the nature of dyadic influences is fundamentally different. These might be masked by this dominant process; I had limited ability to perform subgroup analyses because of the relatively small sample size.

I did not differentiate between groups according to the extent of the NCEs in this analysis. However, Galbally et al. (2019) found that the existence of a dyadic effect was dependent on the extent of NCEs. In a group having no or minimal childhood trauma, a buffering effect was found; better emotional support from the partner was associated with less parent-related parenting stress. However, in a group with moderate to severe childhood trauma, emotional support from the partner did not buffer parenting stress.

An alternative explanation for the documented dyadic effects of NCEs on postnatal depressive symptoms in partners and the extent of their parenting stress could involve assortative mating (Mathews & Reus, 2001) or processes that promote similarity between partners before the transition to parenthood. It might be that individuals who suffered from NCEs are more likely to choose partners who are vulnerable to depressive symptoms in challenging situations or experience greater parenting stress themselves, for example due to insecure attachment representations (Godbout et al., 2014; Godbout et al., 2009; Watson et al., 2004). Watson et al. (2004) documented modest similarity between partners in terms of attachment representations. Lustenberger et al. (2008) reported similarity in the care received by the two partners during childhood, independent from demographic characteristics and current mental health. Over the long term, vulnerability to depression and maladaptive relational patterns might increase in couples, as was also

discussed by Godbout et al. (2014) and Riggs et al. (2011). The weak association between extent of NCEs in the couples in this sample ($r$= .161) is however inconsistent with the hypothesis of assortative mating. Furthermore, couples showed a nonsignificant association in prenatal depressive symptoms ($r$= .118).

## 6.6 Strengths and limitations

This research has several strengths that increase the relevance and generalizability of its findings and extend knowledge in this important area of research. First, as fathers are still not generally included in research on parenting (Schoppe-Sullivan & Fagan, 2020), this study makes an important contribution to our knowledge of factors predicting fathering performance, and provides new insight into the interrelation with the mother's mental well-being and childhood experiences. There is also a paucity of research on the impact of NCEs on the transition to fatherhood. Second, the analytical approach to the dyadic data allowed for less biased interpretation of the interindividual relations between variables in mothers and fathers, which was a shortcoming of the vast majority of studies on parenting stress conducted to date. Third, this study was concerned with a time period found to be especially critical to negative influences on the development of children (Bagner, Pettit, Lewinsohn, & Seeley, 2010), and thus extends knowledge regarding promising time points for intervention. Fourth, the longitudinal design facilitated causal interpretations of results and avoided the disadvantages of cross-sectional studies (e.g. Bai & Han, 2016). Fifth, the study showed relationships among NCEs, subclinical levels of depressive symptoms and parenting stress, and shed light on dyadic processes in well-functioning couples, which makes the findings relevant to a large section of the community.

As well as the aforementioned strengths, the following limitations need to be considered:

I studied a relatively high functioning sample, with a high level of education and a restricted range of depressive symptoms and parenting stress. Nevertheless, the amount of reported potentially traumatic childhood experiences was relatively high compared to other studies, indicating strain even in this relatively high functioning sample. In future, studies with more heterogenous samples, with respect to demographic characteristics and functioning, should aim to show whether the findings can be generalized to a larger population. Because the levels of depression were relatively low in this sample, and especially because there were few couples in which both

partners suffered from severe symptoms, generalizing the findings to couples with clinically relevant major depression should be done with great caution.

Furthermore, the associations may be different in populations without institutional support, i.e., no specific intervention during the transition to parenthood; this remains to be demonstrated, however. Furthermore, there were two different intervention groups in the sample. Although cluster analysis was used to control for the effect of group membership, the nature of the effects might still have differed between groups.

The composition of the current sample may be further biased because the couples were self-selected, i.e. put themselves forward to take part in the randomized-controlled trial of an attachment-based parenting program. Such couples may be those experiencing more strain and, as discussed above, having substantial resilience (seeking help as an adaptive reaction to a perceived burden). Replication of the results of this study with a more representative sample would be very useful to determine generalizability of findings.

Although I used a longitudinal design, which generally allows the causality of effects to be inferred, causality in fact could not be fully established, especially with respect to the relationship between depressive symptoms and parenting stress. Thomason et al. (2014) supported the contrary direction of effects, i.e. from parenting stress to depressive symptoms via parent-related stress. As I only measured parenting stress once, I could not make any inferences regarding the course or stability of parenting stress in partners, nor its impact on later depressive symptoms or the interdependency between partners during the first year of the child's life. I was also unable to test alternative models with effects going in the other direction.

Additionally, Vismara et al. (2016) found that parenting stress decreased over the first 6 months postpartum. Therefore, I could have missed the peak in parenting stress and underestimated dyadic interdependencies. To shed more light on the dyadic processes, future studies should measure depression and parenting stress in both mothers and fathers at all time points.

Here, I will discuss some methodological and statistical points that need to be borne in mind when comparing the results to those of other samples and evaluating generalizability.

To assess the variables of interest, I used only self-report measures, which poses the risk of overestimating associations due to the shared variance of the methods, but considerable time

spans laid between the time of assessments. As it was necessary to impute missing data in this sample, the analysis of interdependencies in partners needs to be cross-validated and replicated in further studies. The significance of indirect effects was not estimated by the bootstrapping method, as suggested by Ledermann et al. (2011), because the models were computed using data imputed 50 times (which already provides a range of estimates and CIs). Furthermore, combining a list of imputed data sets with the bootstrapping method is not possible in MPlus 8 (Muthén & Muthén, 1998-2017). I did not control for the potential effect of defensive responding, which would have been possible for the PSI. The PSI includes a defensive responding scale for the following reason: denial of actual strain can lead to lower scores on scales such as the PSI. Nevertheless, it can be assumed that any such denial also affects responses both to items pertaining to the extent of NCEs and the BDI. Controlling for defensive responding on only one scale might even have led to greater distortion. The defensive responding scale was considered by Cross et al. (2018), for example, who showed that predictions of parent-related parenting stress were not affected by controlling for the scale, unlike the predictions of child-related stress.

Potentially, adults who had experienced a greater level of NCEs might “defensively suppress negative thoughts and feelings regarding their child and themselves as parents in an attempt to avoid identifying with their abusive or neglectful caregivers” as Berthelot et al. (2020, p. 92) suggested and this process might lead to an underestimation of the association of NCE with parenting stress. Berthelot et al. (2020, p. 92) further points out, with reference to Fraiberg et al. (1975), that such defensive processes “would represent a breeding ground for the intergenerational transmission of maltreatment”.

As a measure of depression, I used the BDI instead of the more up-to-date BDI-II (A. T. Beck, Steer, & Brown, 1996), as the BDI-II had not yet been published when the study was conceptualized. The TAQ, as a measure of NCEs, is used relatively infrequently in the literature. The use of a more widely adopted measure, such as ACE questionnaire or CTQ, could have increased the comparability of the results. In addition, further analysis of reliability and validity of the TAQ may be needed. Compared to other measures of NCEs, the TAQ uses a broader range and higher number of questions. Prevoo et al. (2017) and Stoltenborgh, van Ijzendoorn, Euser, and Bakermans-Kranenburg (2011) reviewed a series of meta-analyses and showed that the prevalence of reported childhood adversities was higher when more questions were included in the

measure. Although this enhances the measurement in one respect, prevalence might be overestimated. Furthermore, the validity of retrospective reports on childhood experiences has been discussed extensively in the research community, with the conclusion being drawn that agreement between prospective and retrospective assessments was poor (Baldwin, Reuben, Newbury, & Danese, 2019), reflected in underestimation of prevalence (Fergusson, Horwood, & Woodward, 2000). However, the retest-reliability of retrospective measures, and their prospective validity regarding health outcomes, was good (Dube et al., 2003). Thus, retrospective assessments might be able to identify a different group to that identified with prospective assessments (Baldwin et al., 2019). Furthermore, it is important to keep in mind that the TAQ was administered in this research after the Adult Attachment Interview had been conducted, which might have predisposed the respondents to a rather critical view on their own childhood and thus led to overestimation of NCEs.

As in all studies, several other factors could have been considered in the context of the transition to parenthood, parenting stress, negative childhood experience and the analysis of couple interdependence. For example, Scott, Nelson, and Dix (2018) found that a model including all family relations was superior to a model containing only dyadic relations. Anxiety and symptoms of posttraumatic stress disorder are other aspects of mental well-being associated with a history of childhood adversity that might increase parenting stress during the transition to parenthood (Fredman et al., 2017; Skreden et al., 2012; C. K. Wilson, Padrón, & Samuelson, 2017). Another contextual factor not studied was the socioeconomic status of the family, which was found by Lavee et al. (1996) to be important in terms of the level of parenting stress. In addition, I could not control for exposure to trauma in adulthood (exposure to childhood maltreatment increases the risk of trauma in adulthood; e.g. Galbally et al., 2019) or other current stressors, nor for the individual characteristics of the parent or infant, such as personality traits or temperament. As the group of multiparous women and their partners was small, no group-specific analysis of dyadic interdependencies was possible. Variance and mean values for variables of interest did not differ between the groups.

## 6.7 Relevance of findings to child abuse potential and call for specific interventions

John Bowlby stated in 1951 that “A society that values its children must cherish their parents”, (p. 84). This research stresses the importance of looking at both parents – i.e. mothers and fathers – to promote high-quality parenting. NCEs increase the risk of experiencing stress during the critical life event of the transition to parenthood. At the same time, the transition to parenthood represents a time when parents-to-be might reflect on their childhood experiences, learn how to better cope with childhood adversities and thus break the cycle of NCEs. Knowledge about the interplay between the emotional well-being of partners and parenting stress during the transition to parenthood can help reveal times at which interventions could be effectively implemented in the context of NCEs. Parenting stress was shown to be an important indicator of the capacity to parent effectively and responsively. NCEs, such as emotional, physical, or sexual abuse, neglect, and household dysfunction were shown to increase the risk of maladaptive parenting behavior (i.e. child abuse) in the following generation (Assink et al., 2018; Madigan et al., 2019; O'Brien et al., 2019; Simons et al., 1991); moreover, the risk might be increased or reduced depending on the impact of the partner on perinatal depressive symptoms and parenting stress. Child maltreatment and neglect costs Germany between 11 and 30 billion Euros per year (Habetha, Bleich, Weidenhammer, & Fegert, 2012). The costs associated with the negative consequences of less severe NCEs – though probably even more prevalent – have not yet been estimated.

As the prevalence of NCEs was fairly high in a community sample, and was shown to substantially impact the transition to parenthood, it is important to provide trauma-related care during pre-conception, and pre- and perinatal periods, for both women and men. According to Berthelot et al. (2020), to date no intervention has specifically considered the needs of men with a history of NCEs. It is important to routinely assess experiences in the family of origin to provide adequate postnatal care – either through easy to administer questionnaires or a semi-structured interview, like the Adult Attachment Interview (George, Kaplan, & Main, 1996). Steele et al. (2016) suggested applying the AAI in parents with ACEs in more than four domains. It is essential to keep the specific effects of childhood adversities on parenthood in mind when offering interventions during the transition to parenthood. As perinatal depressive symptoms were found to be an important factor in parenting stress at both the intra-individual and dyadic levels, screening for de-

pressive symptoms in both mothers and fathers is required. Generally, screening and interventions during the transition to parenthood should consider the interdependence of partners in terms of their psychological well-being and capacity to parent. Both partners should take part in interventions and engage with any support provided to increase the quality of the coparenting relationship, reduce symptom contagion, and buffer adverse effects.

## 6.8 Conclusion

This study adds to the growing body of research analyzing both partners simultaneously and thus controlling for their shared variance in APIMeMs. It replicates findings on the impact of NCEs on perinatal depressive symptoms in mothers, and advances knowledge on its impact on parenting stress and fathers generally. Furthermore, it breaks new ground by providing evidence of the dyadic interdependence in partners regarding the impact of NCEs on parenting. Processes of crossover play a significant role in the extent of parenting stress, especially in fathers, and should not be neglected. In future studies, both depression and parenting stress in mothers and fathers should thus be measured more frequently during the transition to parenthood to provide a more detailed picture of dyadic influences and possible times at which interventions should begin.

Moreover, the results support the need for thorough screening of NCEs and emotional well-being of mothers and fathers alike, and the need for an appropriate system of support during the transition to parenthood to buffer and prevent the onset of a vicious circle of depression in one partner, followed by heightened parenting stress in both parents and, consequently, greater vulnerability to maladaptive parenting behaviors, with all the well-known negative consequences for both parents and children.

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# Appendix A: Detailed information on the imputation routine

Multiple imputation of missing data was considered the most suitable way of dealing with missing data at the scale level, while retaining maximum statistical power, as simulation studies suggested that imputation of missing data leads to more accurate, less biased results than simply omitting whole cases (Lüdtke et al., 2007; Newman, 2009). Little's MCAR test (performed in SPSS 24) showed that missing data on the BDI and PSI in the sample were completely random ($X^2$ = 101.23, *df* = 100, *p* = .447 n.s.), such that one important requirement for multiple imputation was met. Missing data were imputed in MPlus 8 using MLR estimation, with data values restricted to the range of values in the used scales. To improve estimation of missing values, auxiliary variables – predicting either the absence of values and/or the value of variables with missing data – were included in the multiple imputation procedure, as suggested by Spratt et al. (2010). Figure A1 shows the MPLUS syntax used. Data on NCEs was complete in both parents (*N*=112). Data on prenatal depression was missing for three women and, for three men. Proportion of missing data on postnatal depression was 36.6% on mothers and 33.9% on fathers. Data on parenting stress was missing for 15.2% of mothers and 26.8% of fathers. The following variables were included as auxiliary variables: age of mother, age of father, education level of father, history of psychotherapy in the mother and father, postnatal depression at T3 in the mother measured by the BDI, postnatal depression at T3 in the mother and father as measured by Edinburgh Postnatal Depression Scale (EPDS), TAQ total scale score (including adulthood) for the mother and father, TAQ positive experiences scale score for the mother and father, number of domains affected on the TAQ, PSI total scale score for the mother and father, Impact of Event Scale score for the mother and father (IES), score on the questionnaire on relationship functioning for the mother and father, and State Trait Anxiety Inventory (STAI Trait or State) pre- and postnatal scores for the mother and father. Table A1 and A2 depict zero-order correlations with "variable values" and "missing values".

Table A1

*Zero-order correlation of missing variables with auxiliary variables before imputation of missing data*

| Variable | | BDI pre M | BDI pre F | BDI post M | BDI post F | PSI PD M | PSI CD M | PSI PD F | PSI CD F | PSI PD-DP M | PSI PD-DP F |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Age M | *r* | -.018 | .096 | -.023 | .052 | -.046 | -.095 | .158 | -.085 | -.027 | .178 |
| | *n* | 108 | 108 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| Age F | *r* | -.085 | .146 | .019 | .075 | -.104 | -.090 | .155 | -.086 | -.084 | .183 |
| | *n* | 107 | 107 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| Education M | *r* | -.162 | -.167 | -.059 | -.381** | -.243* | -.114 | -.134 | -.185 | -.241* | -.153 |
| | *n* | 108 | 108 | 70 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| Education F | *r* | -.080 | -.095 | -.134 | -.085 | -.138 | -.002 | -.032 | .100 | -.119 | -.043 |
| | *n* | 109 | 109 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| Psycho-therapy M | *r* | .278** | .132 | .230 | .234* | .151 | .048 | .161 | .184 | .138 | .176 |
| | *n* | 103 | 103 | 70 | 73 | 95 | 95 | 80 | 80 | 95 | 80 |
| Psycho-therapy F | *r* | .169 | .253** | .355** | .312** | .014 | -.047 | .207 | .054 | .002 | .209 |
| | *n* | 104 | 105 | 70 | 74 | 95 | 95 | 81 | 81 | 95 | 81 |
| BDI T3 M | *r* | .371** | .222 | .586** | .288* | .603** | .338** | .272* | .263 | .572** | .282* |
| | *n* | 67 | 68 | 59 | 60 | 68 | 68 | 53 | 53 | 68 | 53 |
| BDI T3 F | *r* | .109 | .528** | .230 | .542** | .064 | .068 | .450** | .310* | .052 | .436** |
| | *n* | 64 | 65 | 55 | 58 | 64 | 64 | 59 | 59 | 64 | 59 |
| EPDS T3 M | *r* | .345** | .151 | .459** | .177 | .486** | .450** | .172 | .281* | .453** | .181 |
| | *n* | 75 | 76 | 65 | 66 | 77 | 77 | 62 | 62 | 77 | 62 |
| EPDS T3 F | *r* | .060 | .513** | .297* | .609** | .162 | .073 | .476** | .344* | .160 | .479** |
| | *n* | 61 | 63 | 52 | 56 | 60 | 60 | 55 | 55 | 60 | 55 |
| STAI State | *r* | .354** | .105 | .229 | .124 | .396** | .345** | .228* | .319** | .397** | .211 |
| pre M | *n* | 108 | 108 | 71 | 74 | 94 | 94 | 81 | 81 | 94 | 81 |
| STAI Trait | *r* | .615** | .043 | .270* | .097 | .441** | .328** | .318** | .410** | .407** | .298** |
| pre M | *n* | 108 | 108 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| STAI State | *r* | .325** | .105 | .392** | .091 | .583** | .482** | .315* | .480** | .587** | .316* |
| T3 M | *n* | 71 | 72 | 64 | 66 | 73 | 73 | 59 | 59 | 73 | 59 |
| STAI Trait | *r* | .447** | .153 | .481** | .216 | .675** | .472** | .346** | .430** | .646** | .337** |
| T3 M | *n* | 70 | 71 | 64 | 65 | 72 | 72 | 58 | 58 | 72 | 58 |
| STAI State | *r* | .297** | .239* | .115 | .165 | .168 | .151 | .405** | .297** | .156 | .387** |
| pre F | *n* | 108 | 109 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| STAI Trait | *r* | .237* | .486** | .155 | .237* | .197 | .156 | .395** | .257* | .187 | .379** |
| pre F | *n* | 106 | 107 | 69 | 72 | 93 | 93 | 80 | 80 | 93 | 80 |
| STAI State | *r* | .104 | .438** | .171 | .331** | .178 | .102 | .399** | .250 | .186 | .377** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T3 F | *n* | 64 | 65 | 56 | 61 | 63 | 63 | 58 | 58 | 63 | 58 |
| STAI Trait | *r* | .207 | .486** | .134 | .401** | .168 | .111 | .534** | .350** | .176 | .510** |
| T3 F | *n* | 64 | 65 | 56 | 61 | 63 | 63 | 58 | 58 | 63 | 58 |
| IES pre M | *r* | .396** | .194 | .307* | .173 | .236* | .255* | .122 | .137 | .250* | .128 |
| | *n* | 101 | 101 | 64 | 68 | 87 | 87 | 75 | 75 | 87 | 75 |
| IES pre F | *r* | -.072 | .253* | .049 | .191 | -.154 | -.168 | .045 | -.009 | -.164 | .055 |
| | *n* | 98 | 98 | 64 | 68 | 90 | 90 | 76 | 76 | 90 | 76 |
| Partnership quality M | *r* | .441** | .176 | .184 | .205 | .354** | .250* | .210 | .190 | .326** | .199 |
| | *n* | 108 | 108 | 71 | 74 | 94 | 94 | 81 | 81 | 94 | 81 |
| Partnership quality F | *r* | .387** | .128 | .213 | .262* | .259* | .211* | .310** | .281* | .243* | .309** |
| | *n* | 107 | 108 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| TAQ M with adulthood | *r* | .439** | .214* | .274* | .352** | .212* | .202 | .319** | .246* | .190 | .318** |
| | *n* | 109 | 109 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| TAQ F with adulthood | *r* | .095 | .368** | .207 | .388** | .097 | .144 | .322** | .232* | .065 | .315** |
| | *n* | 109 | 109 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| TAQ M nurture | *r* | -.343** | -.233* | -.291* | -.186 | -.296** | -.199 | -.264* | -.287** | -.286** | -.252* |
| | *n* | 109 | 109 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| TAQ F nurture | *r* | -.108 | -.174 | -.233 | -.207 | -.063 | -.077 | -.347** | -.223* | -.077 | -.369** |
| | *n* | 109 | 109 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| TAQ | *r* | .368** | .195* | .296* | .353** | .195 | .195 | .301** | .300** | .171 | .298** |
| number M | *n* | 109 | 109 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| TAQ | *r* | .122 | .291** | .196 | .320** | .095 | .135 | .234* | .206 | .061 | .224* |
| number F | *n* | 109 | 109 | 71 | 74 | 95 | 95 | 82 | 82 | 95 | 82 |
| PSI Total Score M | *r* | .362** | .039 | .405** | .268* | .954** | .909** | .249* | .453** | .948** | .234* |
| | *n* | 92 | 94 | 68 | 70 | 95 | 95 | 77 | 77 | 95 | 77 |
| PSI Total Score F | *r* | .370** | .244* | .289* | .478** | .311** | .443** | .898** | .876** | .323** | .881** |
| | *n* | 79 | 81 | 54 | 59 | 77 | 77 | 82 | 82 | 77 | 82 |

*Note*. *$p$< .05, **$p$< .01; M = Mother; F= Father.

Table A2

*Point-biserial correlation of missing variables (0,1) with auxiliary variables before imputation of missing data*

| Variable | | BDI pre M miss | BDI pre F miss | BDI post M miss | BDI post F miss | PSI M miss | PSI F miss |
|---|---|---|---|---|---|---|---|
| Age M | *r* | -.036 | .052 | -.037 | .069 | .052 | .132 |
| | *n* | 111 | 111 | 111 | 111 | 111 | 111 |
| Age F | *r* | -.057 | .076 | -.008 | .132 | -.022 | .063 |
| | *n* | 110 | 110 | 110 | 110 | 110 | 110 |
| Education M | *r* | -.014 | .130 | -.006 | -.016 | .154 | .013 |
| | *n* | 111 | 111 | 111 | 111 | 111 | 111 |
| Education F | *r* | -.103 | -.041 | -.056 | -.106 | .044 | .009 |
| | *n* | 112 | 112 | 112 | 112 | 112 | 112 |
| Psycho-therapy M | *r* | -.167 | -.054 | .133 | .074 | -.086 | .055 |
| | *n* | 106 | 106 | 106 | 106 | 106 | 106 |
| Psycho-therapy F | *r* | -.049 | -.096 | -.002 | .103 | -.102 | .031 |
| | *n* | 107 | 107 | 107 | 107 | 107 | 107 |
| BDI T3 M | *r* | .057 | .092 | .074 | .035 | .066 | -.055 |
| | *n* | 69 | 69 | 69 | 69 | 69 | 69 |
| BDI T3 F | *r* | .073 | .051 | -.250* | .068 | .019 | .112 |
| | *n* | 66 | 66 | 66 | 66 | 66 | 66 |
| EPDS T3 M | *r* | .005 | .072 | .031 | .006 | .[b] | -.183 |
| | *n* | 77 | 77 | 77 | 77 | 77 | 77 |
| EPDS T3 F | *r* | .068 | .[b] | -.138 | .253* | .143 | .219 |
| | *n* | 63 | 63 | 63 | 63 | 63 | 63 |
| STAI State pre M | *r* | -.023 | -.030 | -.013 | -.048 | -.098 | /-.087 |
| | *n* | 111 | 111 | 111 | 111 | 111 | 111 |
| STAI Trait pre M | *r* | -.080 | .102 | .102 | -.023 | .090 | -.010 |
| | *n* | 111 | 111 | 111 | 111 | 111 | 111 |
| STAI State | *r* | -.209 | -.011 | .169 | -.113 | .[b] | .029 |
| T3 M | *n* | 73 | 73 | 73 | 73 | 73 | 73 |
| STAI Trait | *r* | -.038 | .070 | .220 | -.072 | .[b] | -.180 |
| T3 M | *n* | 72 | 72 | 72 | 72 | 72 | 72 |
| STAI State pre F | *r* | -.062 | .170 | -.022 | .014 | -.049 | -.086 |
| | *n* | 111 | 111 | 111 | 111 | 111 | 111 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| STAI Trait pre F | *r* | .110 | .117 | -.057 | -.040 | -.055 | .064 |
| | *n* | 109 | 109 | 109 | 109 | 109 | 109 |
| STAI State | *r* | -.025 | .147 | .006 | .143 | .082 | .225 |
| T3 F | *n* | 66 | 66 | 66 | 66 | 66 | 66 |
| STAI Trait | *r* | .002 | .168 | -.038 | .036 | .072 | .230 |
| T3 F | *n* | 66 | 66 | 66 | 66 | 66 | 66 |
| IES pre M | *r* | -.040 | .006 | .002 | .002 | .002 | -.023 |
| | *n* | 104 | 104 | 104 | 104 | 104 | 104 |
| IES pre F | *r* | .055 | -.032 | -.145 | -.067 | -.008 | -.085 |
| | *n* | 101 | 101 | 101 | 101 | 101 | 101 |
| Partnership quality M | *r* | .026 | -.165 | -.061 | -.155 | -.166 | -.124 |
| | *n* | 111 | 111 | 111 | 111 | 111 | 111 |
| Partnership quality F | *r* | -.018 | .110 | -.019 | -.035 | -.047 | -.045 |
| | *n* | 110 | 110 | 110 | 110 | 110 | 110 |
| TAQ M with adulthood | *r* | -.056 | -.020 | -.016 | -.273** | -.110 | -.107 |
| | *n* | 112 | 112 | 112 | 112 | 112 | 112 |
| TAQ F with adulthood | *r* | .097 | -.066 | -.076 | .005 | -.014 | -.097 |
| | *n* | 112 | 112 | 112 | 112 | 112 | 112 |
| TAQ M nurture | *r* | .082 | .015 | .184 | .198* | .093 | -.024 |
| | *n* | 112 | 112 | 112 | 112 | 112 | 112 |
| TAQ F | *r* | -.041 | -.088 | .087 | .0337 | .076 | -.128 |
| nurture | *n* | 112 | 112 | 112 | 112 | 112 | 112 |
| TAQ | *r* | -.045 | -.089 | .008 | -.255** | -.147 | -.098 |
| number M | *n* | 112 | 112 | 112 | 112 | 112 | 112 |
| TAQ | *r* | .123 | -.067 | -.097 | -.002 | <.001 | -.115 |
| number F | *n* | 112 | 112 | 112 | 112 | 112 | 112 |
| PSI Total Score M | *r* | -.118 | .098 | .059 | -.061 | .[b] | -.053 |
| | *n* | 95 | 95 | 95 | 95 | 95 | 95 |
| PSI Total Score F | *r* | -.117 | .118 | .0179 | <-.001 | -.166 | .[b] |
| | *n* | 82 | 82 | 82 | 82 | 82 | 82 |

*Note*. *$p$< .05, **$p$< .01; M = Mother; F= Father; b = at least one of the variables is constant.

**MPlus Syntax on data imputation**

```
TITLE: Imputation of Missing data
DATA: FILE = "Pub2_Imp_20190828.dat";
VARIABLE:
NAMES = Code KontvInt Geschlecht_Kind AlterM AlterV GG Bild_M Bild_V Psycho_M Psy-
cho_V TAQ_M TAQ018M TAQ_nurt_M TAQ_V TAQ018V TAQ_nurt_V Kurs_M Kurs_V
PSI_M_CD PSI_M_PD PSI_M_TS PSIMPDdepr PSI_V_CD PSI_V_PD PSI_V_TS PSIVPD-
depr BDIT1M BDIT1V BDIT3M BDIT3V BDIT4M BDIT4V EPT1_M EPT1_V EPT2_M EPT2_V
EPT3_M EPT3_V EPT4_M EPT4_V SCL27T1M SCL27T4M SCL27T1V SCL27T4V
STAITrT1M STAITrT1V STAITrT4M STAITrT4V STAIStT1M STAIStT1V STAIStT4M STAI-
StT4V IEST1M IEST1V IEST3M IEST3V FBZ_M FBZ_V ICQT4MDIFF ICQT4VDIFF
TAQ_BelM TAQ_BelV;
MISSING=.;

USEVAR = KontvInt Geschlecht_Kind
    GG Bild_M TAQ018M TAQ018V  Kurs_M Kurs_V
    PSI_M_CD PSI_M_PD PSIMPDdepr PSI_V_CD PSI_V_PD
    PSIVPDdepr
    BDIT1M BDIT1V BDIT3M
    BDIT3V BDIT4V EPT1_M EPT1_V EPT2_M
    EPT2_V EPT3_M EPT3_V SCL27T1M SCL27T4M
    SCL27T1V SCL27T4V
    IEST3M IEST3V ICQT4MDIFF ICQT4VDIFF;

auxiliary = AlterM AlterV Bild_V Psycho_M Psycho_V TAQ_M BDIT4M EPT4_M EPT4_V
   TAQ_V PSI_M_TS PSI_V_TS IEST1M IEST1V FBZ_M FBZ_V STAITrT1M STAITrT1V
   STAITrT4M STAITrT4V STAIStT1M STAIStT1V STAIStT4M STAIStT4V TAQ_BelM
   TAQ_BelV TAQ_nurt_M TAQ_nurt_V Code;

DATA IMPUTATION:

impute = PSI_M_CD PSI_M_PD PSIMPDdepr
    PSI_V_CD PSI_V_PD PSIVPDdepr
    BDIT1M BDIT1V BDIT3M
    BDIT3V;

values = BDIT1M
BDIT1V BDIT3M BDIT3V (0-63);
values = PSI_M_CD PSI_V_CD (47-235);
values = PSI_M_PD PSI_V_PD (54-270);
values = PSIMPDdepr PSIVPDdepr (45-225);

ROUNDING = BDIT1M
BDIT1V BDIT3M BDIT3V
PSI_M_CD PSI_M_PD PSI_V_CD PSI_V_PD (0);

ndatasets = 50;

save = Pub2Imp20190828t_*.dat;

ANALYSIS:
estimator = mlr;
```

*Figure A1.* MPlus syntax for missing data imputation.

Tables A3 and A4 contain descriptive data and zero-order correlation of the main variables before missing data imputation. Comparison with the descriptive data and zero-order correlations of the

imputed data set (depicted in Tables 2 and 3 in the main text) revealed only minor differences in means, standard deviations as well as height and significance of correlation.

Table A3

*Descriptive data on depression and parenting stress in mothers and fathers before imputation of missing data*

| Variable | Mother | | | | | Father | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *n* (% of N) | *M* | *SD* | min | max | *n* (% of N) | *M* | *SD* | min | max |
| TAQ | 112 (100) | 19.80 | 17.15 | 0 | 73.17 | 112 (100) | 14.43 | 11.31 | 0 | 46.08 |
| BDI pre | 109 (97.3) | 7.62 | 5.02 | 0 | 27 | 109 (97.3) | 4.20 | 3.63 | 0 | 17 |
| BDI post | 71 (63.4) | 5.83 | 4.11 | 0 | 22 | 74 (66.1) | 3.11 | 3.46 | 0 | 16 |
| PSI PD | 95 (84.8) | 110.38 | 25.60 | 68 | 204 | 82 (73.2) | 101.21 | 17.88 | 57 | 156 |
| PSI CD | 95 (84.8) | 86.41 | 18.49 | 56 | 142 | 82 (73.2) | 85.72 | 16.31 | 56 | 138 |
| PSI PD-DP | 95 (84.8) | 94.60 | 20.39 | 58 | 170 | 82 (73.2) | 88.65 | 16.10 | 48 | 136 |

*Note.* *N* = 112. TAQ = Trauma Antecedents Questionnaire; BDI = Beck Depression Inventory; pre = prenatal; post = postnatal; PSI PD = Parenting Stress Index Parent Domain; PSI CD = Parenting Stress Index Child Domain; PSI PD-DP = modified Parent Domain with Depression subscale excluded.

Table A4

*Zero-order correlations (Pearson) between NCEs, postnatal depressive symptomatology and parenting stress in mothers and fathers before imputation of missing data*

| | variable | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TAQ M | *r* | 1 | | | | | | | | | | | |
| | | *n* | 112 | | | | | | | | | | | |
| 2 | TAQ F | *r* | .161 | 1 | | | | | | | | | | |
| | | *n* | 112 | 112 | | | | | | | | | | |
| 3 | BDI pre M | *r* | .409** | .088 | 1 | | | | | | | | | |
| | | *n* | 109 | 109 | 109 | | | | | | | | | |
| 4 | BDI pre F | *r* | .213* | .339** | .101 | 1 | | | | | | | | |
| | | *n* | 109 | 109 | 106 | 109 | | | | | | | | |
| 5 | BDI post M | *r* | .261* | .216 | .385** | .168 | 1 | | | | | | | |
| | | *n* | 71 | 71 | 69 | 70 | 71 | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | BDI post F | *r* | .355** | .320** | .283* | .511** | .260* | 1 | | | | | |
| | | *n* | 74 | 74 | 72 | 73 | 64 | 74 | | | | | |
| 7 | PSI PD M | *r* | .217* | .102 | .372** | .067 | .451** | .267* | 1 | | | | |
| | | *n* | 95 | 95 | 92 | 94 | 68 | 70 | 95 | | | | |
| 8 | PSI CD M | *r* | .205* | .151 | .289** | -.006 | .267* | .225 | .742** | 1 | | | |
| | | *n* | 95 | 95 | 92 | 94 | 68 | 70 | 95 | 95 | | | |
| 9 | PSI PD F | *r* | .341** | .253* | .254* | .314** | .324* | .475** | .224 | .249* | 1 | | |
| | | *n* | 82 | 82 | 79 | 81 | 54 | 59 | 77 | 77 | 82 | | |
| 10 | PSI CD F | *r* | .284** | .195 | .408** | .108 | .188 | .375** | .334** | .550** | .574** | 1 | |
| | | *n* | 82 | 82 | 79 | 81 | 54 | 59 | 77 | 77 | 82 | 82 | |
| 11 | PSI PD-DP M | *r* | .198 | .067 | .332** | .057 | .438** | .269* | .990** | .743** | .240* | .340** | 1 |
| | | *n* | 95 | 95 | 92 | 94 | 68 | 70 | 95 | 95 | 77 | 77 | 95 |
| 12 | PSI PD-DP F | *r* | .335** | .243* | .251* | .307** | .348** | .487** | .214 | .229* | .992** | .551** | .231* |
| | | *n* | 82 | 82 | 79 | 81 | 54 | 59 | 77 | 77 | 82 | 82 | 77 |

*Note*. *$p$< .05, ** $p$< .01; M = Mother; F= Father; TAQ = Trauma Antecedents Questionnaire; BDI = Beck Depression Inventory; pre = prenatal; post = postnatal; PSI PD = Parenting Stress Index Parent Domain; PSI CD = Parenting Stress Index Child Domain; PSI PD-DP = modified Parent Domain with Depression subscale excluded.

# Appendix B: Detailed information and additional results for APIMs and APIMeMs

Figure B1 depicts MPLUS syntax for APIMeM 1 and APIMeM 5 (constrained), including estimation of indirect effects as an example of the analytic routine for the APIMs and APIMeMs.

**MPLUS syntax Model 1**

```
TITLE: Your title goes here
DATA: FILE = "Pub2Imp20190828t_list.dat";
  type = imputation;

VARIABLE:
NAMES =  KONTVINT GESCHLEC GG BILD_M TAQ018M TAQ018V KURS_M KURS_V
PSI_M_CD PSI_M_PD PSIMPDDE PSI_V_CD PSI_V_PD PSIVPDDE BDIT1M BDIT1V
BDIT3M BDIT3V BDIT4V EPT1_M EPT1_V EPT2_M EPT2_V EPT3_M EPT3_V SCL27T1M
SCL27T4M SCL27T1V SCL27T4V IEST3M IEST3V ICQT4MDI ICQT4VDI ALTERM ALTERV
BILD_V PSYCHO_M PSYCHO_V TAQ_M BDIT4M EPT4_M EPT4_V TAQ_V PSI_M_TS
PSI_V_TS IEST1M IEST1V FBZ_M FBZ_V STAITRT1M STAITRT1V STAITRT4M
STAITRT4V STAISTT1M STAISTT1V STAISTT4M STAISTT4V TAQ_BELM TAQ_BELV
TAQ_NURM TAQ_NURV CODE;
MISSING=*;
   cluster = KontvInt;

USEVAR = TAQ018M TAQ018V BDIT1M BDIT1V PSI_M_PD
   PSI_V_PD;
ANALYSIS:
  estimator= mlr;
  type = complex;

MODEL:

   PSI_M_PD On TAQ018M (ca1);
   PSI_M_PD On BDIT1M (ba1);
   PSI_V_PD ON TAQ018V (ca2);
   PSI_V_PD ON BDIT1V (ba2);

   PSI_M_PD On TAQ018V (cp1);
   PSI_M_PD On BDIT1V (bp1);

   PSI_V_PD ON TAQ018M (cp2);
   PSI_V_PD ON BDIT1M (bp2);

   BDIT1M ON TAQ018M (aa1);
   BDIT1M ON TAQ018V (ap1);
   BDIT1V ON TAQ018V (aa2);
   BDIT1V ON TAQ018M (ap2);

   TAQ018M with TAQ018V;
   BDIT1M with BDIT1V;
   PSI_M_PD with PSI_V_PD;

Model Constraint:

   new (aa1_ba1);
   aa1_ba1 = aa1 * ba1;

   new (aa2_ba2);
   aa2_ba2 = aa2 * ba2;
```

```
   new (ap2_bp1);
   ap2_bp1 = ap2 * bp1;

   new (ap1_bp2);
   ap1_bp2 = ap1 * bp2;

   new (aa1_bp2);
   aa1_bp2 = aa1 * bp2;

   new (aa2_bp1);
   aa2_bp1 = aa2 * bp1;

   new (ap2_ba2);
   ap2_ba2 = ap2 * ba2;

   new (ap1_ba1);
   ap1_ba1 = ap1 * ba1;

OUTPUT:
STDYX SAMPSTAT res cinterval;
```

**MPLUS syntax Model 5 (constrained)**

```
TITLE: serial mediation APIMeM Parent Domain (constrained)
DATA: FILE = "Pub2Imp20190828t_list.dat";
  type = imputation;

VARIABLE:
NAMES = KONTVINT GESCHLEC GG BILD_M TAQ018M TAQ018V KURS_M KURS_V
PSI_M_CD PSI_M_PD PSIMPDDE PSI_V_CD PSI_V_PD PSIVPDDE BDIT1M BDIT1V
BDIT3M BDIT3V BDIT4V EPT1_M EPT1_V EPT2_M EPT2_V EPT3_M EPT3_V SCL27T1M
SCL27T4M SCL27T1V SCL27T4V IEST3M IEST3V ICQT4MDI ICQT4VDI ALTERM ALTERV
BILD_V PSYCHO_M PSYCHO_V TAQ_M BDIT4M EPT4_M EPT4_V TAQ_V PSI_M_TS
PSI_V_TS IEST1M IEST1V FBZ_M FBZ_V STAITRT1M STAITRT1V STAITRT4M
STAITRT4V STAISTT1M STAISTT1V STAISTT4M STAISTT4V TAQ_BELM TAQ_BELV
TAQ_NURM TAQ_NURV CODE;
MISSING=*;
   cluster = KontvInt;

USEVAR = TAQ018M TAQ018V BDIT1M BDIT1V BDIT3M BDIT3V PSI_M_PD
   PSI_V_PD;

ANALYSIS:
   estimator= mlr;
   type = complex;

MODEL:

   PSI_M_PD On TAQ018M@0 (ca1);
   PSI_M_PD On BDIT1M (b1a1);
   PSI_M_PD On BDIT3M (b2a1);

   PSI_V_PD ON TAQ018V@0 (ca2);
   PSI_V_PD ON BDIT1V (b1a2);
   PSI_V_PD ON BDIT3V (b2a2);

   PSI_M_PD On TAQ018V@0 (cp1);
   PSI_M_PD On BDIT1V@0 (b1p1);
   PSI_M_PD On BDIT3V (b2p1);

   PSI_V_PD ON TAQ018M@0 (cp2);
```

```
    PSI_V_PD ON BDIT1M@0 (b1p2);
    PSI_V_PD ON BDIT3M (b2p2);

    BDIT1M ON TAQ018M (a1a1);
    BDIT1M ON TAQ018V@0 (a1p1);

    BDIT1V ON TAQ018V (a1a2);
    BDIT1V ON TAQ018M (a1p2);

    BDIT3M ON TAQ018M@0 (a2a1);
    BDIT3M ON TAQ018V (a2p1);

    BDIT3V ON TAQ018V (a2a2);
    BDIT3V ON TAQ018M (a2p2);

    BDIT3V ON BDIT1V (a2ba1);
    BDIT3M ON BDIT1M (a2ba2);

    BDIT3V ON BDIT1M@0 (a2bp1);
    BDIT3M ON BDIT1V@0 (a2bp2);

    TAQ018M with TAQ018V;
    BDIT1M with BDIT1V;
    BDIT3M with BDIT3V;
    PSI_M_PD with PSI_V_PD;

  Model constraint:
      new (a1a2_a2ba1_b2p1);
      a1a2_a2ba1_b2p1 = a1a2 * a2ba1 * b2p1;

      new (a2p2_b2a2);
     a2p2_b2a2 = a2p2 * b2a2;

      new (a2p1_b2a1);
      a2p1_b2a1 = a2p1 * b2a1;

      new (a2p2_b2p1);
      a2p2_b2p1 = a2p2 * b2p1;

OUTPUT:
STDYX SAMPSTAT res cinterval;
```

Table B1 depicts unstandardized and standardized coefficients of all APIMeMs. Kenny et al. (2006) suggested that unstandardized coefficients not be used for greater comparability of both partners estimates. On comparing unstandardized and standardized estimates, interpretations of the effects of differences in the mother and father effects did not differ. Table B2 lists the correlations of error terms of the dependent variables in all APIMs and APIMeMs.

Table B1

*Detailed information on APIMs and APIMeMs including unstandardized coefficients (beta, standard error) standardized coefficients (ß, standard error) and p-values.*

| Effect | Unstandardized estimate beta | SE unstandardized | *p* | Standard estimate ß | SE standardized |
|---|---|---|---|---|---|
| **APIM Parent Domain** | | | | | |
| X → Y | | | | | |
| Actor Effect M | .384 | .171 | .024 | .248 | .109 |
| Actor Effect F | .368 | .121 | .002 | .222 | .069 |
| Partner Effect M | .026 | .123 | .836 | .011 | .053 |
| Partner Effect F | .249 | .094 | .008 | .228 | .007 |
| **APIM Child Domain** | | | | | |
| X → Y | | | | | |
| Actor Effect M | .202 | .090 | .025 | .186 | .087 |
| Actor Effect F | .115 | .105 | .274 | .078 | .071 |
| Partner Effect M | .089 | .214 | .415 | .054 | .130 |
| Partner Effect F | .243 | .075 | .001 | .249 | .075 |
| **Model 1: NCE → prenatal depression → parenting stress – Parent Domain (PD)** | | | | | |
| X → M1 | | | | | |
| Actor Effect M | .120 | .028 | <.001 | .406 | .125 |
| Actor Effect F | .108 | .042 | .011 | .333 | .154 |
| Partner Effect M | .015 | .020 | .462 | .033 | .047 |
| Partner Effect F | .037 | .029 | .194 | .176 | .122 |
| M1→ Y | | | | | |
| Actor Effect M | 1.939 | .329 | <.001 | .369 | .065 |
| Actor Effect F | 1.248 | .426 | .003 | .244 | .063 |
| Partner Effect M | .090 | .823 | .913 | .012 | .115 |
| Partner Effect F | .553 | .284 | .051 | .149 | .080 |
| X → Y | | | | | |
| Actor Effect M | .149 | .159 | .346 | .096 | .103 |
| Actor Effect F | .226 | .120 | .060 | .136 | .072 |
| Partner Effect M | -.012 | .106 | .906 | -.005 | .045 |
| Partner Effect F | .136 | .112 | .226 | .125 | .101 |
| **Model 2: NCE → postnatal depression → parenting stress – Parent Domain (PD)** | | | | | |
| X → M2 | | | | | |
| Actor Effect M | .033 | .015 | .022 | .143 | .062 |
| Actor Effect F | .076 | .021 | <.001 | .257 | .074 |
| Partner Effect M | .053 | .027 | .050 | .149 | .076 |
| Partner Effect F | .064 | .022 | .004 | .328 | .099 |
| M2 → Y | | | | | |
| Actor Effect M | 2.436 | .626 | <.001 | .367 | .085 |
| Actor Effect F | 1.897 | 1.035 | .067 | .338 | .166 (p=.042) |
| Partner Effect M | 1.269 | .616 | .039 | .159 | .077 |
| Partner Effect F | .599 | .447 | .180 | .128 | .182 |
| X → Y | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Actor Effect M | .223 | .210 | .289 | .144 | .136 |
| Actor Effect F | .191 | .115 | .097 | .115 | .069 |
| Partner Effect M | -.196 | .157 | .211 | -.083 | .067 |
| Partner Effect F | .109 | .095 | .250 | .100 | .086 |
| **Model 3: NCE → prenatal depression → parenting stress – Child Domain (CD)** | | | | | |
| X → M1 | | | | | |
| Actor Effect M | .120 | .028 | <.001 | .406 | .125 |
| Actor Effect F | .108 | .042 | .011 | .333 | .154 |
| Partner Effect M | .015 | .020 | .461 | .033 | .047 |
| Partner Effect F | .037 | .029 | .194 | .176 | .122 |
| M1 → Y | | | | | |
| Actor Effect M | .858 | .348 | .014 | .234 | .089 |
| Actor Effect F | .173 | .277 | .532 | .038 | .059 |
| Partner Effect M | -.279 | .474 | .556 | -.055 | .091 |
| Partner Effect F | 1.192 | .253 | <.001 | .360 | .078 |
| X → Y | | | | | |
| Actor Effect M | .109 | .060 | .070 | .100 | .056 |
| Actor Effect F | .079 | .128 | .539 | .053 | .087 |
| Partner Effect M | .106 | .178 | .550 | .065 | .108 |
| Partner Effect F | .095 | .079 | .229 | .096 | .079 |
| **Model 4: NCE → postnatal depression → parenting stress – Child Domain (CD)** | | | | | |
| X → M2 | | | | | |
| Actor Effect M | .033 | .015 | .022 | .143 | .062 |
| Actor Effect F | .076 | .021 | <.001 | .257 | .074 |
| Partner Effect M | .053 | .027 | .050 | .149 | .076 (p=.048) |
| Partner Effect F | .064 | .022 | .004 | .328 | .099 |
| M2 → Y | | | | | |
| Actor Effect M | .626 | .450 | .164 | .135 | .099 |
| Actor Effect F | 1.106 | .408 | .007 | .220 | .081 |
| Partner Effect M | .871 | .847 | .304 | .156 | .151 |
| Partner Effect F | .666 | .324 | .040 | .160 | .079 |
| X → Y | | | | | |
| Actor Effect M | .124 | .145 | .394 | .114 | .137 |
| Actor Effect F | -.006 | .128 | .961 | -.004 | .087 |
| Partner Effect M | -.008 | .195 | .969 | -.004 | .120 |
| Partner Effect F | .151 | .088 | .088 | .154 | .089 |
| **Model 5: NCE → prenatal depression → postnatal depression → parenting stress – Parent Domain (PD)** | | | | | |
| X → M1 | | | | | |
| Actor Effect M | .120 | .028 | <.001 | .406 | .125 |
| Actor Effect F | .108 | .042 | .011 | .333 | .154 |
| Partner Effect M | .015 | .020 | .461 | .033 | .047 |
| Partner Effect F | .037 | .029 | .194 | .176 | .122 |
| X → M2 | | | | | |
| Actor Effect M | .001 | .019 | .939 | .006 | .079 |
| Actor Effect F | .038 | .024 | .110 | .129 | .079 |
| Partner Effect M | .051 | .030 | .093 | .143 | .084 |
| Partner Effect F | .045 | .017 | .007 | .233 | .078 |
| M1→ M2 | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Actor Effect M | .273 | .056 | <.001 | .343 | .067 |
| Actor Effect F | .344 | .068 | <.001 | .377 | .061 |
| Partner Effect M | -.017 | .107 | .875 | -.015 | .097 |
| Partner Effect F | .048 | .056 | .397 | .072 | .089 |
| M1 → Y | | | | | |
| Actor Effect M | 1.348 | .349 | <.001 | .257 | .071 |
| Actor Effect F | .723 | .320 | .024 | .141 | .066 |
| Partner Effect M | -.356 | .816 | .662 | -.049 | .110 |
| Partner Effect F | .338 | .306 | .270 | .091 | .082 |
| M2 → Y | | | | | |
| Actor Effect M | 1.927 | .664 | .004 | .290 | .093 |
| Actor Effect F | 1.559 | 1.113 | .162 | .278 | .184 |
| Partner Effect M | 1.344 | .688 | .051 | .168 | .083 (p=.044) |
| Partner Effect F | .510 | .426 | .231 | .109 | .092 |
| X → Y | | | | | |
| Actor Effect M | .087 | .180 | .628 | .056 | .117 |
| Actor Effect F | .137 | .125 | .272 | .083 | .076 |
| Partner Effect M | -.154 | .125 | .218 | -.066 | .054 |
| Partner Effect F | .067 | .107 | .534 | .061 | .097 |
| **Model 6: NCE → prenatal depression → postnatal depression → parenting stress – Child Domain (CD)** | | | | | |
| X → M1 | | | | | |
| Actor Effect M | .120 | .028 | <.001 | .406 | .125 |
| Actor Effect F | .108 | .042 | .011 | .333 | .154 |
| Partner Effect M | .015 | .020 | .461 | .033 | .047 |
| Partner Effect F | .037 | .029 | .194 | .176 | .122 |
| X → M2 | | | | | |
| Actor Effect M | .001 | .019 | .939 | .006 | .079 |
| Actor Effect F | .038 | .0234 | .110 | .129 | .079 |
| Partner Effect M | .051 | .030 | .093 | .143 | .084 |
| Partner Effect F | .045 | .017 | .007 | .233 | .078 |
| M1→ M2 | | | | | |
| Actor Effect M | .273 | .056 | <.001 | .343 | .067 |
| Actor Effect F | .344 | .068 | <.001 | .377 | .061 |
| Partner Effect M | -.017 | .107 | .875 | -.015 | .097 |
| Partner Effect F | .048 | .056 | .397 | .072 | .089 |
| M1 → Y | | | | | |
| Actor Effect M | .717 | .381 | .059 | .195 | .098 (p=.047) |
| Actor Effect F | -.200 | .278 | .471 | -.044 | .062 |
| Partner Effect M | -.675 | .333 | .043 | -.133 | .061 |
| Partner Effect F | 1.062 | .262 | <.001 | .321 | .079 |
| M2 → Y | | | | | |
| Actor Effect M | .330 | .441 | .454 | .071 | .096 |
| Actor Effect F | 1.124 | .428 | .009 | .224 | .085 |
| Partner Effect M | 1.129 | .814 | .165 | .202 | .146 |
| Partner Effect F | .260 | .313 | .407 | .063 | .076 |
| X → Y | | | | | |
| Actor Effect M | .056 | .093 | .547 | .051 | .086 |
| Actor Effect F | .020 | .132 | .880 | .014 | .090 |
| Partner Effect M | .052 | .166 | .756 | .032 | .101 |
| Partner Effect F | .044 | .084 | .603 | .044 | .085 |

*Note*. SE= standard error; X= independent variable = TAQ = Trauma Antecedents Questionnaire; M1= mediator 1 = prenatal BDI = Beck Depression Inventory; M2= mediator 2 = postnatal BDI = Beck Depression Inventory; Y= dependent variable = Parenting Stress Index (Parent or Child Domain); the p-value of standardized results is also listed if the level of significance differed from the p-value of unstandardized results.

Table B2

*Correlation of error terms of the outcome variables parenting stress and depressive symptomatology, pre- and postnatally*

| Model | PSI error term | BDI pre error term | BDI post error term |
|---|---|---|---|
| APIM Parent Domain | .19 (.06)** | | |
| APIM Child Domain | .50 (.05)*** | | |
| APIMeM | | | |
| Model 1 | .15 (.09)† | .02 (.05) | |
| Model 2 | .09 (.08) | | .12 (.10) |
| Model 3 | .47 (.05)*** | .02 (.05) | |
| Model 4 | .47 (.05)*** | | .12 (.10) |
| Model 5 | .08 (.09) | .02 (.05) | .12 (.08) |
| Model 6 | .45 (.05)*** | .02 (.05) | .12 (.08) |

*Note*. †$p < .10$, *$p < .05$, ** $p < .01$, *** $p < .001$.

# Danksagung

Von Herzen danke ich so einigen wundervollen Menschen, die mich auf dem langen Weg der Dissertation begleitet haben:

Meinem Ehemann, Henning, der mich auf meinem Weg von Anfang des Projekts bis zur Abgabe bestärkt hat und mich durch so einige Durststrecken begleitet hat.

Meinen Eltern, die mich ermutigt haben den Weg der Dissertation einzuschlagen und nie die Überzeugung und den Glauben verloren haben, dass ich zum Ziel komme.

Meiner Forschungskollegin, Julia, die mich in die Forschungstätigkeit eingeführt hat und mich über all die Jahre mit Engagement und wertvollem fachlichen Feedback und Austausch gefördert hat.

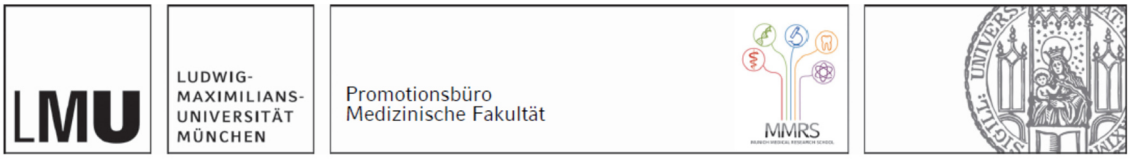
Dem unvergleichlichen Kipsy-Forschungsteam, mit dem wir gekonnt durch so manch hohe Wellen und Stürme der Forschungsprojekte manövriert sind. Die tolle Zusammenarbeit, den Teamgeist, den Zusammenhalt und die tollen Unternehmungen möchte ich nicht missen.

Herrn Prof. Dr. Brisch für die fachkundige und wertschätzende Betreuung und Beratung zur Dissertation und zu meiner wissenschaftlichen Tätigkeit im Allgemeinen.

Erik Danay für die kompetente Beratung und den Austausch zur statistischen Analyse der Daten.

Mike Irvine für die Korrektur der englischen Sprache.

# Affidavit




## Eidesstattliche Versicherung

Landers, Swinde
Name, Vorname

Ich erkläre hiermit an Eides statt, dass ich die vorliegende Dissertation mit dem Titel:

*Negative childhood experiences of parents and parenting stress: A dyadic analysis of couple interdependence and the mediating effects of perinatal depressive mood*

selbständig verfasst, mich außer der angegebenen keiner weiteren Hilfsmittel bedient und alle Erkenntnisse, die aus dem Schrifttum ganz oder annähernd übernommen sind, als solche kenntlich gemacht und nach ihrer Herkunft unter Bezeichnung der Fundstelle einzeln nachgewiesen habe.

Ich erkläre des Weiteren, dass die hier vorgelegte Dissertation nicht in gleicher oder in ähnlicher Form bei einer anderen Stelle zur Erlangung eines akademischen Grades eingereicht wurde.

München, 23.02.2022
Ort, Datum

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